



# City of Grand Island

Tuesday, May 10, 2022

Council Session

## Item G-4

### **#2022-124 - Considering the Adoption of the 2022 Hazard Mitigation Plan**

Staff Contact: Jon Rosenlund

# **Council Agenda Memo**

**From:** Jon Rosenlund, Director of Emergency Management

**Meeting:** May 10, 2022

**Subject:** Approving the Adoption of the 2022 Hazard Mitigation Plan

**Presenter(s):** Jon Rosenlund, Director of Emergency Management

## **Background**

The Federal Disaster Mitigation Act of 2000 requires that local jurisdictions have a Hazard Mitigation Plan in order to identify local hazards and methods that these hazards could be mitigated. Working with the Central Platte Natural Resources District, Hall County, the City of Grand Island and other Hall County jurisdictions have completed an update of the local Hazard Mitigation Plan for adoption by the City. This Plan adoption is valid with FEMA for 5 years.

## **Discussion**

The Federal Disaster Mitigation Act of 2000 requires that local jurisdictions have a Hazard Mitigation Plan in order to identify local hazards and methods that these hazards could be mitigated. Plans are reviewed by the Nebraska Emergency Management Agency and then the Federal Emergency Management Agency (FEMA). Once approved by FEMA, the plan is valid for 5 years and must be renewed following that time.

Working with the Central Platte Natural Resources District, Hall County, the City of Grand Island and other Hall County political subdivisions have completed an update of the local Hazard Mitigation Plan. This plan includes the efforts and information for many jurisdictions along the Central Platte River and received input from dozens of jurisdictions.

Mitigation projects identified in the Plan are not a requirement for the City to complete, nor in a specified time, but are the City's stated priorities for mitigation efforts in the event that resources and opportunities avail themselves. Thus, the City is not committed to any specific expenditures by adopting this Plan, but projects identified therein are eligible for Federal and State grant funding. This Plan adoption is valid with FEMA for 5 years and will be reviewed and renewed in 5 years' time. Failure to have an adopted

hazard mitigation plan will make a jurisdiction ineligible for FEMA post disaster funding in case of a major disaster.

### **Alternatives**

It appears that the Council has the following alternatives concerning the issue at hand. The Council may:

1. Move to approve
2. Refer the issue to a Committee
3. Postpone the issue to future date
4. Take no action on the issue

### **Recommendation**

City Administration recommends that the Council adopt the 2022 Hazard Mitigation Plan.

### **Sample Motion**

Move to approve the adoption of the 2022 Hazard Mitigation Plan.

# Regional Planning Team

Name	Title	Jurisdiction
Jesse Mintken	Assistant Manager	Central Platte NRD
Darrin Lewis	Emergency Manager	Buffalo County
Brian Woldt	Emergency Manager	Dawson County
Jon Rosenlund	Emergency Manager	Hall County
Chad Nabity	Floodplain Administrator	Hall County
Jenna Clark	Emergency Manager	Merrick County/Region 44
Bob Carey	Emergency Manager	Polk County
*Becky Appleford	Project Coordinator	JEO Consulting Group Inc.
*Karl Dietrich	Planner	JEO Consulting Group Inc.
*Kayla Vondracek	Planner	JEO Consulting Group Inc.
*Lexy Hindt	Planning Specialist	NEMA
*Adele Phillips	Floodplain Mitigation Planner	NeDNR

*\*Served as an advisory or consultant role.*



# Executive Summary

## Introduction

This plan is an update to the Central Platte Natural Resources District (CPNRD) Hazard Mitigation Plan (HMP) approved in 2017. The plan update was developed in compliance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000).

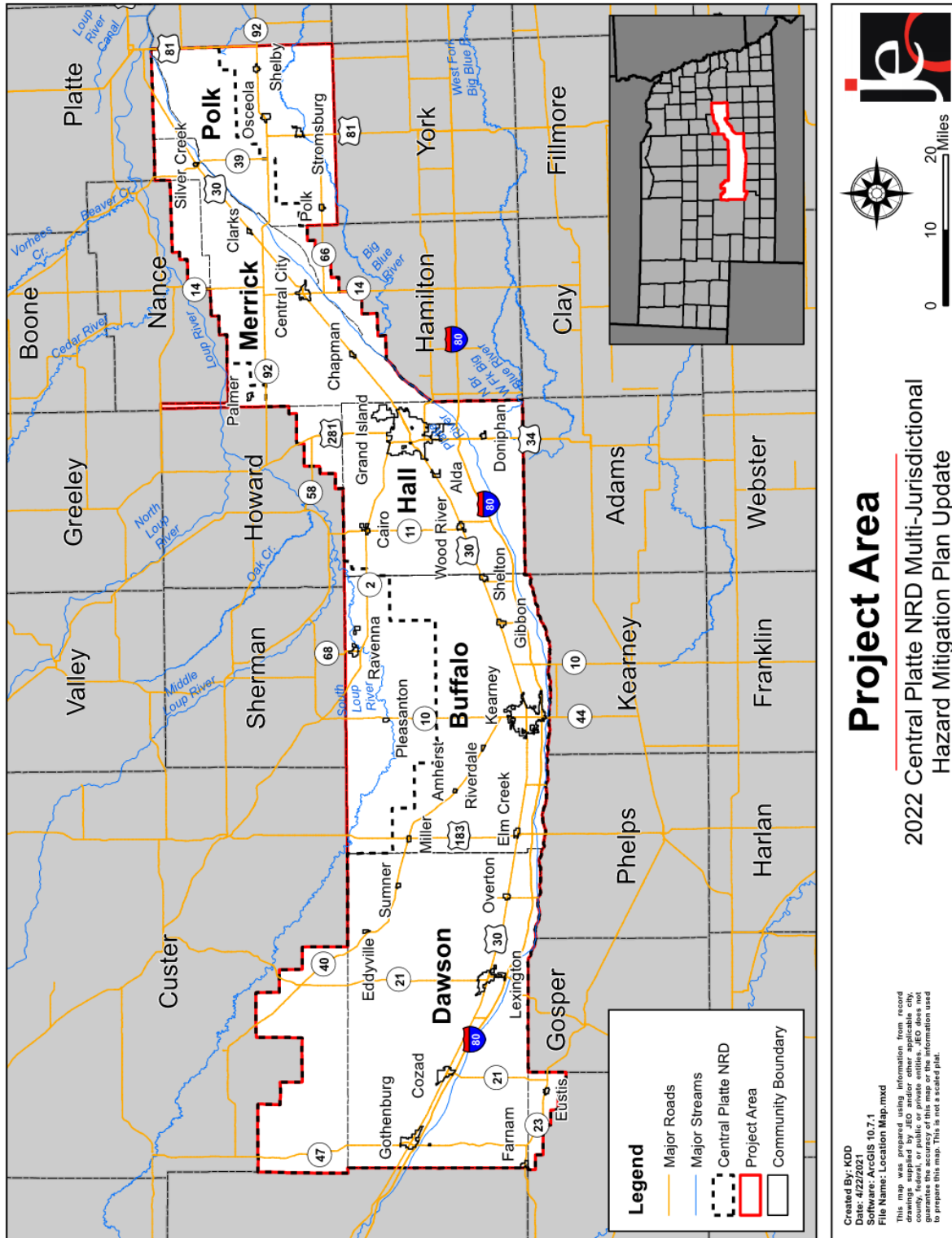
Hazard mitigation planning is a process in which hazards are identified and profiled; people and facilities at-risk are identified and assessed for threats and potential vulnerabilities; and strategies and mitigation measures are identified. Hazard mitigation planning increases the ability of communities to effectively function in the face of natural and human-caused disasters. The goal of the process is to reduce risk and vulnerability, in order to lessen impacts to life, the economy, and infrastructure. Plan participants are listed in the following table and illustrated in the following planning area map.

**Table 1: Participating Jurisdictions**

Participating Jurisdictions	
<b>Central Platte NRD</b>	City of Osceola
<b>Buffalo County</b>	Village of Polk
Village of Amherst	Village of Shelby
Village of Elm Creek	City of Stromsburg
City of Gibbon	Village of Eustis (Frontier County)
City of Kearney	<b>Special Jurisdictions</b>
Village of Pleasanton	Central City Fire District
City of Ravenna	Central City Public Schools
Village of Riverdale	Central District Health Department
Village of Shelton	Centura Public Schools
<b>Dawson County</b>	Cross Country Community Schools
City of Cozad	Doniphan Fire District
Village of Eddyville	Dawson County Drainage District No.2
Village of Farnam	Dawson County Drainage District No.3
City of Gothenburg	Dawson County Drainage District No.4
City of Lexington	Eddyville Fire District
Village of Overton	Elm Creek Fire District
Village of Sumner	Elm Creek Public Schools
<b>Hall County</b>	Gibbon Volunteer Fire District
Village of Alda	Gibbon Public Schools
Village of Cairo	Kearney Public Schools
Village of Doniphan	Lexington Fire District
City of Grand Island	Lexington Public Schools
City of Wood River	Pleasanton Fire District
<b>Merrick County</b>	Pleasanton Public Schools
Central City	Ravenna Public Schools
Village of Chapman	Shelton Public Schools
Village of Clarks	University of Nebraska – Kearney

Participating Jurisdictions	
Village of Silver Creek Polk County	Wood River Rural Schools

Figure 1: Project Area



## Goals and Objectives

The potential for disaster losses and the probability of occurrence of natural and human-caused hazards present a significant concern for the jurisdictions participating in this plan. The driving motivation behind this hazard mitigation plan is to reduce vulnerability and the likelihood of impacts to the health, safety, and welfare of all citizens in the planning area. To this end, the Regional Planning Team reviewed and approved goals which helped guide the process of identifying both broad-based and community-specific mitigation strategies and projects that will, if implemented, reduce their vulnerability and help build stronger, more resilient communities.

Goals from the 2017 HMP were reviewed, and the Regional Planning Team agreed that they are still relevant and applicable for this plan update with some modifications. The planning team requested the language in Goals one, two, and three was changed from “Natural Hazard Events” to “All Hazard Events.” Goal four was added to encompass plan integration in the planning process better. Objective 1.11 was added to include more specific language on addressing cyber security threats in the planning area. Objective 1.12 and Objective 1.13 were included to enhance the understanding of risks from specific hazards. Jurisdictions that participated in this plan update agreed that the updated goals identified in 2017 would be carried forward and utilized for the 2022 plan. The goals for this plan update are as follows:

### **Goal 1: Protect the Health and Safety of Residents from All Hazard Events**

Objective 1.1: Provide Adequate Public Safe Rooms and Post-Disaster Storm Shelters

Objective 1.2: Improve/Provide Adequate Backup and Emergency Generators

Objective 1.3: Improve Warning Systems

Objective 1.4: Improve Emergency Communication Systems

Objective 1.5: Improve Electrical Service

Objective 1.6: Develop Emergency Snow/Evacuation Routes

Objective 1.7: Study/Improve Drinking Water Supply

Objective 1.8: Reduce Water Demand/Improve Drought Education

Objective 1.9: Improve Response to Hazard Materials (Hazmat) Incidents

Objective 1.10: Improve Flood/Dam Failure Warning System

Objective 1.11: Improve Cyber Security Measures

Objective 1.12: Develop Hazard Specific Plans, Conduct Studies, or Assessments

Objective 1.13: Enact or Update Ordinances, Permits, Laws, or Regulations

### **Goal 2: Protect Existing and New Properties from All Hazard Events**

Objective 2.1: Reduce Bottleneck/Flow Restrictions

Objective 2.2: Reduce Wildfire Damage

Objective 2.3: Reduce Stormwater Damage

Objective 2.4: Develop/Update Floodplain Information

Objective 2.5: Reduce Damages in Floodplain

Objective 2.6: Facility Flood Proofing

Objective 2.7: Reduce Tree Damage & Damage from Trees

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Objective 2.8: Evaluate Stream Channelization/Bank Stabilization

Objective 2.9: Improve Construction Standards and Building Survivability

Objective 2.10: Evaluate and Improve Berm, Floodwall and/or Levee

### Goal 3: Increase Public Awareness and Educate About All Hazard Events

Objective 3.1: Community Education and Awareness

Objective 3.2: Increase Soil and Water Conservation

### Goal 4: Enhance Overall Resilience and Promote Sustainability

Objective 4.1: Incorporate Hazard Mitigation and Adaptation into Updating Other Existing Planning Endeavors (e.g., Comprehensive Plans, Zoning Ordinance, Subdivision Regulations, etc.)

## Summary of Changes

The hazard mitigation planning process undergoes several changes during each plan update to best accommodate the planning area and specific conditions. Changes from the 2017 Hazard Mitigation Plan and planning process in this update included: greater efforts to reach and include stakeholder groups, effort to include all taxing authorities as participants; a more specific hazard risk assessment applicable to the planning area; updated and added new goals and objectives, changed any mention of natural hazards to all-hazards within the goals and objectives, and included additional mitigation strategies. This update also works to unify the various planning mechanisms in place throughout the participating communities (i.e. comprehensive plans, local emergency operation plans, zoning ordinances, building codes, etc.) to ensure that the goals and objectives identified in those planning mechanisms are consistent with the strategies and projects included in this plan. Other changes as are described in the table below.

**Table 2: 2017 Plan Comments and Revisions**

Comment/Revision from 2017 Review Tool	Location of Revision	Summary of Change
Hall County was included in the West Fork Big Blue Watershed Risk MAP project and several Risk MAP products are available, including a Flood Risk Database. In future updates, the planning team is encouraged to make use of this information.	Flooding Risk Assessment	Risk MAP products and maps have been included in this update of the plan.
Greater discussion as to how each community prioritized mitigation activities would give insight into the deliberative process and serve as a foundation for future decision making.	Section Five: Mitigation Strategy	Language was updated to provide a better insight as to how mitigation action priority levels were determined by each participant.
The Village of Farnam (and a few others) profile(s) indicate(s), "No other examples of plan integration were identified, and there are currently no plans to further integrate planning mechanisms." However, the village is likely already integrating a number of mitigation goals/actions into existing planning mechanisms such as: annual budgets, maintenance plans, public information programs, grant applications, etc., and should consider taking credit for these activities.	Individual Participant Sections	All planning participants were asked to complete a new Plan Integration Worksheet in order to identify planning documents where plan integration has taken place.

Comment/Revision from 2017 Review Tool	Location of Revision	Summary of Change
Several jurisdictions have one or more actions in their mitigation strategies that are emergency response or operations preparedness in nature. These need not be removed from the plan but are not considered mitigation actions. In future updates, jurisdictions are encouraged to focus their strategies on mitigation projects, particularly those eligible for funding under HMA.	Individual Participant Sections	All planning participants were asked to update their mitigation actions from the previous plan and identify new mitigation actions. While discussion focused on actions eligible for funding under HMA, all types of mitigation actions were identified as the HMP may be utilized for other funding opportunities.

It should be noted as well that due to the coronavirus disease 2019 (COVID-19), some adjustments were made to the planning process to appropriately accommodate plan meeting dates and requirements. To accommodate those that were uncomfortable attending in person meetings, Hybrid meetings with options to join in person, online, or by phone were utilized. In addition, an all-virtual meeting option was also given. Additional changes are described in Section Two.

## Plan Implementation

Various communities across the planning area have implemented hazard mitigation projects following the 2017 Hazard Mitigation Plan. A few examples of completed projects include improving warning systems, reducing tree damage, installing storm shelters, purchasing equipment, mapping infrastructure, and others. In order to build upon these prior successes and to continue implementation of mitigation projects, despite limited resources, communities will need to continue relying upon multi-agency coordination as a means of leveraging resources. Communities across the region have been able to work with a range of entities to complete projects; potential partners for future project implementation include but are not limited to: Nebraska Forest Service (NFS), Nebraska Department of Transportation, Nebraska Department of Natural Resources (NeDNR), Nebraska Emergency Management Agency (NEMA), United States Department of Agriculture (USDA), and United States Army Corps of Engineers (USACE).

## Hazard Profiles

The hazard mitigation plan includes a description of the hazards considered, including a risk and vulnerability assessment. Data considered during the risk assessment process include: historic occurrences and recurrence intervals; historic losses (physical and monetary); impacts to the built environment (including privately-owned structures as well as critical facilities); and the local risk assessment. The following tables provide an overview of the risk assessment for each hazard and the losses associated with each hazard.

**Table 3: Hazard Occurrences**

Hazard	Previous Occurrence Events/Years	Approximate Annual Probability	Likely Extent
<b>Animal and Plant Disease</b>	Animal: 98/7 Plant: 59/20	Animal 100% Plant 75%	~33 animals per event Crop damage or loss
<b>Dam Failure</b>	6/130	5%	Varies by structure
<b>Drought</b>	444/1,513 months	29%	D1-D4
<b>Earthquakes</b>	1/120	Less than 1%	Less than 5.0 on the Richter Scale
<b>Extreme Heat</b>	Avg 5 days per year >100°F	78%	>100°F
<b>Flooding</b>	84/26	65%	Some inundation of structures (22.6% of structures) and roads near streams. Some evacuations of people may be necessary (19.4% of population)
<b>Grass/Wildfires</b>	1,460/21	100%	Avg 32.3 acres Some homes and structures threatened or at risk
<b>Hazardous Materials Release</b>	Fixed Site: 176/31 Transportation: 183/51	100% 65%	Avg Liquid Spill
			277 gal
			Avg Gas Spill
			440 gal
<b>Levee Failure</b>	0/120	Less than 1%	Varies by extent
<b>Public Health Emergency</b>	2	Unknown	Varies by extent
<b>Severe Thunderstorms</b>	1,599/26	100%	≤3.71" rainfall Avg 57 mph winds
<b>Severe Winter Storms</b>	513/26	100%	0.25" – 1.5" Ice
			30°-70° below zero (wind chill)
			2-18" snow
			20-90 mph winds
<b>Terrorism</b>	1/48	Less than 1%	Varies by event
<b>Tornadoes and High Winds</b>	258/26	92%	Avg: EF0 Range EF0-EF3

The following table provides loss estimates for hazards with sufficient data. Description of major events are included in *Section Seven: Community Profiles*.



**Table 4: Hazard Loss History**

Hazard Type		Count	Property Damage	Crop Damage <sup>2</sup>
<b>Animal and Plant Disease</b>	Animal Disease <sup>1</sup>	98	3,303 animals	N/A
	Plant Disease <sup>2</sup>	59	N/A	\$770,256
<b>Dam Failure<sup>5</sup></b>		6	N/A	N/A
<b>Drought<sup>6</sup></b>		444 of 1,513 months	\$0	\$76,993,162
<b>Earthquakes<sup>12</sup></b>		1	\$0	N/A
<b>Extreme Heat<sup>7</sup></b>		Avg. 5 Days a Year	N/A	\$25,937,061
<b>Flooding<sup>8</sup></b>	Flash Flood	47	\$42,655,000	\$4,140,050
	Flood	37	\$9,118,000	
<b>Grass/Wildfires<sup>9</sup></b> <i>7 injuries</i> <i>3 fatalities</i>		1,460	41,435 acres	\$248,598
<b>Hazardous Materials Release</b>	Fixed Site <sup>3</sup>	176	\$0	N/A
	Transportation <sup>4</sup>	183	\$1,325,150	N/A
<b>Levee Failure<sup>11</sup></b>		0	\$0	N/A
<b>Public Health Emergency</b>		2	N/A	N/A
<b>Severe Thunderstorms<sup>8</sup></b> <i>25 injuries</i>	Thunderstorm Wind Range: 57 Average: 50-92	540	\$34,940,000	\$190,074,924
	Hail Range: 0.75-5.0 in. Average: 1.2 in	957	\$117,794,000	
	Heavy Rain	94	\$587,000	
	Lightning	8	\$492,000	
	Blizzard	50	\$905,000	
<b>Severe Winter Storms<sup>8</sup></b> <i>12 injuries</i> <i>4 fatalities</i>	Extreme Cold/Wind Chill	17	\$0	\$3,613,366
	Heavy Snow	16	\$0	
	Ice Storm	35	\$23,325,000	
	Winter Storm	216	\$1,265,000	
	Winter Weather	179	\$160,000	
<b>Terrorism<sup>10</sup></b>		1	\$0	N/A
<b>Tornadoes and High Winds<sup>8</sup></b> <i>10 injuries</i>	Tornadoes Range: EF0-EF3 Average: EF0	68	\$30,425,000	\$6,490,000
	High Winds Range: 50 kts Average: 35-70 kts	190	\$5,966,400.00	\$24,439,112
<b>Total</b>		<b>4,440</b>	<b>\$268,957,550</b>	<b>\$332,706,530</b>

N/A: Data not available

1 - NDA, 2014 – April 2021

2 - USDA RMA, 2000 – 2020

3 - NRC, 1990 – February 2020

4 - PHMSA, 1971 – June 2021

5 – DNR Communication, July 2021

6 - NOAA, 1895 – January 2021

7 - NOAA Regional Climate Center, 1878 – June 2021

8 - NCEI, 1996 – June 2021

9 - NFS, 2000 - 2020

10 - University of Maryland, 1970-2018

11 – USACE NLN, 1900 – June 2021

12 – USGS, 1900 – June 2021

Events like wildfires, severe thunderstorms, and severe winter storms will occur annually. Other hazards like drought, dam failure, and terrorism will occur less often. The scope of events and how they will manifest themselves locally is not known regarding hazard occurrences. Historically, drought, flooding, severe thunderstorms, and tornadoes and high winds have resulted in the most significant damages within the planning area. These hazards are summarized below.

### **Drought**

Drought is a regular and reoccurring phenomenon in the planning area and the State of Nebraska. Historical data shows that drought has occurred with regularity across the planning area and recent research indicates that trend will continue and potentially intensify. The most common impacts of drought affect the agricultural sector. Over \$76 million in total crop loss was reported for the planning area since 2000.

Prolonged drought events can have a profound effect on the planning area and individual communities within it. Expected impacts from prolonged drought events include but are not limited to economic loss in the agricultural sector; loss of employment in the agricultural sector; and limited water supplies (drinking and fire suppression).

### **Flooding**

Flash flooding and riverine flooding are common for the planning area due to the regular occurrence of severe thunderstorms in spring and summer, the proximity of rivers to many communities, and aged or undersized stormwater drainage infrastructure. Flooding can occur on a local level, only affecting a few streets, but can also extend throughout an entire district, affecting whole drainage basins. The National Centers for Environmental Information (NCEI) has recorded 47 flash flood and 37 flood events in 26 years. All together flooding has caused over \$51 million in property damages and \$4 million in total crop loss for the planning area since 1996.

### **Severe Thunderstorms**

Thunderstorms are generally large in magnitude, have a long duration, and travel across large areas and through multiple jurisdictions within a single region. Additionally, thunderstorms often occur in series, with one area potentially impacted multiple times in one day and producing a range of associated hazards, including strong winds, heavy rain, and lightning strikes. Severe thunderstorms are most likely to occur between April and October, with the highest number of events happening in May. The NCEI recorded 1,599 severe thunderstorm events in 26 years across the five-county planning area. These events caused over \$153 million in property damages. Typical impacts resulting from severe thunderstorms include but are not limited to: loss of power; obstruction of transportation routes; grass/wildfires starting from lightning strikes; localized flooding; and damages discussed in the hazard profiles for hail and high winds.

Vulnerable populations related to severe thunderstorms include residents of mobile homes (10% of housing units), citizens with decreased mobility, and those caught outside during storm events. Most residents within the planning area are familiar with severe thunderstorms and know how to prepare and respond to events appropriately.

### **Tornadoes and High Winds**

Tornadoes and high winds are an annual occurrence for the planning area. Tornadoes are known for high winds and a spinning vortex of air. Tornadoes and high winds typically occur between May and July. The NCEI reported 258 tornado and high wind events that caused over \$36 million in property damages in 24 years. Impacts resulting from tornadoes and high winds include but



are not limited to: closure of transportation routes; downed power lines and power outages; collapsed roofs; and closure of critical facilities.

The most vulnerable citizens within the planning area are the elderly, individuals without basements or shelters, residents of mobile homes, citizens with decreased mobility, and those caught outside during storm events.

## Mitigation Strategies

There are a wide variety of strategies that can be used to reduce the impacts of hazards for the built environment and planning area residents. *Section Five: Mitigation Strategy* shows the mitigation actions chosen by the participating jurisdictions to assist in preventing future losses.

# Section One: Introduction

## Hazard Mitigation Planning

Severe weather and hazardous events are occurring more frequently in our daily lives. Pursuing mitigation strategies reduces risk and is socially and economically responsible to prevent long-term risks from natural and human-caused hazard events.

Natural hazards, such as severe winter storms, high winds and tornadoes, severe thunderstorms, flooding, extreme heat, drought, agriculture diseases, and wildfires are part of the world around us. Human-caused hazards are a product of the society and can occur with significant impacts to communities. Human-caused hazards can include dam failure, hazardous materials release, transportation incidents, and terrorism. These hazard events can occur as a part of normal operation or as a result of human error. All jurisdictions participating in this planning process are vulnerable to a wide range of natural and human-caused hazards that threaten the safety of residents and have the potential to damage or destroy both public and private property, cause environmental degradation, or disrupt the local economy and overall quality of life.

The CPNRD has prepared this multi-jurisdictional hazard mitigation plan in an effort to reduce impacts from natural and human-caused hazards and to better protect the people and property of the region from the effects of these hazards. This plan demonstrates a regional commitment to reducing risks from hazards and serves as a tool to help decision makers establish mitigation activities and resources. Further, this plan was developed to ensure the counties and participating jurisdictions are eligible for federal pre-disaster funding programs and to accomplish the following objectives:

- Minimize the disruption to each jurisdiction following a disaster.
- Establish actions to reduce or eliminate future damages in order to efficiently recover from disasters.
- Investigate, review, and implement activities or actions to ensure disaster related hazards are addressed by the most efficient and appropriate solution.
- Educate citizens about potential hazards.
- Facilitate development and implementation of hazard mitigation management activities to ensure a sustainable community.



FEMA definition of  
Hazard Mitigation

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from [natural] hazards."

## Disaster Mitigation Act of 2000

The U.S. Congress passed the Disaster Mitigation Act 2000 to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act<sup>1</sup>. Section 322 of the DMA 2000 requires that state and local governments develop, adopt, and routinely update a hazard mitigation plan to remain eligible for pre- and post-disaster mitigation funding.<sup>2</sup> These funds currently include the Hazard Mitigation Grant Program (HMGP)<sup>3</sup>, Building Resilient Infrastructure and Communities (BRIC)<sup>4</sup>, and the Flood Mitigation Assistance Program (FMA)<sup>5</sup>. The Federal Emergency Management Agency (FEMA) administers these programs under the Department of Homeland Security.<sup>6</sup>

This plan was developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans. The plan shall be monitored and updated on a routine basis to maintain compliance with the legislation – Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the DMA 2000 (P.L. 106-390)<sup>7</sup> and by FEMA’s Final Rule (FR)<sup>8</sup> published in the Federal Register on November 30, 2007, at 44 Code of Federal Regulations (CFR) Part 201.

## Hazard Mitigation Assistance

On June 1, 2009, FEMA initiated the Hazard Mitigation Assistance (HMA) program integration, which aligned certain policies and timelines of the various mitigation programs. These HMA programs present a critical opportunity to minimize the risk to individuals and property from hazards while simultaneously reducing the reliance on federal disaster funds.

Each HMA program was authorized by separate legislative actions, and as such, each program differs slightly in scope and intent.

**Mitigation** is the cornerstone of emergency management. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation lessens the impact disasters have on people's lives and property through damage prevention, appropriate development standards, and affordable flood insurance. Through measures such as avoiding building in damage-prone areas, stringent building codes, and floodplain management regulations, the impact on lives and communities is lessened.  
- FEMA Mitigation Directorate

- **HMGP:** To qualify for post-disaster mitigation funds, local jurisdictions must have adopted a mitigation plan that is approved by FEMA. HMGP provides funds to states, territories, Indian tribal governments, local governments, and eligible private non-profits following a presidential disaster declaration. The DMA 2000 authorizes up to seven percent of HMGP

1 Federal Emergency Management Agency, Public Law 106-390. 2000. "Disaster Mitigation Act of 2000." Last modified September 26, 2013. <https://www.fema.gov/media-library/assets/documents/4596>.

2 Federal Emergency Management Agency. June 2007. "Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and Related Authorities." Federal Emergency Management Agency 592: 22. Sec. 322. Mitigation Planning (42 U.S.C. 5165). <https://www.fema.gov/media-library/assets/documents/15271>

3 Federal Emergency Management Agency. "Hazard Mitigation Grant Program." Last modified July 8, 2017. <https://www.fema.gov/hazard-mitigation-grant-program>.

4 Federal Emergency Management Agency. "Building Resilient Infrastructure and Communities." Last modified July 10, 2020. <https://fema.gov/bric>.

5 Federal Emergency Management Agency. "Flood Mitigation Assistance Grant Program." Last modified July 11, 2017. <https://www.fema.gov/flood-mitigation-assistance-grant-program>.

6 Federal Emergency Management Agency. "Hazard Mitigation Assistance." Last modified March 29, 2017. <https://www.fema.gov/hazard-mitigation-assistance>.

7 Federal Emergency Management Agency: Federal Register. 2002. "Section 104 of Disaster Mitigation Act 2000: 44 CFR Parts 201 and 206: Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule." <https://www.fema.gov/pdf/help/fr02-4321.pdf>.

8 Federal Emergency Management Agency: Federal Register. 2002 "44 CFR Parts 201 and 206: Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule." <https://www.fema.gov/pdf/help/fr02-4321.pdf>.

funds available to a state after a disaster to be used for the development of state, tribal, and local mitigation plans.

- **FMA:** To qualify to receive grant funds to implement projects such as acquisition or elevation of flood-prone homes, local jurisdictions must prepare a mitigation plan. Furthermore, local jurisdictions must be participating communities in the National Flood Insurance Program (NFIP). The goal of FMA is to reduce or eliminate claims under the NFIP.
- **BRIC:** To qualify for funds, local jurisdictions must adopt a mitigation plan that is approved by FEMA. BRIC assists states, territories, Indian tribal governments, and local governments in implementing a sustained pre-disaster hazard mitigation program.

## Plan Financing and Preparation

Regarding the plan financing and preparation, the CPNRD is the “sub-applicant” that is the eligible entity that submits a sub-application for FEMA assistance to the “Applicant”. The “Applicant” in this case is the State of Nebraska. If HMA funding is awarded, the sub-applicant becomes the “sub-grantee” and is responsible for managing the sub-grant and complying with program requirements and other applicable federal, state, territorial, tribal, and local laws and regulations.

# Section Two:

## Planning Process

### Introduction

The process utilized to develop a hazard mitigation plan is often as important as the final planning document. For this planning process, CPNRD adapted the four-step hazard mitigation planning process outlined by FEMA to fit the needs of the participating jurisdictions. The following pages will outline how the Regional Planning Team was established; the function of the Regional Planning Team; critical project meetings and community representatives; outreach efforts to the general public; key stakeholders and neighboring jurisdictions; general information relative to the risk assessment process; general information relative to local/regional capabilities; plan review and adoption; and ongoing plan maintenance.

**Requirement §201.6(b):** Planning process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

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

### Multi-Jurisdictional Approach

According to FEMA, “A multi-jurisdictional hazard mitigation plan is a plan jointly prepared by more than one jurisdiction.” The term ‘jurisdiction’ means ‘local government.’ Title 44 Part 201, Mitigation Planning in the CFR, defines a ‘local government’ as “any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, any rural community, unincorporated town or village, or other public entity.” For the purposes of this plan, a ‘taxing authority’ was utilized as the qualifier for jurisdictional participation. FEMA recommends the multi-jurisdictional approach under the DMA 2000 for the following reasons.

- It provides a comprehensive approach to the mitigation of hazards that affect multiple jurisdictions.
- It allows economies of scale by leveraging individual capabilities and sharing cost and resources.
- It avoids duplication of efforts.
- It imposes an external discipline on the process.

Both FEMA and NEMA recommend this multi-jurisdictional approach through the cooperation of counties, regional emergency management, and natural resources districts. CPNRD utilized the multi-jurisdiction planning process recommended by FEMA (Local Mitigation Plan Review Guide<sup>9</sup>, Local Mitigation Planning Handbook<sup>10</sup>, and Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards<sup>11</sup>) to develop this plan.

## Hazard Mitigation Planning Process

The hazard mitigation planning process as outlined by FEMA has four general steps which are detailed in the figure below. The mitigation planning process is rarely a linear process. It's common that ideas developed during the initial risk assessment may need revision later in the process, or that additional information may be identified while developing the mitigation plan or during plan implementation that results in new goals or additional risk assessments.

### Organization of Resources

- Focus on the resources needed for a successful mitigation planning process. Essential steps include: Organizing interested community members; and Identifying technical expertise needed.

### Assessment of Risk

- Identify the characteristics and potential consequences of the hazard. Identify how much of the jurisdiction can be affected by specific hazards and the potential impacts on local assets.

### Mitigation Plan Development

- Determine priorities and identify possible solutions to avoid or minimize the undesired effects. The result is the hazard mitigation plan and strategy for implementation.

### Plan Implementation and Progress Monitoring

- Bring the plan to life by implementing specific mitigation projects and changing day-to-day operations. It is critical that the plan remains relevant to succeed. Thus, it is important to conduct periodic evaluations and revisions, as needed.

## Organization of Resources

### Plan Update Process

CPNRD was awarded FEMA grant funding for their multi-jurisdictional hazard mitigation plan in October 2020. JEO Consulting Group, INC. (JEO) was contracted in January 2020 to guide and facilitate the planning process and assemble the multi-jurisdictional hazard mitigation plan. For the planning area, Jesse Mintken with CPNRD led the development of the plan and served as the primary point of contact throughout the project. A clear timeline of this plan update process is provided in Figure 2.

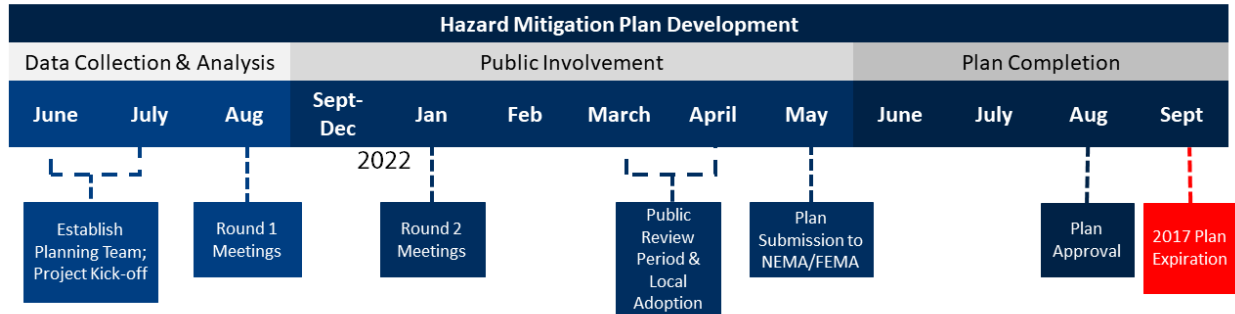
9 Federal Emergency Management Agency. 2011. "Local Mitigation Plan Review Guide." <https://www.fema.gov/media-library/assets/documents/23194>.

10 Federal Emergency Management Agency. 2013. "Local Mitigation Planning Handbook." <https://www.fema.gov/media-library/assets/documents/31598>.

11 Federal Emergency Management Agency. 2013. "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards." [https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema\\_mitigation\\_ideas\\_final508.pdf](https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema_mitigation_ideas_final508.pdf).

**Figure 2: Project Timeline**

Central Platte NRD Hazard Mitigation Plan 2022  
Project Schedule



### Planning Team

At the beginning of the planning process, CPNRD and JEO staff identified who would be the Regional Planning Team. This planning team was established to guide the planning process, review the existing plan, and serve as a liaison to plan participants throughout the planning area. A list of planning team members can be found in Table 5. Staff from NEMA and NeDNR provided additional technical support.

**Table 5: Regional Planning Team**

Name	Title	Jurisdiction
Jesse Mintken	Assistant Manager	Central Platte NRD
Darrin Lewis	Emergency Manager	Buffalo County
Brian Woldt	Emergency Manager	Dawson County
Mark Streit	Floodplain Administrator	Dawson County
Job Resenlund	Emergency Manager	Hall County
Chad Nabity	Floodplain Administrator	Hall County, Grand Island, Wood River
Jenna Clark	Emergency Manager	Merrick County/Region 44
Bob Carey	Emergency Manager	Polk County
*Becky Appleford	Project Coordinator	JEO Consulting Group
*Karl Dietrich	Planner	JEO Consulting Group
*Kayla Vondracek	Planner	JEO Consulting Group
*Lexy Hindt	Planning Specialist	NEMA
*Adele Phillips	Floodplain Mitigation Planner	NeDNR

\*Served as a consultant or advisory role.

A kick-off meeting was held on July 8, 2021, at the Central Platte NRD office in Grand Island, NE, to discuss an overview of the planning process between JEO staff and members of the Regional Planning Team. Preliminary discussion was held over hazards to be included in this plan, changes to be incorporated since the last plan, goals and objectives, identification of key stakeholders to include in the planning process, and a general schedule for the plan update. This meeting also assisted in clarifying the role and responsibilities of the Regional Planning Team and strategies for public engagement throughout the planning process. Table 6 shows kick-off meeting attendees.



**Table 6: Kick-off Meeting Attendees**

Name	Title	Jurisdiction
Becky Appleford	Project Coordinator	JEO Consulting Group
Brian Woldt	Emergency Manager	Dawson County
Chad Nabity	Floodplain Administrator	Hall County, Grand Island, Wood River
Darrin Lewis	Emergency Manager	Buffalo County
Denise Ziemba	Ex-Emergency Manager	Merrick County/Region 44
Heather Thole	Hazard Mitigation Planning Specialist	NEMA
Jesse Mintken	Assistant Manager	Central Platte NRD
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group
Lexy Hindt	Hazard Mitigation Planning Specialist	NEMA
Mark Streit	Floodplain Administrator	Dawson County

Table 7 shows the date, location, and agenda items of for the kick-off meeting.

**Table 7: Kick-off Meeting Location and Time**

Location and Time	Agenda Items
<b>Central Platte NRD</b> <b>215 Kaufman Avenue</b> <b>Grand Island, NE</b> <b>July 8, 2021</b> <b>1:00pm</b>	<ul style="list-style-type: none"> <li>-Consultant and planning team responsibilities</li> <li>-Overview of plan update process and changes from 2017 HMP</li> <li>-Review and adoption of goals and objectives</li> <li>-Plan goals/objectives</li> <li>-Hazard identification</li> <li>-Project schedule and dates/locations for public meetings</li> </ul>

## Public Involvement and Outreach

To notify and engage the public in the planning process, a wide range of stakeholder groups were contacted and encouraged to participate. There were 86 stakeholder groups or entities that were identified and sent letters to participate. Stakeholder groups that attended a Round 1 or Round 2 meeting include: Cozad Community Hospital, Grand Island Regional Medical Center, Dawson County Farm Service Agency, Emerald Nursing & Rehab Cozad, CHI Health St. Francis Medical Center / Common Spirit Health, and Azria Health Central City. Any comments these stakeholders provided were incorporated into the appropriate community profiles (see *Section Seven*). NEMA also attended meetings and provided data and guidance during the planning process. The general public was encouraged to participate through the project website by providing comments to the Regional Planning Team members. No comments were received from the general public.

**Table 8: Notified Stakeholder Groups**

Organizations		
American Red Cross of Central and Western Nebraska	Annie Jeffrey Memorial County Health Center	Avamere at Lexington
Azria Health Broadwell	Azria Health Central City	Brickford Senior Living
Brookestone Gardens	Buffalo County Community Partners	Buffalo-Sherman County Farm Service Agency
Cambridge Court	CC Live	Central Assisted Living
Central Catholic Middle & Highschool	Central City Area Chamber of Commerce	Central City Municipal Airport
Central Nebraska Regional Airport	Central Nebraska Veterans Home	CHI Health Good Samaritan
CHI Health Richard Young Behavioral Health	CHI Health St. Francis	Cottonwood Estates



Organizations		
Cozad Chamber of Commerce	Cozad Community Hospital	Cozad Municipal Airport
Crane Meadows Assisted Living	Dawson Area Development	Dawson County Farm Service Agency
Dawson Public Power District	Economic Development Council of Buffalo County	Edgewood Grand Island Senior Living
Emerald Nursing & Rehab Cozad	Emerald Nursing & Rehab Lakeview	Faith Christian School
Good Samaritan Society – Grand Island Village	Good Samaritan Society - Osceola	Good Samaritan Society – Ravenna
Good Samaritan Society – St. John's	Good Samaritan Society – St. Luke's Village	Gothenburg Chamber of Commerce
Gothenburg Memorial Hospital	Grand Island Chamber of Commerce	Grand Island Country House
Grand Island Regional Medical Center	Hall County Farm Service Agency	Heartland Lutheran High School
Hilltop Estates	Kearney Ambulatory Surgical Center	Kearney Area Chamber of Commerce
Kearney Catholic High School	Kearney Countryhouse	Kearney Regional Airport
Kearney Regional Medical Center	Kinship Pointe Northridge	Lebensraum Assisted Living
Lexington Municipal Airport	Lexington Regional Health Center	Life Essentials Assisted Living
Lizienburg Memorial County Hospital	Meadowlark Pointe Assisted Living	Merrick County Farm Service Agency
Merrick Medical Center	Midwest Covenant Home	Midwest Homestead of Kearney
Mother Hull Home	Mt Carmel Home	Nebraska Christian Schools
New Hope Christian School	Polk County Farm Service Agency	Polk County Rural Public Power District
Polk County Senior Services	Prairie View Gardens	Prairie Winds
Primrose Retirement Community of Grand Island	Ravenna Chamber of Commerce	Ridgeview Heights
Riverside Lodge	Seneca Sunrise	Stone Hearth Estates
Stromsburg Municipal Airport	The Evangelical Lutheran Good Samaritan Society	The Heritage at Sagewood
The Plaza	Tiffany Square	Trinity Lutheran School
Well-Life at Kearney	Well-Life at Plum Creek	-

### Neighboring Jurisdictions

Neighboring jurisdictions were notified and invited to participate in the planning process. The following table indicates which neighboring communities or entities were notified of the planning process. Invitation letters were sent to county emergency managers, and NRDs. The General Manager for the Tri-Basin NRD attended the Round 1 Meeting in Lexington.

**Table 9: Notified Neighboring Jurisdictions**

Notified Neighboring Jurisdictions	
Adams County	Lower Loup NRD
Butler County	Lower Platte North NRD
Clay County	Middle Republican NRD
Colfax County	Nance County
Custer County	Phelps County
Frontier County	Platte County

Notified Neighboring Jurisdictions	
Gosper County	Sherman County
Hamilton County	Tri-Basin NRD
Howard County	Twin Platte NRD
Kearney County	Upper Big Blue NRD
Lincoln County	York County

## Participant Involvement

Participants play a key role in identifying hazards, providing a record of historical disaster occurrences and localized impacts, identifying and prioritizing potential mitigation projects and strategies, and the developing annual review procedures.

To be a participant in the development of this plan update, jurisdictions were required to have, at a minimum, one representative present at the Round 1 or Round 2 meeting, watch meeting recordings, or attend a follow-up meeting with a JEO staff member. Some jurisdictions sent multiple representatives to meetings. For jurisdictions who had only one representative, they were encouraged to bring meeting materials back to their governing bodies, to collect diverse input on their jurisdiction's meeting documents. Attendance was recorded on sign-in sheets for both in-person and virtual attendees. Jurisdictions that were unable to attend the scheduled public meetings were able to request a meeting with JEO staff to satisfy the meeting attendance requirement or watch a recording of the Round 1 and Round 2 meetings. This effort enabled jurisdictions which could not attend a scheduled public meeting to participate in the planning process.

Outreach to eligible jurisdictions included notification prior to all public meetings, phone calls and email reminders of upcoming meetings, and reminders to complete worksheets required for the planning process. Table 10 provides a summary of outreach activities utilized in this process.

**Table 10: Outreach Activity Summary**

Action	Intent
<b>Project Website</b>	Informed the public and local/planning team members of past, current, and future activities ( <a href="https://jeo.com/central-platte-nrd-hazard-mitigation-plan-update">https://jeo.com/central-platte-nrd-hazard-mitigation-plan-update</a> ).
<b>Round 1 Meeting Letters and Emails (30-day notification)</b>	Sent to participants, stakeholders, and neighboring jurisdictions to discuss the agenda/dates/times/ locations of the first round of public meetings.
<b>Round 2 Meeting Letters and Emails (30-day notification)</b>	Sent to participants and stakeholders to discuss the agenda/dates/times/locations of the second round of public meetings.
<b>Notification Phone Calls</b>	Called potential participants to remind them about upcoming meetings.
<b>Follow-up Emails and Phone Calls</b>	Correspondence was provided to remind and assist participating jurisdictions with the collection and submission of required local data.
<b>Project Flyer</b>	Flyers were shared with all Regional Planning team members to distribute. Flyers were also made available to local planning team members to distribute.
<b>Word-of-Mouth</b>	Staff discussed the plan with jurisdictions throughout the planning process.

### Round 1 Meetings: Hazard Identification and Plan Integration

At the Round 1 meetings, jurisdictional representatives (i.e., the local planning teams) reviewed the hazards identified at the kick-off meeting and conducted risk and vulnerability assessments based on these hazards' previous occurrence and the communities' exposure. (For a complete list of hazards reviewed, see *Section Four: Risk Assessment*.) In addition, local planning team members evaluated potential integration of the HMP alongside other local planning mechanisms.

Due to Covid-19 numbers across Nebraska, Round 1 meetings were held as either a hybrid or virtual meeting. Hybrid meetings were in-person public workshop meetings with additional options to join via an online or phone format. The virtual meeting was held as an online and phone format only, rather than in-person public workshop meetings. This was done to protect the health of residents and staff members with pre-existing health conditions and to increase participation from individuals who may not have felt comfortable in public situations during the pandemic. Table 11 shows the date and location of meetings held for the Round 1 meeting phase of the project.

**Table 11: Round 1 Meeting Dates and Locations**

Agenda Items	
General overview of the HMP update process, discuss participation requirements, begin the process of risk assessment and impact reporting, update critical facilities, capabilities assessment, and plan integration.	
Location and Time	Date
Hybrid Meeting In Person, Online, or by Phone Central City Venture Center 1532 17 <sup>th</sup> Ave, Central City, NE	Thursday, August 12, 2021, at 2:00 pm
Hybrid Meeting In Person, Online, or By Phone Dawson County Annex 200 W. 7 <sup>th</sup> St, Lexington, NE	Monday, August 16, 2021, at 2:00 pm
Hybrid Meeting In Person, Online, or By Phone Central Platte NRD Office 215 Kaufman Ave, Grand Island, NE	Thursday, August 19, 2021, at 1:00 pm
Virtual Zoom Meeting Online or By Phone	Wednesday, August 25, 2021, at 6:00 pm

The intent of these meetings was to familiarize local planning team members with the plan update process, expected actions for the coming months, the responsibilities of being a participant, and to collect preliminary information to update the HMP. Data collected at these meetings included: plan integration; identifying the top concerns from each jurisdiction; and reviewing and updating community profiles for demographics, capabilities, and critical facilities. Information/data reviewed include but was not limited to local hazard prioritization results; identified critical facilities and their location within the community; future development areas; and expected growth trends (refer to *Appendix B*).

The following table shows the attendees for each jurisdiction who attended a Round 1 meeting. No participants watched the meeting recording or had a one-on-one discussion with JEO staff during this round of meetings.

**Table 12: Round 1 Meeting Attendees**

Name	Title	Jurisdiction
<b>Central City Hybrid Meeting – Thursday, August 12, 2021</b>		
Barb Church	Ex Clerk / Treasurer / Floodplain Administrator	Village of Clarks
Bill Carlstrom	Utility Superintendent / Water Commissioner	Village of Polk
Brad Wells	Fire Chief	Central City Volunteer Fire Department
Bret Schroder	Superintendent	Elm Creek Public Schools
Chris Anderson	City Administrator	Central City
Clifford Yrkoski	Board Supervisor	Merrick County
Collins Haag	Utility Superintendent	Village of Palmer
Dan Theis	Highway Superintendent	Polk County
Darrin Lewis	Emergency manager	Buffalo County
Dennise Daniels	Planning / Zoning / Floodplain Administrator	Buffalo County
Dusty Newton	Municipal Administrator / Director of Admissions	Village of Elm Creek / University of Nebraska – Kearney
Edward Dexter	Board Supervisor	Merrick County
Jake Blackburn	Firefighter	Polk Fire District
Janice Taubenheim	Clerk / Treasurer / Floodplain Administrator	Village of Amherst
Jay Colson	Water Operator	City of Osceola
Jennifer Czarnick	Clerk / Treasurer / Floodplain Administrator	Village of Silver Creek
Jesse Mintken	Associate Director / Assistant Manager	Central Platte NRD
Katherine Klingsporn	Administrator	Azria Health Central City
Kim Beran	Superintendent	High Plains Community Schools
Nancy Bryan	Clerk / Treasurer	City of Stromsburg
Pam Holbrook	Planning / Zoning	Dawson County
Pamela Lancaster	Board Supervisor	Hall County
Pat Powell	City Utilities	City of Stromsburg
Reiny Dickhart	Deputy Sheriff	Merrick County
Roger Wiegert	Board Supervisor	Merrick County
Scott Umberger	Village Maintenance	Village of Polk
Zach Springer	Dean of Students	Central City Public Schools
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group
<b>Lexington Hybrid Meeting – Monday August 16, 2021</b>		
Alison Feik	Emergency Coordinator	Cozad Community Hospital
Bo Berry	Maintenance Supervisor / Firefighter	Lexington Public Schools / Lexington Volunteer Fire Department
Bret Schroder	Superintendent	Elm Creek Public Schools
Brian Woldt	Emergency Manager	Dawson County
Chad Nabity	Floodplain Administrator / Planning / Zoning	Hall County / Village of Alda / Village of Cairo / Village of Doniphan / City of Grand Island / City of Wood River
Chris Fankhauser	-	Two Rivers Public Health Department

Name	Title	Jurisdiction
Darrin Lewis	Emergency Manager	Buffalo County
Dennis Burnside	Assistant City Manager	City of Lexington
Dennise Daniels	Planning / Zoning / Floodplain Administrator	Buffalo County
Doug Swanson	Zoning / Floodplain Administrator	City of Gothenburg
Heather Thole	Planning Specialist	NEMA
Jesse Mintken	Associate Director / Assistant Manager	Central Platte NRD
Joe Pepplichtsch	City Manager	City of Lexington
John Thorburn	General Manager	Tri-Basin NRD
John Valentine	County Executive Director	Dawson County Farm Service Agency
Kathie Carlstrom	Clerk / Treasurer	Village of Polk
Kiley Goff	Administrator	Emerald Nursing & Rehab Cozad
Kraig Johnson	Emergency Response Coordinator	Two Rivers Public Health Department
Marisa Alvares	Planning Specialist	NEMA
Mark Christiansen	Highway Superintendent	Dawson County
Mark Streit	Floodplain Administrator	Dawson County
Rod Reynolds	County Commissioner	Dawson County
Ryan Ruhl	Superintendent	Centura Public Schools
Thomas Barnett	Emergency Response Coordinator	Four Corner Health Department
Trent Boasard	Facilities Director	Kearney Public Schools
Troy Franzen	Sewer / Water Commissioner	City of Cozad
Vern Fisher	Superintendent	Gibbon Public Schools
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group

#### Grand Island Hybrid Meeting – Thursday August 19, 2021

Andrew Hills	Emergency Response Coordinator	Central District Health Department
Bill Redinger	Risk Manager	Grand Island Regional Medical Center
Bob Carey	Emergency Manager	Polk County
Bryan Simonson	Deputy Sheriff	Hall County
Cannon Blauvelt	Principal	Ravenna Public Schools
Carla Maurer	-	Village of Doniphan
Curtis Rohich	-	City of Wood River
Dale Beye	Safety Specialist	CHI Health St. Francis Medical Center / Common Spirit Health
Dan Petsch	Director of Buildings and Grounds	Grand Island Public Schools
Dan Sell	Utility Superintendent / Floodplain Administrator	Village of Shelton
Darrin Lewis	Emergency Manager	Buffalo County
Dave Dunning	Public Works Director	City of Ravenna
Deb Van Matre	Mayor	City of Gibbon
Dennise Daniels	Planning / Zoning / Floodplain Administrator	Buffalo County
Eric Hellriegel	City Manager	City of Kearney
Eric Miller	Attorney	Drainage District No.2 / Drainage District No.3
Greg Cramer	Mayor	City of Wood River
Heather Thole	Planning Specialist	NEMA

Name	Title	Jurisdiction
Jaime Rathman	Clerk / Treasurer	Village of Cairo
Janice Taubenheim	Clerk / Treasurer / Floodplain Administrator	Village of Amherst
Jason Whalen	Fire Administrator	Kearney Fire Department / Suburban Protection District #1
Jeffrey Edwards	Superintendent	Northwest Public Schools
Joel Linn	Director of Maintenance	Cross County Community Schools
Jon Rosenlund	Emergency Manager	Hall County
Keith Kurz	Assistant Public Works Director	City of Grand Island
Larry Homan	Floodplain / City Administrator	City of Gibbon
Leora Hofmann	Clerk / Treasurer	Village of Pleasanton
Marisa Alvares	Planning Specialist	NEMA
Nathan Lightle	Superintendent	Pleasanton Public Schools
Ramona Schafer	Clerk / Treasurer	Village of Alda
Rashad Moxey	Member	Hall County Regional Planning Commission
Shanna Gannon	Superintendent	Shelton Public Schools
Steven Riehle	Highway Superintendent / Engineer	Hall County
Ted Eichholz	Emergency Management Coordinator	University of Nebraska-Kearney
Terry Zessin	Superintendent	Wood River Rural Schools
Tyler Doane	Member	Hall County Regional Planning Commission
Tyson Coble	Assistance Fire Chief	Doniphan Volunteer Fire Department
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group

### Virtual Zoom Meeting – Wednesday August 25, 2021

Amy Graham	Clerk / Treasurer / Water Commissioner	Village of Miller
Carol Jorgensen	-	Village of Elm Creek / Elm Creek Fire and Rescue
Chad Dixon	Fire Chief / Floodplain Administrator	Pleasanton Volunteer Fire Department / Village of Ravenna / Village of Pleasanton
Jason Lavaley	Superintendent	Osceola Public Schools
Jim Cudaback	Clerk / Floodplain Administrator	Village of Riverdale
Lexy Hindt	Deputy SHMO	NEMA
Nick Hodge	Superintendent	Eustis-Farnam Public Schools
Rick Brown	Fire Chief	Gibbon Volunteer Fire Department
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group

### Round 2 Meetings: Mitigation Strategies and Plan Maintenance

Round 2 meetings are designed to identify and prioritize mitigation measures, update previous mitigation actions from the 2017 HMP, and identify when the plan would be reviewed and by whom. Mitigation actions and plan maintenance are essential components in effective hazard mitigation plans. Participating jurisdictions were asked to identify any new mitigation actions to pursue alongside continued actions from the 2017 HMP. Plan maintenance included identifying who would review and updated the plan, how often, and how the public would be involved.



Participating jurisdictions were also asked to review the information collected from the Round 1 meeting related to their jurisdiction through this planning process for accuracy. Information/data reviewed included but was not limited to local hazard prioritization results, identified critical facilities and their location within the community, future development areas, and expected growth trends (refer to *Appendix B*).

There was also a brief discussion about the planning process, when the plan would be available for public review and comment, the approval process, and grant opportunities available once the plan was approved. As with Round 1 meetings, any jurisdictions unable to attend were given the opportunity to have a one-on-one phone conference with the consultant or view a recording of the meeting in order to meet plan participation requirements and complete required information.

Round 2 meetings were again held as either a hybrid or virtual meeting. Hybrid meetings were in-person public workshop meetings with additional options to join via an online or phone format. The virtual meeting was held as an online and phone format only, rather than in-person public workshop meetings. Table 13 shows the date and location of meetings held for Round 2 Meetings. Meeting attendees are identified in Table 14 and Table 15.

**Table 13: Round 2 Meeting Dates and Locations**

Agenda Items	
Update 2017 mitigation actions, identify new mitigation actions, update the plan review process, review of local data and community profile, discuss review process, and discuss available grants and eligibility.	
Location and Time	Date
Hybrid Meeting In Person, Online, or by Phone Dawson County Annex 200 W. 7 <sup>th</sup> St, Lexington, NE	Tuesday, January 25, 2022, at 2:00 pm
Hybrid Meeting In Person, Online, or By Phone Central Platte NRD Office 215 Kaufman Ave, Grand Island, NE	Tuesday, February 1, 2022, at 2:00 pm
Hybrid Meeting In Person, Online, or By Phone Central City Venture Center 1532 17 <sup>th</sup> Ave, Central City, NE	Wednesday, February 2, 2022, at 2:00 pm
Virtual Zoom Meeting Online or By Phone	Wednesday, February 9, 2022, at 6:00 pm

**Table 14: Round 2 Meeting Attendees**

Name	Title	Jurisdiction
<b>Lexington Hybrid Meeting – Tuesday January 25, 2022</b>		
Alison Feik	Emergency Coordinator	Cozad Community Hospital
Adele Phillips	Floodplain Mitigation Planner	NeDNR
Bill Redinger	Risk Manager	Grand Island Regional Medical Center
Bo Berry	Maintenance Supervisor / Firefighter	Lexington Public Schools / Lexington Volunteer Fire Department
Bret Schroder	Superintendent	Elm Creek Public Schools
Brian Woldt	Emergency Manager	Dawson County
Dan Theis	Highway Superintendent	Polk County
Dennis Burnside	Assistant City Manager	City of Lexington
Diana Mendoza Cauley	-	FEMA

Name	Title	Jurisdiction
Doug Adkisson	Zoning & Planning / Floodplain Administrator	City of Cozad
Doug Swanson	Zoning / Floodplain Administrator	City of Gothenburg
Dusty Newton	Municipal Administrator	Village of Elm Creek
Eric Hellriegel	City Manager	City of Kearney
Fred Boon	-	Village of Eddyville / Eddyville Volunteer Fire Department
Jay Colson	Water Operator	City of Osceola
Jesse Mintken	Associate Director / Assistant Manager	Central Platte NRD
Joe Carlson	President	Drainage District No. 4
Joe Pepplichtsch	City Manager	City of Lexington
Kari Podliska	Village Clerk	Village of Clarks
Katie Griffis	Clerk	Village of Pleasanton
Kiley Goff	Administrator	Emerald Nursing & Rehab Cozad
Leora Hofmann	Clerk / Treasurer	Village of Pleasanton
Marisa Alvares	Planning Specialist	NEMA
Mark Christiansen	Highway Superintendent	Dawson County
Mark Streit	Floodplain Administrator	Dawson County
Michael Wolf	Board Chairperson	Village of Eustis
Nancy Bryan	Clerk / Treasurer	City of Stromsburg
Renee Johansen	Clerk / Treasurer	City of Osceola
Rod Reynolds	County Commissioner	Dawson County
Vern Fisher	Superintendent	Gibbon Public Schools
Zane Hoselton	Sewage Plan Operator / Street / Water Commissioner	Village of Eustis
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group

### Grand Island Hybrid Meeting – Tuesday February 1, 2022

Andy Bartling	Floodplain Administrator	City of Kearney
Brett Gillming	-	Village of Shelton
Bryan Simonson	Deputy Sheriff	Hall County
Chad Nabity	Floodplain Administrator / Planning / Zoning	Hall County / Village of Alda / Village of Cairo / Village of Doniphan / City of Grand Island / City of Wood River
Courtney Widup	Water Resources Tech	Central Platte NRD
Dale Beye	Safety Specialist	CHI Health St. Francis Medical Center / Common Spirit Health
Darrin Lewis	Emergency Manager	Buffalo County
Dave Dunning	Public Works Director	City of Ravenna
Deb Van Matre	Mayor	City of Gibbon
Dennise Daniels	Planning / Zoning / Floodplain Administrator	Buffalo County
Greg Cramer	Mayor	City of Wood River
Ivan Klein	County Commissioner	Buffalo County
Jaime Rathman	Clerk / Treasurer	Village of Cairo
Jesse Mintken	Associate Director / Assistant Manager	Central Platte NRD
Jon Rosenlund	Emergency Manager	Hall County
Karen Brdthauer	County Commissioner	Hall County



Name	Title	Jurisdiction
Keith Kurz	Assistant Public Works Director	City of Grand Island
Larry Homan	Floodplain / City Administrator	City of Gibbon
Ramona Schafer	Clerk / Treasurer	Village of Alda
Scott Sorenson	County Commissioner	Hall County
Shanna Gannon	Superintendent	Shelton Public Schools
Shannon Callahan	Street Superintendent	City of Grand Island
Ted Eichholz	Emergency Management Coordinator	University of Nebraska – Kearney
Terry Zessin	Superintendent	Wood River Rural Schools
Tom Spaulding	-	City of Ravenna
Trent Bosard	Facilities Director	Kearney Public Schools
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group

### Central City Hybrid Meeting – Wednesday February 2, 2022

Andrew Hills	Emergency Response Coordinator	Central District Health Department
Brad Wells	Fire Chief	Central City Volunteer Fire Department
Chris Anderson	City Administrator	Central City
Dennise Daniels	Planning / Zoning / Floodplain Administrator	Buffalo County
Jan Placke	Board Supervisor	Merrick County
Janice Taubenheim	Clerk / Treasurer / Floodplain Administrator	Village of Amherst
Jeffrey Jenson	Superintendent	Central City Public Schools
Jenna Clark	Region 44 Emergency Manager	Merrick County
Jesse Mintken	Associate Director / Assistant Manager	Central Platte NRD
Lexy Hindt	Deputy SHMO	NEMA
Marisa Alvares	Planning Specialist	NEMA
Scott Stuhr	Planning / Zoning	Merrick County / Village of Chapman / Village of Silver Creek / Village of Palmer
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group

### Zoom Meeting – Wednesday, February 9, 2022

Chad Dixon	Fire Chief / Floodplain Administrator	Pleasanton Volunteer Fire Department / Village of Pleasanton
Kraig Johnson	Emergency Response Coordinator	Two Rivers Public Health Department
Rick Brown	Fire Chief	Gibbon Volunteer Fire Department
Thomas Barnett	Emergency Response Coordinator	Four Corners Health Department
Tyler Hillmer	Fire Chief	Elm Creek Fire & Rescue
Becky Appleford	Project Manager	JEO Consulting Group
Karl Dietrich	Planner	JEO Consulting Group
Kayla Vondracek	Planner	JEO Consulting Group

**Table 15: Round 2 One-on-One or Recording Attendees**

Name	Title	Jurisdiction
Jim Cudaback	Clerk / Floodplain Administrator	Village of Riverdale
Karee Dvorak	Village Emergency Manager	Village of Doniphan
Patrick Robinson	Utility Superintendent	Village of Silver Creek
Deanna Party	Clerk/Treasurer	Village of Shelby
Scott Umberger	Village Maintenance	Village of Polk
Eric Miller	Attorney	Dawson County Drainage Districts No.2 & No.3
Nathan Lightle	Superintendent	Pleasanton Public Schools

## Public Review

Once the HMP draft was completed, a public review period was opened to allow for participants and community members at large to review the plan, provide comments, and request changes. The public review period was open from April 18, 2022, through May 20, 2022. Participating jurisdictions were emailed and mailed a letter notifying them of this public review period. The HMP was also made available on the project website (<https://jeo.com/central-platte-nrd-hazard-mitigation-plan-update>) to download the document. Jurisdictions and the public could make provide comments via mail, email, or by using the comment box on the project website.

## Plan Adoption and Implementation

Based on FEMA requirements, this multi-jurisdictional hazard mitigation plan must be formally adopted by each participant through approval of a resolution. This approval will create individual ownership of the plan by each participant. Formal adoption provides evidence of a participant's full commitment to implement the plan's goals, objectives, and action items. A copy of the resolution draft submitted to participating jurisdictions is located in *Appendix A*. Copies of adoption resolutions may be requested from the NEMA's State Hazard Mitigation Officer.

**Requirement §201.6(c)(5):**  
For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Hazard mitigation plans are living documents. Once an HMP has been adopted locally, participants are responsible for implementing identified projects, maintaining the plan with relevant information, and fully updating the plan every five years. The plan must be monitored, evaluated, and updated on a five-year or less cycle. Each participating jurisdiction identified positions or departments who will review and update their section of the plan outside the required five-year cycle. It is critical the plan be reviewed and updated regularly or when a hazard event occurs that significantly affects the area or individual participants. These reviews are the responsibility of each jurisdiction's local planning team and should be documented and reflected in the plan via amendments. However, participants are encouraged to work alongside the plan sponsor, CPNRD or the consultant, JEO, to document updates and revise the HMP.

Additional implementation of the mitigation plan should include integrating HMP goals, objectives, and mitigation actions into county and local comprehensive or capital improvement plans as they are developed or updated. *Section Six* describes the system that jurisdictions participating in the HMP have established to monitor the plan; provides a description of how, when, and by whom the HMP process and mitigation actions will be evaluated; presents the criteria used to evaluate the plan; and explains how the plan will be maintained and updated.

# Section Three:

## Planning Area Profile

### Introduction

To identify jurisdictional vulnerabilities, it is vitally important to understand the people and built environment of the planning area. The following section is meant to provide an overall description of the planning area's characteristics to create a summary profile for the region. Specific characteristics are covered in each jurisdiction's community profile, including demographics, transportation routes, and structural inventory. Redundant information will not be covered in this section. Therefore, this section will highlight at-risk populations and characteristics of the built environment that add to regional vulnerabilities.

### Planning Area Geographic Summary

CPNRD's planning area includes the south-central portion of Nebraska and spans 3,338 square miles. For the purpose of this plan update, the planning area includes all of Buffalo, Dawson, Hall, Merrick and Polk counties. The planning area has a diverse range of topographic regions including bluffs and escarpments, dissected plains, large reservoirs, plains, sandhills, and valleys (Figure 3). Descriptions of these topographic regions are below.

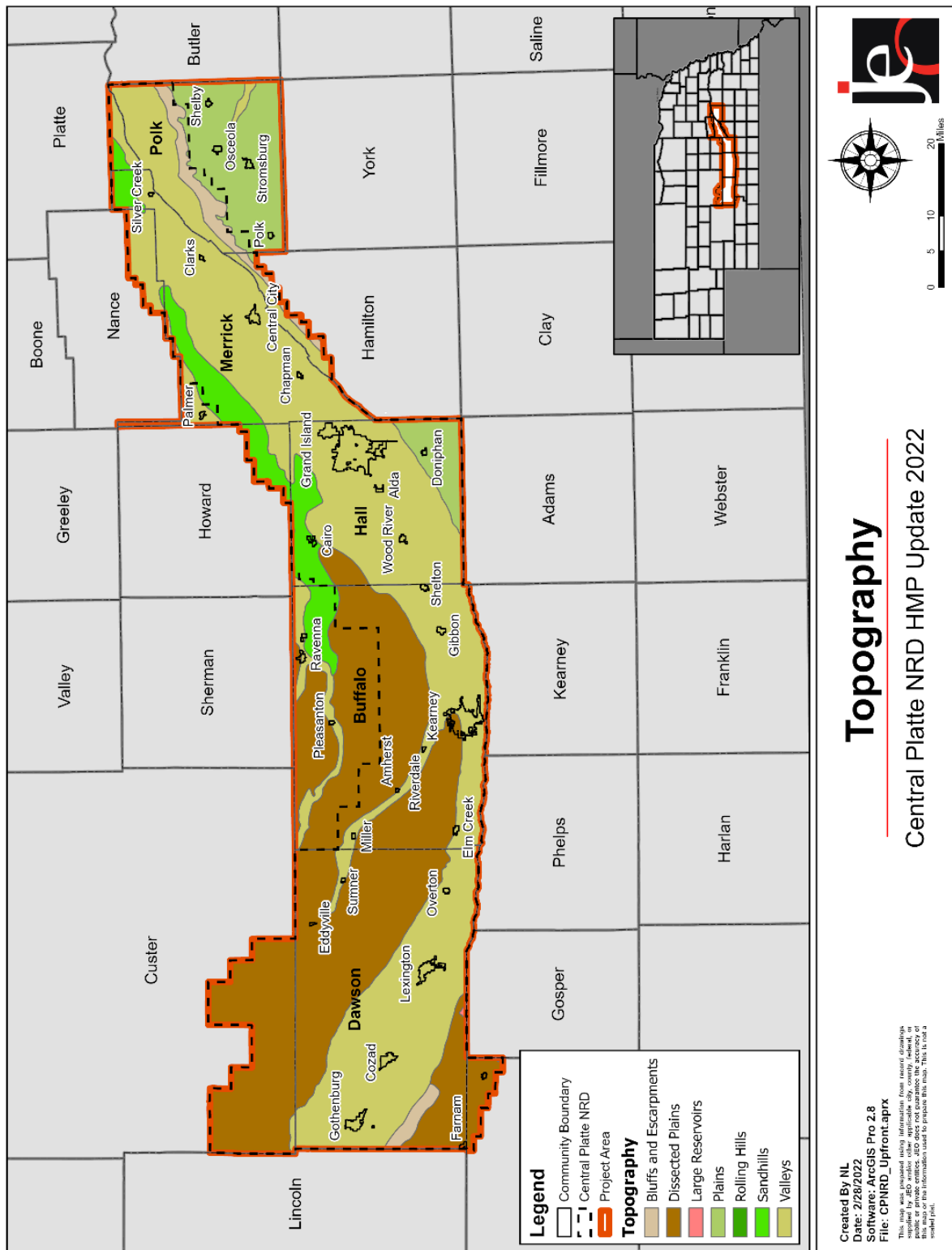
- **Bluffs and escarpments:** Rugged land with very steep and irregular slopes.
- **Dissected plains:** Hilly land with moderate to steep slopes and sharp ridge crests.
- **Large reservoirs:** Constructed for purposes such as water storage for irrigation, generation of electricity, flood control or recreation.
- **Plains:** Flat-lying land that lies above the valley. The materials of the plains are sandstone or stream-deposited silt, clay, sand and gravel overlain by wind-deposited silt.
- **Sandhills:** Hilly land composed of low to high dunes of sand stabilized by grass cover.
- **Valleys:** Flat-lying land along the major streams.<sup>12</sup>

The region resides in the Central Platte River, Loup River, and Upper Big Blue River watersheds. Major waterways in the area include 205 miles of the Platte River, 49.9 miles of the North Channel, and 173 miles of the Wood River. The Platte River is an important feature of the district. It is also the largest river in the state, traversing the entire length of the state from west to east and serving as a major tributary to the Missouri River. With origins in Colorado, the Platte is formed by two branches, the North and South Platte, converging near the City of North Platte. While there are some minor tributaries in the NRD that flow into the Platte, the major tributaries of the Loup and Elkhorn Rivers, join the Platte east of the district. The Platte River is too shallow for navigation and is used primarily for irrigation, recreation, generation of hydroelectric power and as a habitat for wildlife.

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12 Conservation and Survey Division/Institute of Agriculture and Natural Resources. 2001. "Topographic regions map of Nebraska." <https://digitalcommons.unl.edu/caripubs/62>.

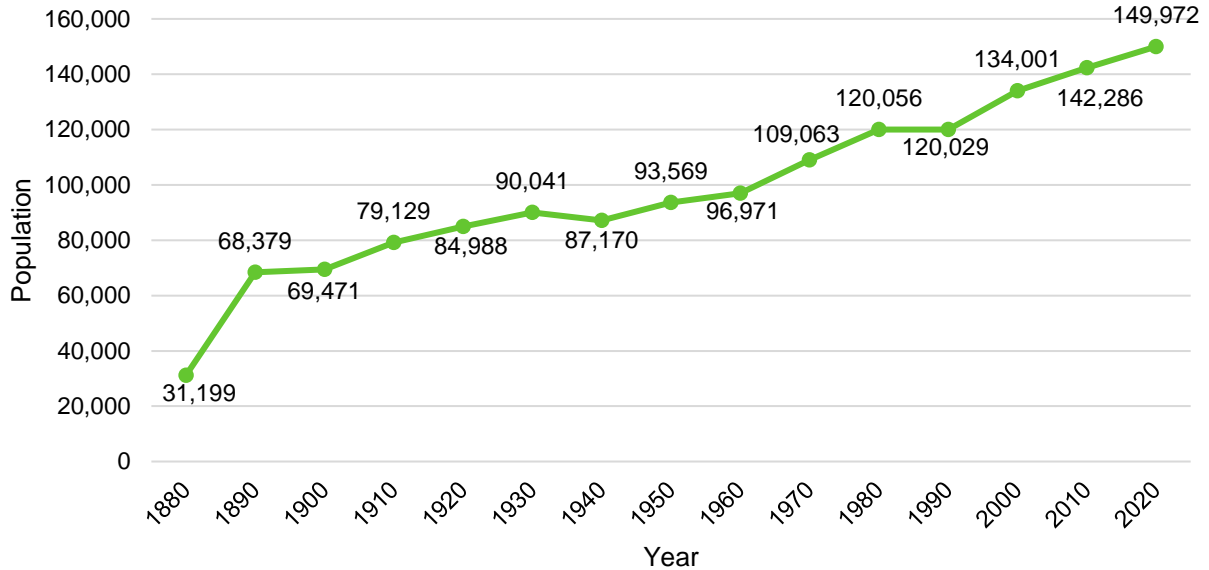
Figure 3: Topography



## Demographics and At-Risk Populations

As noted above, the planning area includes all of Buffalo, Dawson, Hall, Merrick and Polk counties. The U.S. Census Bureau collects specific demographic information for each county. The estimated population of the planning area is 149,972.<sup>13</sup>

**Figure 4: Planning Area Population, 1880-2020**



Source: U.S. Census Bureau<sup>14</sup>

**Figure 5: Population by Age Cohort and Sex (2020)**



Source: U.S. Census Bureau

<sup>13</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.

<sup>14</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.

Community and regional vulnerability are impacted by growing or declining populations. Communities growing quickly may lack resources to provide services for all members of the community in a reasonable timeframe including snow removal, emergency storm shelters, repairs to damaged infrastructure, or even tracking the location of vulnerable populations. Communities experiencing population decline may be more vulnerable to hazards as a result of vacant and/or dilapidated structures, an inability to properly maintain critical facilities and/or infrastructure, and higher levels of unemployment and populations living in poverty. It is important for communities to monitor their population changes and ensure that potential issues be incorporated into hazard mitigation plans, as well as other planning mechanisms within the community. The planning area has displayed population growth since 1940.

### **At-risk Populations**

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

- Outward appearance does not necessarily mark a person as at-risk.
- A hazard event will, in many cases, impact at-risk populations in different ways.

The National Response Framework defines at-risk populations as "...populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to maintaining independence, communication, transportation, supervision, and medical care."<sup>15</sup>

Dependent children under 20 years old are one of the most vulnerable populations to disasters.<sup>16</sup> The majority of people in this age group do not have access to independent financial resources and transportation. They lack practical knowledge necessary to respond appropriately during a disaster. Despite this vulnerability, children are generally overlooked in disaster planning because the presence of a caretaker is assumed. With approximately 25% of the planning area's population younger than 20, children are a key vulnerable group to address in the planning process.

Schools house a high number of children and adults within the planning area during the daytime hours of weekdays, as well as during special events on evenings and weekends. The following table identifies the various school districts located within the planning area, and Figure 6 is a map of the school district boundaries.

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15 United States Department of Homeland Security. October 2019. "National Response Framework Third Edition."  
<https://www.fema.gov/media-library/assets/documents/117791>.

16 Flanagan, Gregory, Hallisey, Heitgerd, & Lewis. 2011. "A Social Vulnerability Index for Disaster Management." Journal of Homeland Security and Emergency Management, 8(11): Article 3.

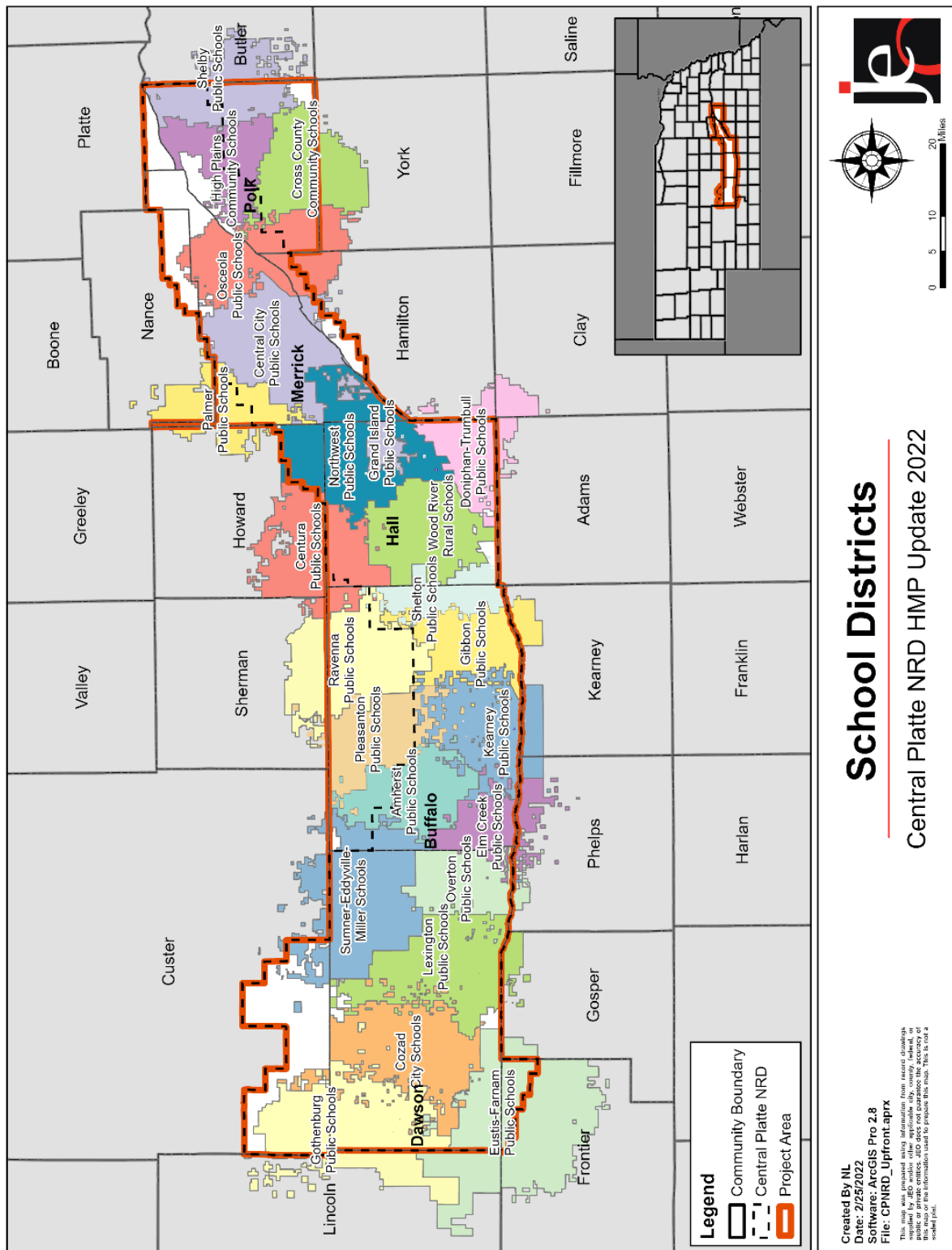
**Table 16: School Inventory**

School District	Total Enrollment (2019-2020)	Total Teachers
Amherst Public Schools	380	27
Central City Public Schools	767	63
Centura Public Schools	493	43
Cozad City School	951	72
Cross Country Community Schools	378	36
Doniphan-Trumbull Public Schools	460	42
Elm Creek Public Schools	366	32
Eustis-Farnam Public Schools	165	22
Gibbon Public Schools	582	42
Gothenburg Public Schools	880	64
Grand Island Public Schools	10,070	711
High Plains Community Schools	266	29
Kearney Public Schools	6,121	361
Lexington Public Schools	3,169	211
Northwest Public Schools	1,574	108
Osceola Public Schools	214	23
Overton Public Schools	303	27
Palmer Public Schools	326	24
Pleasanton Public Schools	288	21
Ravenna Public Schools	437	41
Shelby Public Schools	404	38
Shelton Public Schools	285	26
Sumner-Eddyville-Miller Schools	216	21
Wood River Rural Schools	521	47

Source: Nebraska Department of Education<sup>17</sup>

17 Nebraska Department of Education. 2020. "Nebraska Education Profile." Accessed June 2021. <http://nep.education.ne.gov/>.

Figure 6: Regional School Districts





The University of Nebraska-Kearney (UNK) is a public institution located in the west central portion of the City of Kearney in Buffalo County. The main office is located at 2504 9th Avenue, Kearney, NE 68849. Forty-nine degree programs are offered under three broad areas: Arts and Sciences, Business and Technology, and Education. There are 32 buildings on campus, nine of which are residence halls. A small canal runs through the center of the campus. In addition, the Kearney Canal and Kearney Lake are located directly north of the university. There are approximately 5,000 students and 1,200 staff at the university. Of the 5,000 students, over 300 are international students. Student housing is spread throughout campus with around 2,000 students living in the residence halls.<sup>18</sup>

Central Community College is a two-year public college serving a 25-county area in central Nebraska with three campuses located in Columbus, Grand Island, and Hastings. The college also has learning centers in Holdrege, Kearney, and Lexington. The college offers 37 career and technical education programs with a focus on programs requiring two years or less to complete. The college also offers an academic transfer program for students who want to transfer to a four-year university after completing their first two years of a bachelor's degree. The college also offers online learning, training and development for businesses, industries, and other organizations in the 25-county service area. As of 2019-2020, the college had approximately 18,897 students, with 23% Full-Time and 77% Part-Time.<sup>19</sup>

Like minors, seniors (age 65 and greater) are often more significantly impacted by hazards and temperature extremes. During prolonged heat waves or periods of extreme cold, seniors may lack resources to effectively address hazard conditions and as a result may incur injury or potentially death. Prolonged power outages (either standalone events or as the result of other contributing factors) can have significant impacts on any citizen relying on medical devices. One study conducted by the Center for Injury Research and Policy found that increases in vulnerability related to severe winter storms (with significant snow accumulations) begin at age 55.<sup>20</sup> The study found that on average there are 11,500 injuries and 100 deaths annually related to snow removal. Men over the age of 55 are 4.25 times more likely to experience cardiac events during snow removal.

While the previously identified populations live throughout the planning area, there is the potential that they will be located in higher concentrations at care facilities. Table 17 identifies the number and capacity of care facilities throughout the planning area.

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18 University of Nebraska-Kearney. March 2022. "About UNK." <https://www.unk.edu/about/index.php>

19 Central Community College. March 2022. "Fast Facts." <https://www.cccneb.edu/fastfacts>

20 Center for Injury Research and Policy. January 2011. "Snow Shoveling Safety." Accessed July 2017. <http://www.nationwidechildrens.org/cirp-snow-shoveling>.

**Table 17: Inventory of Care Facilities**

Jurisdiction	Hospitals	Hospital Beds	Health Clinics	Adult Care Homes	Adult Care Beds	Assisted Living Homes	Assisted Living Beds
<b>Buffalo</b>	4	328	0	7	589	8	395
<b>Dawson</b>	3	57	1	3	197	5	244
<b>Hall</b>	2	222	0	5	377	10	470
<b>Merrick</b>	1	20	1	2	110	4	94
<b>Polk</b>	1	16	0	2	98	2	44

Source: Nebraska Department of Health and Human Services<sup>21,22,23,24</sup>

In addition to residents being classified as at-risk by age, there are other specific groups within the planning area that experience vulnerabilities related to their ability to communicate or their economic status. Table 18 provides statistics per county regarding households with English as a second language (ESL) and population reported as in poverty within the past 12 months.

**Table 18: ESL and Poverty At-Risk Populations**

County	Percent That Speaks English as Second Language	Individuals Below Poverty Level
<b>Buffalo</b>	8.0%	7.1%
<b>Dawson</b>	30.3%	10.6%
<b>Hall</b>	22.5%	9.8%
<b>Merrick</b>	6.0%	8.4%
<b>Polk</b>	6.0%	4.7%

Source: U.S. Census Bureau<sup>25,26</sup>

Residents below the poverty line may lack resources to prepare for, respond to, or recover from hazard events. Residents with limited economic resources might struggle to prioritize the implementation of mitigation measures over more immediate needs. Further, residents with limited economic resources are more likely to live in older, more vulnerable structures. These structures could be mobile homes; located in the floodplain; located in remote rural areas away from urban amenities; located near known hazard sites (i.e., chemical storage areas); or older poorly maintained structures. Residents below the poverty line will be more vulnerable to all hazards within the planning area.

Residents who speak English as a second language may struggle with a range of issues before, during, and after hazard events. General vulnerabilities revolve around what could be an inability to effectively communicate with others or an inability to comprehend materials aimed at notification and/or education of hazard events. When presented with a hazardous situation it is important that all community members be able to receive, decipher, and act on relevant

21 Department of Health and Human Services. 2021. "State of Nebraska: Assisted Living Facilities."

<https://dhhs.ne.gov/licensure/Documents/ALF%20Roster.pdf>

22 Department of Health and Human Services. 2021. "State of Nebraska Roster: Hospitals."

<https://dhhs.ne.gov/licensure/Documents/Hospital%20Roster.pdf>

23 Department of Health and Human Services. 2021. "State of Nebraska Roster: Long Term Care Facilities."

<https://dhhs.ne.gov/licensure/Documents/LTCRoster.pdf>

24 Department of Health and Human Services. 2021. "State of Nebraska Roster: Rural Health Clinic."

[https://dhhs.ne.gov/licensure/Documents/RHC\\_Roster.pdf](https://dhhs.ne.gov/licensure/Documents/RHC_Roster.pdf)

25 United States Census Bureau. "2019 Census Bureau American Community Survey: S1601: Language Spoken at Home."

<https://data.census.gov/cedsci/>

26 United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics."

<https://data.census.gov/cedsci/>

information. An inability to understand warnings and notifications may prevent non-native English speakers from taking action in a timely manner. Further, educational materials related to regional hazards are most often developed in the dominant language for the area, for the planning area that would be English. Residents who struggle with English in the written form may not have sufficient information related to local concerns to effectively mitigate potential impacts. Residents with limited English proficiency would be at an increased vulnerability to all hazards within the planning area.

Similar to residents below the poverty line, racial minorities tend to have access to fewer financial and systemic resources that would enable them to implement hazard mitigation projects and to respond and recover from hazard events, including residence in standard housing and possession of financial stability (Table 19).

**Table 19: Racial Composition Trends**

Race	2010		2019		% Change
	Number	% of Total	Number	% of Total	
<b>White, Not Hispanic</b>	125,145	88.0%	129,855	87.6%	-0.4
<b>Black</b>	2,008	1.4%	3,733	2.5%	1.1
<b>American Indian and Alaskan Native</b>	3,091	2.2%	1,624	1.1%	-1.1
<b>Asian</b>	1,244	0.9	1,504	1.0%	0.1
<b>Native Hawaiian and Other Pacific Islander</b>	0	0%	273	0.2%	0.2
<b>Other Races</b>	8,915	6.3	8,687	5.9%	-0.4
<b>Two or More Races</b>	1,883	1.3%	2,574	1.7%	0.4
<b>Total Population</b>	<b>142,286</b>	<b>-</b>	<b>148,250</b>	<b>-</b>	<b>-</b>

Source: U.S. Census Bureau<sup>27,28</sup>

## Built Environment and Structural Inventory

The U.S. Census Bureau provides information related to housing units and potential areas of vulnerability as described in the following discussion.

Of the occupied housing units in the planning area, more than 34 percent are renter occupied. Renter-occupied housing units often do not receive many of the updates and retrofits that are needed to make them resilient to disaster impacts. Communities may consider enacting landlord outreach programs aimed at educating property owners about the threats in their area and what they can do to help reduce the vulnerability of the tenants living in their housing units. It should be noted that Hall County has the highest percentage of renter-occupied housing units in the planning area. The City of Grand Island, the largest community in the planning area, has more than 41 percent of housing stock occupied by renters.

Polk County has the highest percentage of vacant housing units compared to the other four counties. Unoccupied homes may not be maintained as well as occupied housing, thus adding to their vulnerability. During disaster events like high winds or tornadoes, these structures may fail and result in debris which can impact other structures as well as people, resulting in injuries or fatalities, as well as higher damage totals.

27 United States Census Bureau. "2010 Decennial Census: Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

28 United States Census Bureau. "2019 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

**Table 20: Housing Characteristics**

Jurisdiction	Total Housing Units				Occupied Housing Units			
	Occupied		Vacant		Owner		Renter	
	#	%	#	%	#	%	#	%
<b>Buffalo County</b>	19,062	93.1%	1,420	6.9%	12,388	65.0%	6,674	35.0%
<b>Dawson County</b>	8,965	87.3%	1,303	12.7%	6,035	67.3%	2,930	32.7%
<b>Hall County</b>	23,096	93.0%	1,736	7.0%	14,398	62.3%	8,698	37.7%
<b>Merrick County</b>	3,373	88.3%	448	11.7%	2,514	74.5%	859	25.5%
<b>Polk County</b>	2,052	74.6%	699	25.4%	1,705	83.1%	347	16.9%
<b>Alda</b>	243	90.7%	25	9.3%	193	79.4%	50	20.6%
<b>Amherst</b>	65	78.3%	18	21.7%	52	80.0%	13	20.0%
<b>Cairo</b>	359	90.4%	38	9.6%	226	63.0%	133	37.0%
<b>Central City</b>	1,231	92.3%	102	7.7%	736	59.8%	495	40.2%
<b>Chapman</b>	118	88.7%	15	11.3%	87	73.7%	31	26.3%
<b>Clarks</b>	162	92.0%	14	8.0%	112	69.1%	50	30.9%
<b>Cozad</b>	1,594	88.7%	204	11.3%	1,055	66.2%	539	33.8%
<b>Doniphan</b>	353	89.6%	41	10.4%	277	78.5%	76	21.5%
<b>Eddyville</b>	43	87.8%	6	12.2%	39	90.7%	4	9.3%
<b>Elm Creek</b>	427	95.5%	20	4.5%	342	80.1%	85	19.9%
<b>Eustis</b>	224	89.2%	27	10.8%	184	82.1%	40	17.9%
<b>Farnam</b>	97	94.2%	6	5.8%	83	85.6%	14	14.4%
<b>Gibbon</b>	719	96.1%	29	3.9%	511	71.1%	208	28.9%
<b>Gothenburg</b>	1,339	85.8%	221	14.2%	961	71.8%	378	28.2%
<b>Grand Island</b>	19,243	93.5%	1,329	6.5%	11,310	58.8%	7,933	41.2%
<b>Kearney</b>	12,987	93.0%	972	7.0%	7,670	59.1%	5,317	40.9%
<b>Lexington</b>	3,494	94.2%	216	5.8%	2,043	58.5%	1,451	41.5%
<b>Miller</b>	61	80.3%	15	19.7%	48	78.7%	13	21.3%
<b>Osceola</b>	364	89.0%	45	11.0%	288	79.1%	76	20.9%
<b>Overton</b>	227	83.5%	45	16.5%	151	66.5%	76	33.5%
<b>Palmer</b>	205	84.0%	39	16.0%	172	83.9%	33	16.1%
<b>Pleasanton</b>	159	98.8%	2	1.2%	132	83.0%	27	17.0%
<b>Polk</b>	152	68.2%	71	31.8%	116	76.3%	36	23.7%
<b>Ravenna</b>	606	87.6%	86	12.4%	427	70.5%	179	29.5%
<b>Riverdale</b>	95	100.0%	0	0.0%	74	77.9%	21	22.1%
<b>Shelby</b>	297	94.3%	18	5.7%	237	79.8%	60	20.2%
<b>Shelton</b>	429	92.5%	35	7.5%	295	68.8%	134	31.2%
<b>Silver Creek</b>	187	88.2%	25	11.8%	155	82.9%	32	17.1%
<b>Stromsburg</b>	447	87.0%	67	13.0%	363	81.2%	84	18.8%
<b>Sumner</b>	85	80.2%	21	19.8%	58	68.2%	27	31.8%
<b>Wood River</b>	489	87.5%	70	12.5%	360	73.6%	129	26.4%

Source: U.S. Census Bureau<sup>29</sup>

29 United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

The U.S. Census Bureau provides information related to housing units and potential areas of vulnerability. The selected characteristics examined in Table 21 include lacking complete plumbing facilities; lacking complete kitchen facilities; no telephone service available; housing units that are mobile homes; and housing units with no vehicles.

**Table 21: Selected Housing Characteristics**

Counties	Buffalo	Dawson	Hall	Merrick	Polk	Total
<b>Occupied Housing Units</b>	19,062 (93.1%)	8,965 (87.3%)	23,096 (93.0%)	3,373 (88.3%)	2,052 (74.6%)	<b>56,548</b>
<b>Lacking Complete Plumbing Facilities</b>	0.2%	0.2%	0.1%	0.9%	0.3%	<b>0.2%</b>
<b>Lacking Complete Kitchen Facilities</b>	1.6%	0.9%	1.2%	3.4%	0.8%	<b>1.4%</b>
<b>No Telephone Service Available</b>	2.6%	1.3%	2.2%	3.5%	1.9%	<b>2.3%</b>
<b>No Vehicles Available</b>	1.9%	1.6%	1.2%	0.4%	1.3%	<b>1.5%</b>
<b>Mobile Homes</b>	7.3%	8.6%	5.3%	5.9%	7.0%	<b>6.6%</b>

Source: U.S. Census Bureau<sup>30</sup>

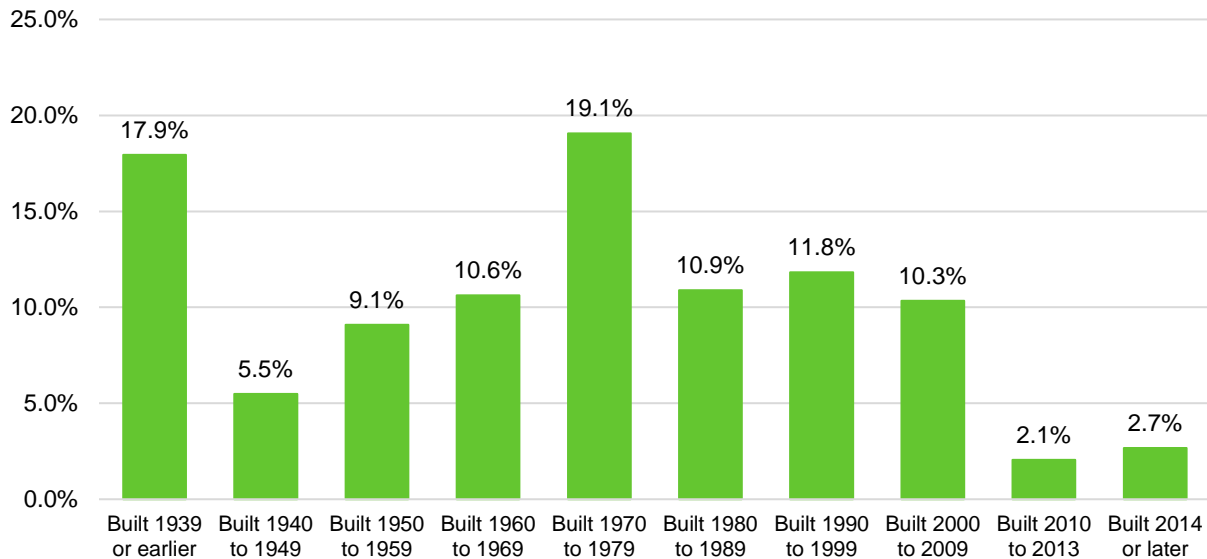
Slightly more than two percent of housing units lack access to landline telephone service. This does not necessarily indicate that there is not a phone in the housing unit, as cell phones are now the primary form of telephone service. However, this lack of access to landline telephone service does represent a population at increased risk to disaster impacts. Reverse 911 systems are designed to contact households via landline services and as a result, some homes in hazard prone areas may not receive notification of potential impacts in time to take protective actions. Emergency managers should continue to promote the registration of cell phone numbers with Reverse 911 systems. The CodeRED system is available for many communities and residents to use in the planning area. This opt-in program sends emergency alerts and hazard event updates to cellular devices located within specific geographical areas based on cell tower reception. Additionally, emergency managers, the National Weather Service, and other government agencies can utilize FEMA's Integrated Public Alert and Warning System (IPAWS) to send emergency alerts and weather warnings to cellphones within a designated area. Like CodeRED, notifications are sent to all cellphone users within specific geographical areas without needing to opt-in.

Approximately 6.6 percent of housing units in the planning area are mobile homes. Dawson County has the highest rate of mobile homes in its housing stock at 8.6 percent. Mobile homes have a higher risk of sustaining damages during high wind events, tornadoes, severe thunderstorms, and severe winter storms. Mobile homes that are either not anchored or are anchored incorrectly can be overturned by 60 mph winds. A thunderstorm is classified as severe when wind speeds exceed 58 mph, placing improperly anchored mobile homes at risk. Furthermore, approximately 1.5 percent of all housing units in the planning area do not have a vehicle available. Households without vehicles may have difficulty evacuating during a hazardous event and a reduced ability to access resources in times of need.

30 United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

The majority of homes within the planning area were built prior to 1980 (62%), with nearly 18% of homes built prior to 1939 (Figure 7). Housing age can serve as an indicator of risk, as structures built prior to the development of state building codes may be more vulnerable. Residents living in these homes may be at higher risk to the impacts of high winds, tornadoes, severe winter storms, and thunderstorms.

Figure 7: Housing Age in Planning Area

Source: U.S. Census Bureau<sup>31</sup>

## State and Federally Owned Properties

The following table provides an inventory of state and federally owned properties within the planning area by county.

Table 22: State and Federally Owned Facilities

Facility	Nearest Community
<b>Buffalo County</b>	
Windmill SRA	Gibbon, NE
Bassway Strip WMA	Gibbon, NE
Fort Kearney SRA	Kearney, NE
East Odessa WMA	Kearney, NE
Union Pacific SRA	Kearney, NE
Bufflehead WMA	Kearney, NE
Kea Lake WMA	Kearney, NE
Kea West WMA	Kearney, NE
North Kearney Rest Area (westbound) DOR	Kearney, NE
South Kearney Rest Area (eastbound) DOR	Kearney, NE
Coot Shallows WMA	Kearney, NE
Sandy Channel SRA	Kearney, NE
Blue Hole WMA	Kearney, NE
Sandy Channel SRA #6	Kearney, NE
University of Nebraska- Kearney	Kearney, NE
Central Community College	Kearney, NE

31 United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

Facility	Nearest Community
<b>Dawson County</b>	
Dogwood WMA	Overton, NE
<b>Hall County</b>	
Cornhusker WMA	Grand Island, NE
Hannon WPA	Wood River, NE
Martin's Reach WMA	Wood River, NE
West Wood River WMA	Wood River, NE
<b>Merrick County</b>	
Dr. Bruce Cowgill WMA	Silver Creek, NE
<b>Polk County</b>	
Flatsedge WMA	Shelby, NE

Source: Nebraska Game & Parks,<sup>32</sup> U.S National Park Service<sup>33</sup>

## Historical Sites

According to the National Register of Historic Places for Nebraska by the National Park Service, there are 61 historic sites located in the planning area. Several of the sites are located in the one percent and 0.2 percent annual chance floodplain.

**Table 23: Historical Sites**

Site Name	Date Listed	Nearest Community, County	In Floodplain
Barnd, John, House	3/31/1983	Kearney, Buffalo	N
Bartlett, John J. and Lenora, House	12/27/2007	Kearney, Buffalo	N
Fort Theater	7/12/2006	Kearney, Buffalo	N
Frank, George W., House	2/23/1973	Kearney, Buffalo	Y – 0.2%
Hanson-Downing House	12/10/1980	Kearney, Buffalo	N
Harmon Park	12/10/2010	Kearney, Buffalo	Unknown
Kearney Junior High School	7/5/2000	Kearney, Buffalo	N
Kearney National Guard Armory	7/16/2009	Kearney, Buffalo	N
Kilgore Bridge	6/29/1992	Kearney, Buffalo	Y – 1%
Klehm House	3/25/1999	Kearney, Buffalo	N
Masonic Temple and World Theater Building	11/10/2009	Kearney, Buffalo	N
Meisner Bank Building	3/25/1999	Shelton, Buffalo	N
Meisner, George, House	6/23/1988	Shelton, Buffalo	Unknown
Saint Luke's Protestant Episcopal Church	12/1/1986	Kearney, Buffalo	N
Sweetwater Mill Bridge	6/29/1992	Sweetwater, Buffalo	Y – 1%
Thomas, Dr. A. O., House	2/28/1980	Kearney, Buffalo	N
U.S. Post Office	9/17/1981	Kearney, Buffalo	N
Allen's Opera House	9/28/1988	Cozad, Dawson	N
Calling, Ernest A., House	10/25/1979	Gothenburg, Dawson	N
Carnegie Public Library	12/19/1986	Gothenburg, Dawson	N
Dawson County Courthouse	1/10/1990	Lexington, Dawson	Yes – 0.2%, 1%
Hendee Hotel	3/21/1979	Cozad, Dawson	N
Midway Ranch House	7/5/2001	Gothenburg, Dawson	Unknown
Midway Stage Station	10/15/1969	Gothenburg, Dawson	Unknown
Olive, Ira Webster, House	11/27/1989	Lexington, Dawson	Y – 1%

<sup>32</sup> Nebraska Game and Parks. 2021. "Public Access ATLAS." <https://maps.outdoornebraska.gov/PublicAccessAtlas/>.

<sup>33</sup> U.S National Park Service. 2021. "Parks." <https://www.nps.gov/state/ne/index.htm>.



Site Name	Date Listed	Nearest Community, County	In Floodplain
<b>Lincoln Highway-Grand Island Seedling Mile</b>	4/24/2013	Grand Island, Hall	Unknown
<b>Bartenbach, H. J., House</b>	12/8/1986	Grand Island, Hall	N
<b>Cathedral of the Nativity of the Blessed Virgin Mary</b>	7/15/1982	Grand Island, Hall	N
<b>Evangelische Lutherische Dreienigkeit Kirche</b>	12/1/1986	Grand Island, Hall	N
<b>Giese, Heinrich, House</b>	7/26/2006	Grand Island, Hall	N
<b>Glade--Donald House</b>	9/12/1985	Grand Island, Hall	N
<b>Gloe Brothers Service Station</b>	7/5/2000	Wood River, Hall	Y – 0.2%
<b>Grand Island Carnegie Library</b>	5/2/1975	Grand Island, Hall	N
<b>Grand Island FCC Monitoring Station</b>	1/16/1973	Grand Island, Hall	Unknown
<b>Grand Island Senior High School</b>	11/22/1999	Grand Island, Hall	N
<b>Grand Island United States Post Office and Courthouse</b>	2/14/2006	Grand Island, Hall	N
<b>Hall County Courthouse</b>	9/15/1977	Grand Island, Hall	N
<b>Hamilton--Donald House</b>	3/13/1986	Grand Island, Hall	N
<b>Hargis, Andrew M., House</b>	6/9/1978	Grand Island, Hall	N
<b>Hotel Yancey (The)</b>	12/13/1984	Grand Island, Hall	N
<b>Huff, Lee, Apartment Complex</b>	7/1/1994	Grand Island, Hall	N
<b>Liederkrantz</b>	11/30/1978	Grand Island, Hall	N
<b>Nine Bridges Bridge</b>	6/29/1992	Doniphan, Hall	Y – Floodway, 1%, 0.2%
<b>Roeser, Oscar, House</b>	6/25/1982	Grand Island, Hall	N
<b>Shady Bend Gas Station, Grocery, and Diner</b>	7/2/2008	Grand Island, Hall	N
<b>Stolley, William, Homestead and Site of Fort Independence</b>	3/16/1972	Grand Island, Hall	N
<b>Stuhr Museum of the Prairie Pioneer</b>	5/18/2015	Grand Island, Hall	Y – 1%
<b>Townsley--Murdock Immigrant Trail Site</b>	3/5/1998	Alda, Hall	Unknown
<b>Cahow Barber Shop</b>	1/12/1984	Chapman, Merrick	Unknown
<b>Ellen, Martha, Auditorium</b>	9/28/1988	Central City, Merrick	Y – 0.2%
<b>Hord, Heber, House</b>	12/7/1987	Central City, Merrick	Y – 0.2%
<b>Merrick County Courthouse</b>	1/10/1990	Central City, Merrick	Y – 0.2%
<b>Morris, Wright, Boyhood House</b>	10/22/1980	Central City, Merrick	Y – 0.2%
<b>Nelson Farm</b>	8/26/2009	Central City, Merrick	Unknown
<b>Patterson Law Office</b>	3/13/1979	Central City, Merrick	Y – 0.2%
<b>Riverside Park Dance Pavillion</b>	12/31/1998	Central City, Merrick	Y – 1%
<b>Clarks Site</b>	8/14/1973	Osceola, Polk	Unknown
<b>Mickey, Gov. John Hopwood, House</b>	5/12/1977	Osceola, Polk	N
<b>Morrill, Charles H., Homestead</b>	6/4/1973	Stromsburg, Polk	N
<b>Polk County Courthouse</b>	1/10/1990	Osceola, Polk	N
<b>Strickland Site</b>	7/3/1996	Silver Creek, Polk	Unknown
<b>Wilson, Victor E., House</b>	7/7/1988	Stromsburg, Polk	N

Source: National Park Service<sup>34</sup>

<sup>34</sup> National Park Service. January 2021. "National Register of Historic Places NPGallery Database." <https://npgallery.nps.gov/NRHP>

# Section Four:

## Risk Assessment

### Introduction

The ultimate purpose of this hazard mitigation plan is to minimize the loss of life and property across the planning area. The basis for the planning process is the regional and local risk assessment. This section contains a description of potential hazards, regional vulnerabilities and exposures, probability of future occurrences, and potential impacts and losses. By conducting a regional and local risk assessment, participating jurisdictions can develop specific strategies to address areas of concern identified through this process. The following table defines terms that will be used throughout this section of the plan.

**Table 24: Term Definitions**

Term	Definition
<b>Hazard</b>	A potential source of injury, death, or damages
<b>Asset</b>	People, structures, facilities, and systems that have value to the community
<b>Risk</b>	The potential for damages, loss, or other impacts created by the interaction of hazards and assets
<b>Vulnerability</b>	Susceptibility to injury, death, or damages to a specific hazard
<b>Impact</b>	The consequence or effect of a hazard on the community or assets
<b>Historical Occurrence</b>	The number of hazard events reported during a defined period of time
<b>Extent</b>	The strength or magnitude relative to a specific hazard
<b>Probability</b>	Likelihood of a hazard occurring in the future

### Methodology

The risk assessment methodology utilized for this plan follows the same methodology as outlined in the FEMA Local Mitigation Planning Handbook. This process consists of four primary steps: 1) Describe the hazard; 2) Identify vulnerable community assets; 3) Analyze risk; and 4) Summarize vulnerability.

When describing the hazard, this plan will examine the following items: previous occurrences of the hazard within the planning area; locations where the hazard has occurred in the past or is likely to occur in the future; extent of past events and likely extent for future occurrences; and probability of future occurrences. While the identification of vulnerable assets will be conducted across the entire planning area, *Section Seven* will discuss community-specific assets at risk for relevant hazards. Analysis for regional risk will examine historic impacts and losses and what is possible should the hazard occur in the future. Risk analysis will include both qualitative (i.e., description of historic or potential impacts) and quantitative data (i.e., assigning values and measurements for potential loss of assets). Finally, each hazard identified the plan will provide a summary statement encapsulating the information provided during each of the previous steps of the risk assessment process.

For each of the hazards profiled the best and most appropriate data available have been considered. Further discussion relative to each hazard is discussed in the hazard profile portion of this section.

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

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

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

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

Requirement §201.6(c)(2)(ii): The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods.

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

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

## Average Annual Damages and Frequency

FEMA *Requirement §201.6(c)(2)(ii) (B)* suggests that when the appropriate data is available, hazard mitigation plans should also provide an estimate of potential dollar losses for structures in vulnerable areas. This risk assessment methodology includes an overview of assets at risk and provides historic average annual dollar losses for all hazards for which historic event data are available. Additional loss estimates are provided separately for those hazards for which sufficient data is available. These estimates can be found within the relevant hazard profiles.

Average annual losses from historical occurrences can be calculated for those hazards which there is a robust historic record and for which monetary damages are recorded. There are three main pieces of data used throughout this formula.

- **Total Damages in Dollars:** This is the total dollar amount of all property damages and crop damages as recorded in federal, state, and local data sources. The limitation to these data sources is that dollar figures usually are estimates and often do not include all damages from every event, but only officially recorded damages from reported events.
- **Total Years of Record:** This is the span of years there is data available for recorded events.
- **Number of Hazard Events:** This shows how often an event occurs. The frequency of a hazard event will affect how a community responds. A thunderstorm may not cause much damage each time, but multiple storms can have an incremental effect on housing and utilities. In contrast, a rare tornado can have a widespread effect on a community.

An example of the Event Damage Estimate is found below:

$$\text{Annual Damages (\$)} = \frac{\text{Total Damages in Dollars (\$)}}{\text{Total Years Recorded (\#)}}$$

Each hazard will be included, while those which have caused significant damages or occurred in significant numbers are discussed in detail. It should be noted NCEI data are not all inclusive and the database provides very limited information on crop losses. To provide a better picture of the crop losses associated with the hazards within the planning area, crop loss information provided by the Risk Management Agency (RMA) of the USDA was also utilized for this update of the plan for counties with available data. The collected data were from 2000 to 2020. Data for all the hazards are not always available, so only those with an available dataset are included in the loss estimation.

Annual probability can be calculated based on the total years of record and the total number of years in which an event occurred. An example of the annual probability estimate is found below:

$$\text{Annual Probability (\%)} = \frac{\text{Total Years with an Event Occurring (\#)}}{\text{Total Years of Record (\#)}} \times 100$$

## Hazard Identification

The identification of relevant hazards for the planning area began with a review of the 2021 State of Nebraska Hazard Mitigation Plan. The Regional Planning Team and participating jurisdictions reviewed the list of hazards addressed in the state mitigation plan and determined which hazards were appropriate for discussion relative to the planning area. The hazards for which a risk assessment was completed are included in the following table.

**Table 25: Hazards Addressed in the Plan**

Hazards Addressed in the Plan		
Animal and Plant Disease	Flooding	Severe Thunderstorms
Dam Failure	Grass/Wildfire	Severe Winter Storms
Drought	Hazardous Materials Release	Terrorism
Earthquakes	Levee Failure	Tornadoes and High Winds
Extreme Heat	Public Health Emergency	

## Hazard Elimination

Given the location and history of the planning area, hazards from the State HMP were eliminated from further review. These hazards are listed below with a brief explanation of why the hazards were eliminated.

- **Civil Disorder:** For the entire state, there have been a small number of civil disorder events reported; most date back to the 1960s, however, in 2020 civil disorder events occurred during Black Lives Matter Protests. Most events have occurred in the state's larger communities like Lincoln and Omaha. This approach is consistent with the 2021 Nebraska State HMP.
- **Landslides:** According to the data available related to landslides across the state, one landslide occurred in Merrick County in 1989. The event had no reported damages. Landslides that have occurred across the state have also not resulted in any reported damages or exceeded local response capabilities. Additionally, the local planning team

noted that this was not a hazard of concern. This approach is consistent with the 2021 Nebraska State HMP.

- **Urban Fire:** Fire departments across the planning area have mutual aid agreements in place to address this threat, and typically this hazard is addressed through existing plans and resources. As such, urban fire will not be profiled for this plan. Discussion relative to fire will be focused on wildfire and the potential impacts wildfire could have on the built environment. This approach is consistent with the 2021 Nebraska State HMP.

## Hazard Assessment Summary Tables

The following table provides an overview of the data contained in the hazard profiles. Hazards listed in this table and throughout the section are in alphabetical order. This table is intended to be a quick reference for people using the plan and does not contain source information. Source information and full discussion of individual hazards are included later in this section. Annual probability is based off the number of years that had at least one event.

**Table 26: Regional Risk Assessment**

Hazard	Previous Occurrence Events/Years	Approximate Annual Probability	Likely Extent
<b>Animal and Plant Disease</b>	Animal: 98/7 Plant: 59/20	Animal 100% Plant 75%	~33 animals per event Crop damage or loss
<b>Dam Failure</b>	6/130	5%	Varies by structure
<b>Drought</b>	444/1,513 months	29%	D1-D4
<b>Earthquakes</b>	1/120	Less than 1%	Less than 5.0 on the Richter Scale
<b>Extreme Heat</b>	Avg 5 days per year >100°F	78%	>100°F
<b>Flooding</b>	84/26	65%	Some inundation of structures (22.6% of structures) and roads near streams. Some evacuations of people may be necessary (19.4% of population)
<b>Grass/Wildfires</b>	1,460/21	100%	Avg 32.3 acres Some homes and structures threatened or at risk
<b>Hazardous Materials Release</b>	Fixed Site: 176/31 Transportation: 183/51	100% 65%	Avg Liquid Spill
			i.e. 277 gal
			Avg Gas Spill
			i.e. 440 gal
<b>Levee Failure</b>	0/120	Less than 1%	Varies by extent
<b>Public Health Emergency</b>	2	Unknown	Varies by extent
<b>Severe Thunderstorms</b>	1,599/26	100%	≤3.71" rainfall Avg 57 mph winds
<b>Severe Winter Storms</b>	513/26	100%	0.25" – 1.5" Ice
			30°-70° below zero (wind chill) 2-18" snow 20-90 mph winds
<b>Terrorism</b>	1/48	Less than 1%	Varies by event

**Tornadoes and High Winds**

258/26

92%

Avg: EF0  
Range EF0-EF3

The following table provides loss estimates for hazards with sufficient data. Detailed descriptions of major events are included in *Section Seven: Community Profiles*.

**Table 27: Loss Estimation for the Planning Area**

Hazard Type		Count	Property Damage	Crop Damage <sup>2</sup>
<b>Animal and Plant Disease</b>	Animal Disease <sup>1</sup>	98	3,303 animals	N/A
	Plant Disease <sup>2</sup>	59	N/A	\$770,256
<b>Dam Failure<sup>5</sup></b>		6	N/A	N/A
<b>Drought<sup>6</sup></b>		444 of 1,513 months	\$0	\$76,993,162
<b>Earthquakes<sup>12</sup></b>		1	\$0	N/A
<b>Extreme Heat<sup>7</sup></b>		Avg. 5 Days a Year	N/A	\$25,937,061
<b>Flooding<sup>8</sup></b>	Flash Flood	47	\$42,655,000	\$4,140,050
	Flood	37	\$9,118,000	
<b>Grass/Wildfires<sup>9</sup></b> <i>7 injuries 3 fatalities</i>		1,460	41,435 acres	\$248,598
<b>Hazardous Materials Release</b>	Fixed Site <sup>3</sup>	176	\$0	N/A
	Transportation <sup>4</sup>	183	\$1,325,150	N/A
<b>Levee Failure<sup>11</sup></b>		0	\$0	N/A
<b>Public Health Emergency</b>		2	N/A	N/A
<b>Severe Thunderstorms<sup>8</sup></b> <i>25 injuries</i>	Thunderstorm Wind Range: 57 Average: 50-92	540	\$34,940,000	\$190,074,924
	Hail Range: 0.75-5.0 in. Average: 1.2 in	957	\$117,794,000.00	
	Heavy Rain	94	\$587,000	
	Lightning	8	\$492,000	
	Blizzard	50	\$905,000	
<b>Severe Winter Storms<sup>8</sup></b> <i>12 injuries 4 fatalities</i>	Extreme Cold/Wind Chill	17	\$0	\$3,613,366
	Heavy Snow	16	\$0	
	Ice Storm	35	\$23,325,000	
	Winter Storm	216	\$1,265,000	
	Winter Weather	179	\$160,000	
<b>Terrorism<sup>10</sup></b>		1	\$0	N/A
<b>Tornadoes and High Winds<sup>8</sup></b> <i>10 injuries</i>	Tornadoes Range: EF0-EF3 Average: EF0	68	\$30,425,000	\$6,490,000
	High Winds Range: 50 kts Average: 35-70 kts	190	\$5,966,400.00	\$24,439,112
<b>Total</b>		<b>4,440</b>	<b>\$268,957,550</b>	<b>\$332,706,530</b>

N/A: Data not available

1 - NDA, 2014 – April 2021



- 2 - USDA RMA, 2000 – 2020
- 3 - NRC, 1990 – February 2020
- 4 - PHSMA, 1971 – June 2021
- 5 - DNR Communication, July 2021
- 6 - NOAA, 1895 – January 2021
- 7 - NOAA Regional Climate Center, 1878 – June 2021
- 8 - NCEI, 1996 – June 2021
- 9 - NFS, 2000 - 2020
- 10 - University of Maryland, 1970-2018
- 11 - USACE NLN, 1900 – June 2021
- 12 - USGS, 1900 – June 2021

## Historical Disaster Declarations

The following tables show past disaster declarations that have been granted within the planning area.

### Farm Service Agency Small Business Administration Disasters

The U.S. Small Business Administration (SBA) was created in 1953 as an independent agency of the federal government to aid, counsel, assist, and protect the interests of small business concerns, to preserve free competitive enterprise, and maintain and strengthen the overall economy of our nation. A program of the SBA includes disaster assistance for those affected by major natural disasters. The following table summarizes the SBA Disasters involving the planning area since 2006.

**Table 28: SBA Declarations**

Disaster Declaration Number	Declaration Date	Title	Primary Counties	Contiguous Counties
NE-00002	6/23/2005	Severe Storms, and Flooding	Buffalo, Hall, Merrick	-
NE-00005	1/26/2006	Severe Winter Storm	Dawson	-
NE-00011	1/7/2007	Severe Winter Storm	Buffalo, Dawson, Hall, Merrick, Polk	-
NE-00014	7/24/2007	Severe Storms, and Flooding	Buffalo, Dawson	-
NE-00020	6/20/2008, 6/24/2008, 7/29/2008	Severe Storms, Tornadoes, and Flooding	Buffalo, Dawson	Hall, Merrick, Polk
NE-00021	6/20/2008, 6/24/2008, 7/29/2008	Severe Storms, Tornadoes, and Flooding	Buffalo, Dawson, Hall, Merrick, Polk	-
NE-00033	02/25/2010 & 3/26/2010	Severe Winter Storms and Snowstorm	Merrick, Polk	-
NE-00035	04/21/2010 & 6/10/2010	Severe Storms, Ice Jams, and Flooding.	Polk	-
NE-00044	08/12/2011 & 8/25/2011	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Buffalo, Polk	-
NE-00048	3/25/2013	Drought	Merrick	Buffalo, Hall, Polk
NE-00049	4/1/2013	Drought	Buffalo, Dawson, Hall	Merrick, Polk



Disaster Declaration Number	Declaration Date	Title	Primary Counties	Contiguous Counties
NE-00050	4/8/2013	Drought	Polk	Buffalo, Hall, Merrick
NE-00053	12/10/2013	Drought	Buffalo, Dawson, Hall, Merrick, Polk	-
NE-00059	1/28/2015	Drought	Dawson	Buffalo

Source: Small Business Administration, 2006-2019<sup>35</sup>

### Presidential Disaster Declarations

Presidential disaster declarations are available via FEMA from 1953 to 2021. Declarations prior to 1964 are not designated by county on the FEMA website and are not included below. The following table describes presidential disaster declarations within the planning area for the period of record. Note that while data is available from 1953 onward, the planning area has received 28 presidential disaster declarations since 1967.

**Table 29: Presidential Disaster Declarations**

Disaster Declaration Number	Declaration Date	Title	Affected Counties	Public Assistance
228	7/18/1967	Severe Storms and Flooding	Buffalo, Hall, Merrick, Polk	-
500	4/8/1976	Severe Ice Storm	Hall, Merrick, Polk	-
552	3/24/1978	Storms, Ice Jams, Snowmelt, and Flooding	Buffalo, Dawson, Merrick	-
625	6/4/1980	Severe Storms and Tornadoes	Merrick, Hall	-
873	7/4/1990	Severe Storms, Tornadoes, and Flooding	Buffalo, Hall	-
983	4/2/1993	Ice Jams and Flooding	Hall, Merrick	-
998	7/19/1993	Severe Storms and Flooding	Buffalo, Dawson, Hall, Merrick, Polk	-
1027	5/9/1994	Severe Snow and Ice Storm	Buffalo, Dawson	-
1190	11/1/1997	Severe Snow Storms, Rain, and Strong Winds	Buffalo, Dawson, Hall, Polk	-
1480	7/21/2003	Severe Storms and Tornadoes	Polk	\$3,891,329
1517	5/25/2004	Severe Storms, Tornadoes, and Flooding	Hall, Buffalo	\$13,351,658
1590	6/23/2005	Severe Storms and Flooding	Buffalo, Hall, Merrick	\$1,688,474

35 Small Business Administration. 2001-2019. [data files]. Office of Disaster Assistance | Resources." <https://www.sba.gov/offices/headquarters/oda/resources/1407821>.

Disaster Declaration Number	Declaration Date	Title	Affected Counties	Public Assistance
<b>3245</b>	9/13/2005	Hurricane Katrina Evacuees	Buffalo, Dawson, Hall, Merrick, Polk	\$393,813
<b>1627</b>	1/26/2006	Severe Winter Storm	Dawson	\$5,444,137
<b>1674</b>	1/7/2007	Severe Winter Storms	Buffalo, Dawson, Hall, Merrick, Polk	\$124,357,843
<b>1714</b>	7/24/2007	Severe Storms and Flooding	Buffalo, Dawson	\$2,306,259
<b>1770</b>	6/20/2008	Severe Storms, Tornadoes, and Flooding	Buffalo, Dawson, Hall, Merrick, Polk	\$36,258,650
<b>1878</b>	2/25/2010	Severe Winter Storms and Snowstorm	Merrick, Polk	\$6,577,021
<b>1902</b>	4/21/2010	Severe Storms, Ice Jams, and Flooding	Polk	\$3,112,392
<b>1924</b>	7/15/2010	Severe Storms and Flooding	Buffalo, Dawson	\$49,926,355
<b>4014</b>	8/12/2011	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	Buffalo, Polk	\$3,362,468
<b>4185</b>	7/28/2014	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	Polk	\$3,937,964
<b>4325</b>	8/1/2017	Severe Storms, Tornadoes, and Straight-Line Winds	Polk	\$15,572,546
<b>4375</b>	6/29/2018	Severe Winter Storm and Straight-Line Winds	Hall, Merrick	\$7,428,072
<b>4420</b>	3/21/2019	Severe Winter Storm, Straight Line Winds, and Flooding	Buffalo, Dawson, Hall, Merrick, Polk	\$465,813,265
<b>3483</b>	3/13/2020	Covid-19	Buffalo, Dawson, Hall, Merrick, Polk	-
<b>4521</b>	4/4/2020	Covid-19 Pandemic	Buffalo, Dawson, Hall, Merrick, Polk	\$222,708,357
<b>4616</b>	9/6/2021	Severe Storms and Straight-Line Winds	Hall	\$1,208,818

Source: Federal Emergency Management Agency, 1953-Sept 2021<sup>36</sup>

## Climate Adaptation

Long-term climate trends have shifted throughout the 21st century and have created significant changes in precipitation and temperature which have altered the severity and subsequent impacts from severe weather events. The Regional and Local Planning Teams identified changes in the regional climate as a top concern impacting communities, residents, local economies, and

36 Federal Emergency Management Agency. 2021. "Disaster Declarations." Accessed Sept 2021. <https://www.fema.gov/disasters>.

infrastructure throughout the planning area. Discussions on temperature, precipitation, and climate impacts are included below.

The planning area is located in the Northern Great Plains region of the United States, which includes Montana, Wyoming, North Dakota, South Dakota, and Nebraska. A large elevation change across the region contributes to high geographical, ecological, and climatological variability, including a strong gradient of decreasing precipitation moving from east to west across the region. Significant weather extremes impact this area, including winter storms, extreme heat and cold, severe thunderstorms, drought, and flood producing rainfall. The Fourth National Climate Assessment has provided an overview of potential impacts within the planning area.<sup>37</sup>

- **Water:** Water is the lifeblood of the Northern Great Plains, and effective water management is critical to the region's people, crops and livestock, ecosystems, and energy industry. Even small changes in annual precipitation can have large effects downstream; when coupled with the variability from extreme events, these changes make managing these resources a challenge. Future changes in precipitation patterns, warmer temperatures, and the potential for more extreme rainfall events are very likely to exacerbate these challenges.
- **Agriculture:** Agriculture is an integral component of the economy, the history, and the culture of the Northern Great Plains. Recently, agriculture has benefited from longer growing seasons and other recent climatic changes. Some additional production and conservation benefits are expected in the next two to three decades as land managers employ innovative adaptation strategies, but rising temperatures and changes in extreme weather events are very likely to have negative impacts on parts of the region. Adaptation to extremes and to longer-term, persistent climate changes will likely require transformative changes in agricultural management, including regional shifts of agricultural practices and enterprises.
- **Recreation and Tourism:** Ecosystems across the Northern Great Plains provide recreational opportunities and other valuable goods and services that are at risk in a changing climate. Rising temperatures have already resulted in shorter snow seasons, lower summer stream flows, and higher stream temperatures. These changes have important consequences for local economies that depend on winter or river-based recreational activities. Climate-induced land-use changes in agriculture can have cascading effects on closely entwined natural ecosystems, such as wetlands, and the diverse species and recreational amenities they support.
- **Energy:** Fossil fuel and renewable energy production and distribution infrastructure is expanding within the Northern Great Plains. Climate change and extreme weather events put this infrastructure at risk, as well as the supply of energy it contributes to support individuals, communities, and the U.S. economy as a whole. The energy sector is also a significant source of greenhouse gases and volatile organic compounds that contribute to climate change and ground-level ozone pollution.

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37 U.S. Global Change Research Program. 2018. "Fourth National Climate Assessment". <https://nca2018.globalchange.gov/>.

## Nebraska's Changing Climate

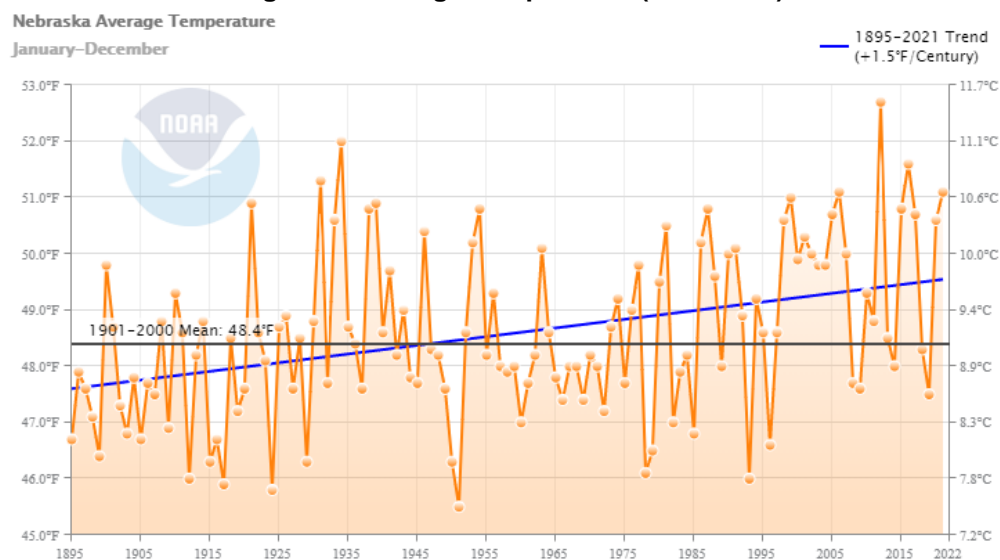
The United States as a whole is experiencing significant changes in temperature, precipitation, and severe weather events resulting from climate change. According to a University of Nebraska report (Understanding and Assessing Climate Change: Implications for Nebraska), the following changes can be expected for Nebraska's future climate:<sup>38</sup>

- Increase in extreme heat events (days over 100°F).
- Decrease in soil moisture by 5-10%.
- Increase in drought frequency and severity.
- Increase in heavy rainfall events.
- Increase in flood magnitude.
- Decrease in water flow in the Missouri River and Platte River from reduced snowpack in the Rocky Mountains.
- Additional 30-40 days in the frost-free season.

### Changes in Temperature

Since 1895 Nebraska's overall average temperature has increased by almost 1.5°F (Figure 8). Climate modeling suggests warmer temperature conditions will continue in the coming decades and rise steadily into mid-century. Warming has increased the most in winter and spring months with winter minimum temperatures rising 2-4°F. In addition, there is greater warming for nighttime lows than for daytime highs. Since 1985, the length of the frost season has increased by an average of more than one week across Nebraska, with the length likely to continue to increase in the future. Projected temperature changes range from 4-9°F by 2099.<sup>39</sup>

**Figure 8: Average Temperature (1895-2021)**



Source: NOAA, 2021<sup>40</sup>

38 University of Nebraska-Lincoln. 2014. "Understanding and Assessing Climate Change: Implications for Nebraska". <http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf>.

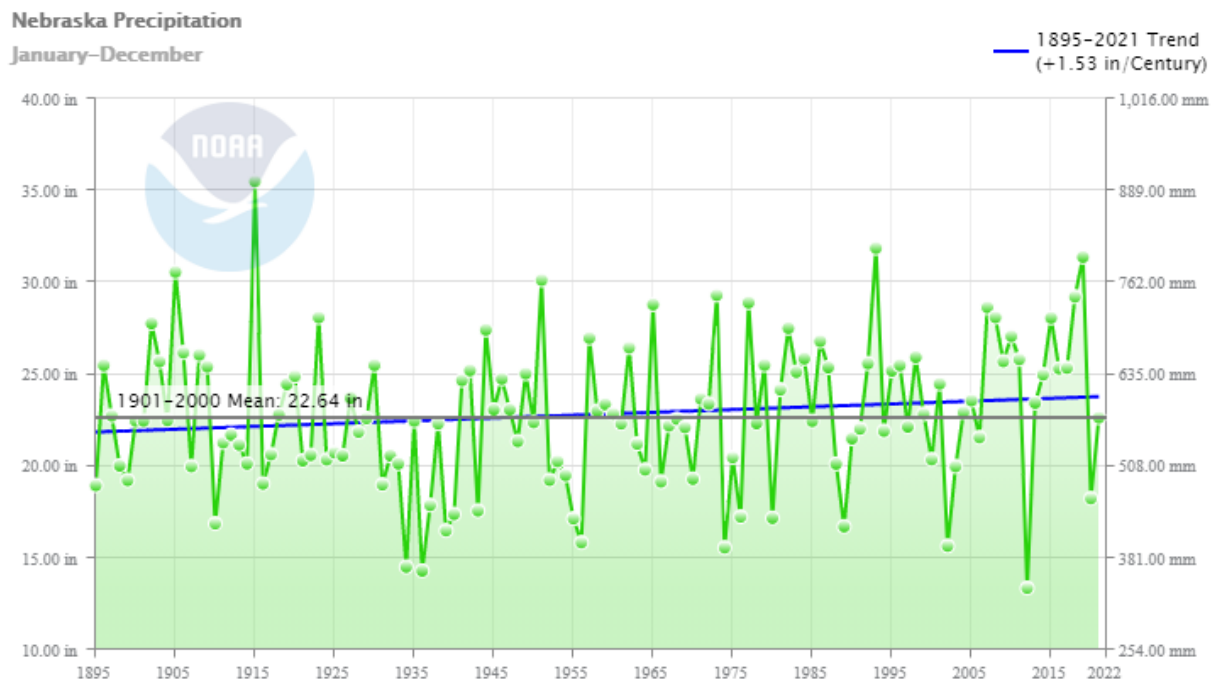
39 University of Nebraska-Lincoln. 2014. "Understanding and Assessing Climate Change: Implications for Nebraska". <http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf>.

40 NOAA. 2021. "Climate at a Glance: Statewide Time Series.". Accessed March 2022. <https://www.ncdc.noaa.gov/cag/statewide/time-series/25/tavg/12/12/1895->

### Changes in Precipitation

Changing extremes in precipitation are anticipated in the coming decades, with more significant rain and snowfall events and more intense drought periods. Seasonal variations will be heightened, with more frequent and more significant rainfall expected in the spring and winter and hotter, drier periods in the summer. Since 1895, yearly annual precipitation for Nebraska has increased slightly (Figure 9). This trend is expected to continue as the impacts of climate change continue to be felt. Climate modeling may show only moderate precipitation and streamflow changes; however, the state is already at risk to large annual and seasonable variability as seen by flooding and drought events occurring in concurrent years. There will likely be more days with a heavy precipitation event (rainfall of greater than one inch per day) across the state. Precipitation varies significantly across the state (Figure 10) and moves in a longitudinal gradient. The east receives twice as much precipitation (35 inches annually) as the Nebraska Panhandle (15 inches) on average.<sup>41</sup>

**Figure 9: Average Precipitation (1895-2021)**



Source: NOAA, 2021<sup>42</sup>

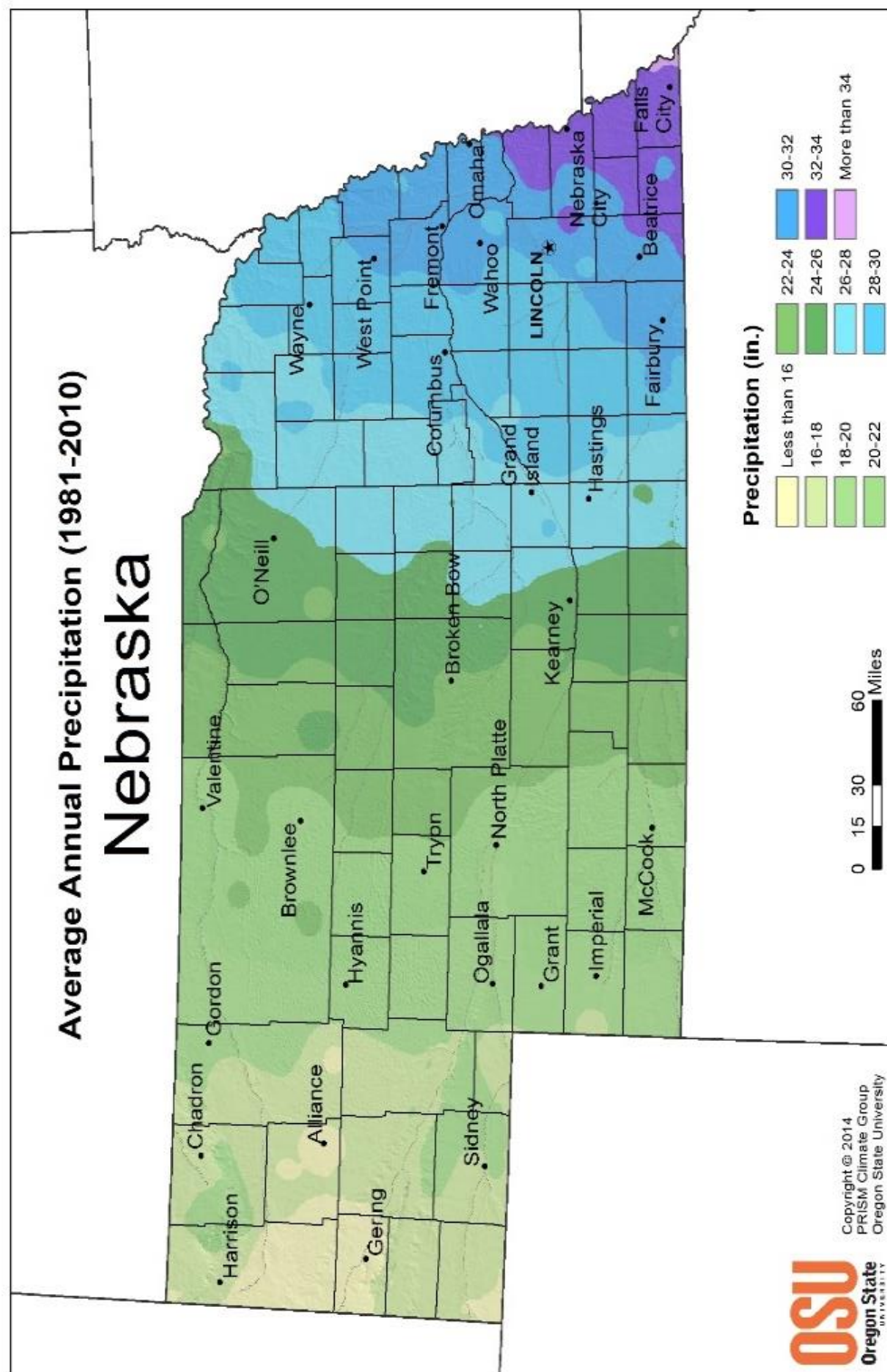
2020?base\_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend\_base=100&begtrendyear=1895&endtrendyear=2021.

41 North Central Climate Collaborative. January 2020. "NC3 Nebraska Climate Summary." Accessed April 2021. [https://northcentralclimate.org/files/2020/01/nc3-Nebraska-Climate-Summary-FINAL\\_2.12.pdf?x24082](https://northcentralclimate.org/files/2020/01/nc3-Nebraska-Climate-Summary-FINAL_2.12.pdf?x24082)

42 NOAA. 2021. "Climate at a Glance: Statewide Time Series." Accessed March 2022.

[https://www.ncdc.noaa.gov/cag/statewide/time-series/25/pcp/12/12/1895-2022?base\\_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend\\_base=100&begtrendyear=1895&endtrendyear=2022](https://www.ncdc.noaa.gov/cag/statewide/time-series/25/pcp/12/12/1895-2022?base_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend_base=100&begtrendyear=1895&endtrendyear=2022)

Figure 10: Average Annual Precipitation for Nebraska (1981-2010)



Source: Oregon State University PRISM Climate Group, 2014



## Impacts from Climate Change

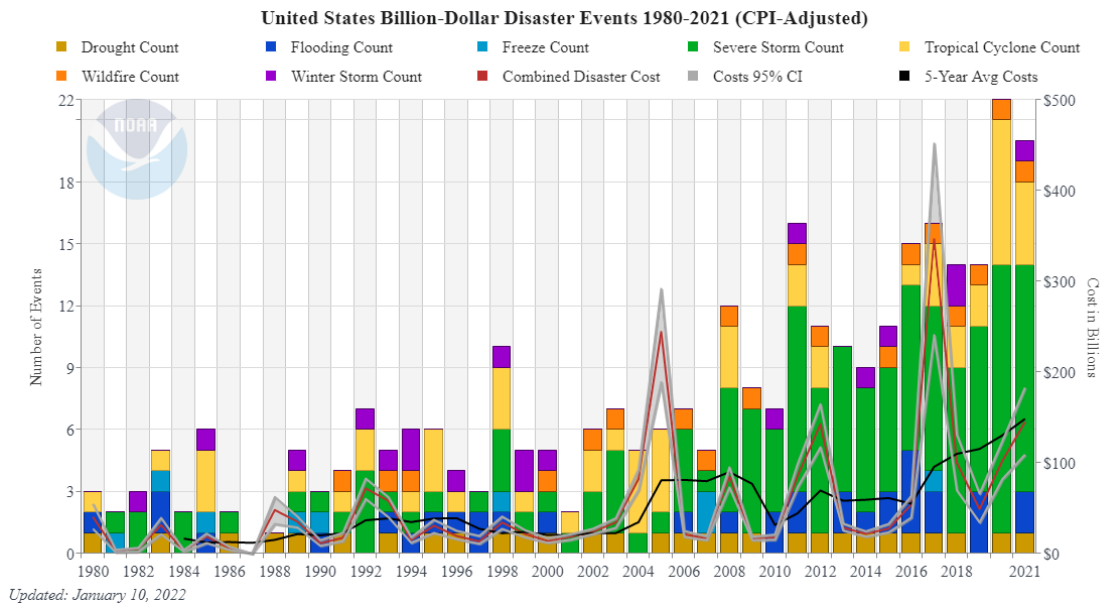
Observed changes in the intensity and frequency of extreme events are a significant concern now and in the future because of the social, environmental, and economic costs associated with their impacts. Challenges that are expected to affect communities, environments, and residents as a result of climate change include:

- Developing and maintaining sustainable agricultural systems.
- Resolving increasing competition among land, water, and energy resources.
- Conserving vibrant and diverse ecological systems.
- Enhancing the resilience of the region's people to the impacts of climatic extremes.

Certain groups of people may face greater difficulty when dealing with the impacts of a changing climate. Older adults, immigrant communities, and those living in poverty are particularly susceptible. Additionally, specific industries and professions tied to weather and climate, like outdoor tourism, commerce, and agriculture, are especially vulnerable.<sup>43</sup>

As seen in the figure below, the United States is experiencing an increase in the number of billion-dollar natural disasters due to increases in development and climate change.

**Figure 11: U.S. Billion-Dollar Disaster Events (1980-2021)**



Source: NOAA, 2021<sup>44</sup>

## Agriculture

The agricultural sector will experience an increase in droughts, an increase in grass and wildfire events, changes in the growth cycle as winters warm, an influx of new and damaging agricultural diseases or pests, and changes in the timing and magnitude of rainfall. As described in the Plant Hardiness Zone map available for the United States (Figure 12), these changes have shifted the annual growing season and expected agricultural production conditions. Nebraska is vulnerable

43 U.S. Environmental Protection Agency. "Climate Impacts on Society." Accessed March 2022.

[https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-society\\_.html](https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-society_.html)

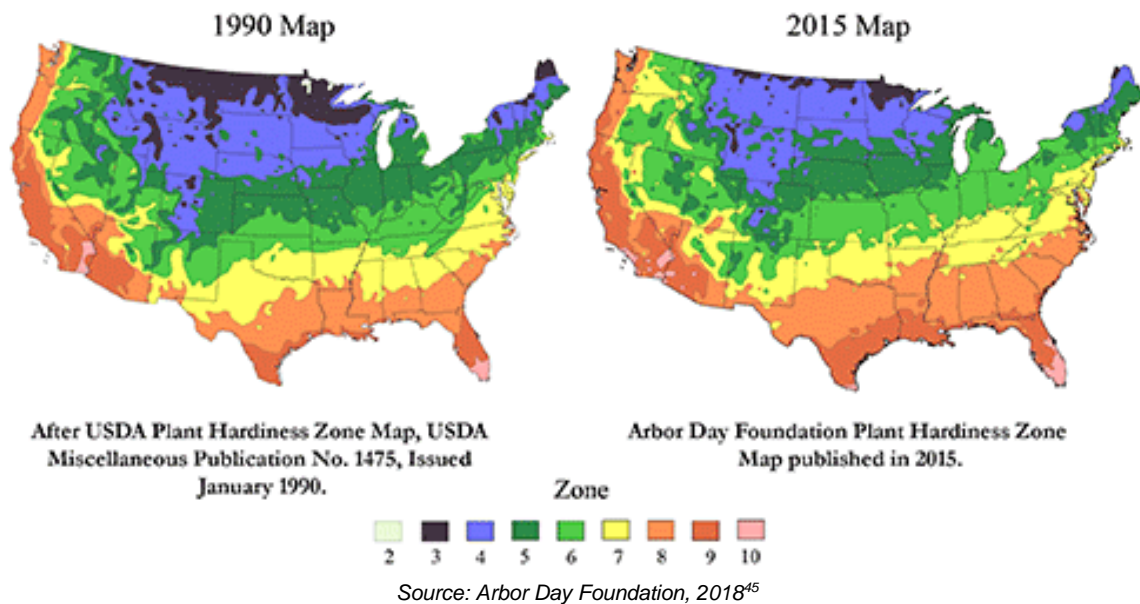
44 NOAA National Centers for Environmental Information. 2021. "U.S. Billion-Dollar Weather and Climate Disasters".

<https://www.ncdc.noaa.gov/billions/>



to changes in growing season duration and growing season conditions as a heavily agriculturally dependent state. These added stressors on agriculture could have devastating economic effects if new agricultural and livestock management practices are not adopted.

**Figure 12: Plant Hardiness Zone Change**



#### Air Quality

Rising temperatures will also impact air quality. Harmful air pollutants and allergens increase as temperatures increase. More extended periods of warmth contribute to longer pollen seasons that allow plant spores to travel farther and increase exposure to allergens. More prolonged exposure to allergens can increase the risk and severity of asthma attacks and worsen existing allergies in individuals.<sup>46</sup> An increase in air pollutants can occur from the increased number of grass/wildfires. The public can be exposed to harmful particulate matter from smoke and ash that can cause various health issues. Depending on the length of exposure, age, and individual susceptibility, effects from wildfire smoke can range from eye and respiratory irritation to severe disorders like bronchitis, asthma, and aggravation of pre-existing respiratory and cardiovascular diseases.<sup>47</sup>

#### Water Quality

Increasing temperatures, shifting precipitation patterns, and extreme weather events impact water quality throughout the state. With the increasing intensity and frequency of extreme precipitation events, impacts to water systems ultimately threaten human health. Events can lead to flooding and stormwater runoff that can carry pollutants across landscapes and threaten human health by contaminating water wells, groundwater, and other bodies of water. Common pollutants include pesticides, bacteria, nutrients, sediment, animal waste, oil, and hazardous waste.

As average temperatures increase, water temperatures also rise and put water bodies at risk for eutrophication and excess algal growth that reduce water quality. In agricultural landscapes this can be exacerbated from major storm events that cause sediment and nutrients such as

<sup>45</sup> Arbor Day Foundation. 2018. "Hardiness Zones." [https://www.arborday.org/media/map\\_change.cfm](https://www.arborday.org/media/map_change.cfm)

<sup>46</sup> Asthma and Allergy Foundation of America. 2010. "Extreme Allergies and Climate Change." Accessed 2022. <https://www.aafa.org/extreme-allergies-and-climate-change/>.

<sup>47</sup> AirNow. 2019. "Wildfire Smoke: A Guide for Healthcare Professionals." Accessed 2022. <https://www.airnow.gov/wildfire-smoke-guide-publications/>

phosphorous and nitrogen to runoff into nearby water sources. The runoff can contribute to the buildup of nutrients in the water, increasing plant and algae growth that can deplete oxygen and kill aquatic life. Nutrient enrichment can lead to toxic cyanobacterial harmful algae blooms (cyanoHABs), which can be harmful to animal and human health. CyanoHABs can cause economic damage such as decreasing property values, reducing recreational revenue, and increasing the costs for treating drinking water.<sup>48</sup>

#### Zoonotic Disease

Changes in temperature and precipitation can alter the geographic range of disease-carrying insects and pests. Mosquitoes that transmit viruses such as Zika, West Nile and dengue may become more prevalent in Nebraska because of the increased temperatures and precipitation. These diseases may initially spread faster as the local population is not aware of the proper steps to reduce their risk.

#### Energy

As the number of 100°F days increases, along with warming nights, the stress placed on the energy grid will likely increase and possibly lead to more power outages. Severe weather events also stress emergency production, infrastructure transmission, and transportation. Roads, pipelines, and rail lines are all at risk of damages from flooding, extreme heat, erosion, or added stress from increased residential demands.<sup>49</sup> Critical facilities and vulnerable populations that are not prepared to handle periods of power outages, particularly during heat waves, will be at risk.

#### Drought and Extreme Heat

An increase in average temperatures will contribute to the raise in the frequency and intensity of hazardous events like extreme heat and drought, which will cause significant economic, social, and environmental impacts on Nebraskans. Although drought is a natural part of the climate system, increasing temperatures will increase evaporation rates, decrease soil moisture, and lead to more intense droughts in the future, having negative impacts on farming and community water systems. Extreme heat events have adverse effects on both human and livestock health. Heatwaves may also impact plant health, with negative effects on crops during essential growth stages. Increasing temperatures and drought may reduce the potential for aquifers to recharge, which has long-term implications for the viability of agriculture in Nebraska.

#### Grass/Wildfire

Rising temperatures will likely increase the frequency and intensity of grass/wildfires. Warmer temperatures cause snow to melt sooner and create drier soils and forests, which act as kindling to ignite fires. Dry and dead trees will increase fuel loads causing fires to spread much quicker. Additionally, warmer nighttime temperatures contribute to the continued spread of wildfires over multiple days.<sup>50</sup>

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48 USGS. "Nutrients and Eutrophication". Accessed 2022. [https://www.usgs.gov/mission-areas/water-resources/science/nutrients-and-eutrophication?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/mission-areas/water-resources/science/nutrients-and-eutrophication?qt-science_center_objects=0#qt-science_center_objects).

49 USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp.

50 NASA Global Climate Change. September 2019. "Satellite Data Record Shows Climate Change's Impact on Fires." Accessed 2022. <https://climate.nasa.gov/news/2912/satellite-data-record-shows-climate-changes-impact-on-fires/>.

### Severe Storms and Flooding

Nebraska experiences frequent snowstorms and ice storms during winter, which can produce heavy snowfall and high wind gusts that lead to whiteout conditions. In the warmer months, convective storms are common and include flash flood-producing rainstorms and severe thunderstorms capable of producing hail, damaging winds, and tornadoes. As temperatures continue to rise, more water vapor evaporates into the atmosphere, creating increased humidity, which can increase the frequency and intensity of these storms. An increase in severe storms and heavy rain events will lead to more flooding and larger magnitude flood events. These severe storm and flooding events can cause increased damages to structures and put more people at risk of injury or death.

### **Future Adaptation and Mitigation**

The planning area will have to adapt to a changing climate and its impacts or experience an increase in economic losses, property damages, agricultural damages, and loss of life. Past events have typically informed HMPs to be more resilient to future events. This HMP includes strategies for the planning area to address these changes and increase resilience. However, future updates of this HMP should consider including adaptation as a core strategy to be better informed by future projections on the frequency, intensity, and distribution of hazards. Jurisdictions in the planning area should consider past and future climate changes and impacts when incorporating mitigation actions into local planning processes.

## **Hazard Profiles**

Information from participating jurisdictions was collected and reviewed alongside hazard occurrence, magnitude, and event narratives as provided by local, state, and federal databases. Based on this information, profiled hazards were determined to either have a historical record of occurrence or the potential for occurrence in the future. The following profiles will broadly examine the identified hazards across the region. Hazards of local concern or events which have deviated from the norm are discussed in greater detail in each respective community profile (see *Section Seven* of this plan). Local jurisdictional planning teams selected hazards from the regional hazard list as the prioritized hazards for the jurisdiction based on historical hazard occurrences, potential impacts, and the jurisdictions' capabilities. However, it is important to note that while a jurisdiction may not have selected a specific hazard to be profiled, hazard events can impact any jurisdiction at any time and their selection is not a full indication of risk.

# Animal and Plant Disease

Agriculture disease is any biological disease or infection that can reduce the quality or quantity of either livestock or vegetative crops. This section looks at both animal disease and plant disease, as both make up a significant portion of Nebraska's and the planning area's economy.

The State of Nebraska's economy is heavily invested in both livestock and crop sales. According to the Nebraska Department of Agriculture (NDA) in 2017, the market value of agricultural products sold was estimated at nearly \$22 billion; this total is split between crops (estimated \$9.31 billion) and livestock (estimated \$12.67 billion). For the planning area, the market value of sold agricultural products exceeded \$1.9 million.<sup>51</sup>

Table 30 shows the population of livestock within the planning area. This count does not include wild populations that are also at risk from animal diseases.

**Table 30: Livestock Inventory**

County	Market Value of 2017 Livestock Sales	Cattle and Calves	Hogs and Pigs	Poultry Egg Layers	Sheep and Lambs
Buffalo	\$159,260,000	94,485	2,544	1,710	1,071
Dawson	\$576,681,000	232,801	93,461	1,015	589
Hall	\$127,977,000	68,427	4,272	835	137
Merrick	\$126,524,000	51,674	(D)	1,047	478
Polk	\$200,333,000	82,008	70,244	(D)	200
<b>Total</b>	<b>\$1,190,775,000</b>	<b>529,395</b>	<b>170,521</b>	<b>2,475</b>	<b>4,607</b>

Source: U.S. Census of Agriculture, 2017

\*(D) Withheld to avoid disclosing data for individual farms.

The following tables provide the value and acres of land in farms for the planning area. Buffalo County has the highest number of farms and Dawson County has the highest number of land (acres) in the planning area. Corn is the most prevalent crop type in the region followed by soybeans.

**Table 31: Land and Value of Farms in the Planning Area**

County	Number of Farms	Land in Farms (acres)	Market Value of 2017 Crop Sales
Buffalo	953	528,404	\$173,451,000
Dawson	686	610,097	\$171,745,000
Hall	582	328,229	\$174,424,000
Merrick	483	242,865	\$113,804,000
Polk	432	251,028	\$130,365,000
<b>Total</b>	<b>3,136</b>	<b>1,960,623</b>	<b>\$763,789,000</b>

Source: U.S. Census of Agriculture, 2017

51 US Department of Agriculture, National Agricultural Statistics Server. 2021. "2017 Census of Agriculture – County Data."

Accessed March 2022.

[https://www.nass.usda.gov/Publications/AgCensus/2017/Full\\_Report/Volume\\_1,\\_Chapter\\_2\\_County\\_Level/Nebraska/](https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Nebraska/).

**Table 32: Crop Values**

County	Corn		Soybeans		Wheat	
	Acres Planted	Value (2017)	Acres Planted	Value (2017)	Acres Planted	Value (2017)
<b>Buffalo</b>	182,561	\$117,930,000	84,860	\$49,326,000	2322	\$422,000
<b>Dawson</b>	172,173	\$120,091,000	69,149	\$39,298,000	2161	\$376,000
<b>Hall</b>	200,842	\$140,236,000	51,287	\$30,902,000	435	\$98,000
<b>Merrick</b>	110,168	\$70,115,000	65,840	\$35,536,000	994	\$224,000
<b>Polk</b>	118,264	\$79,619,000	87,668	\$49,547,000	316	(D)
<b>Total</b>	<b>784,008</b>	<b>\$289,970,000</b>	<b>204,795</b>	<b>\$115,985,000</b>	<b>1,429</b>	<b>\$1,120,000</b>

Source: U.S. Census of Agriculture, 2017

\*(D) Withheld to avoid disclosing data for individual farms.

### Location

Given the strong agricultural presence in the planning area, animal and plant disease have the potential to occur across the planning area. If a major outbreak were to occur, the economy in the entire planning area would be affected, including urban areas.

The primary land uses where animal and plant disease will be observed include agricultural lands, range or pasture lands, and forests. It is possible that animal or plant disease will occur in domestic animals or crops in urban areas.

### Extent

There is no standard for measuring the magnitude of animal and plant disease. Historical events have impacted livestock ranging from a single individual to eight individuals. The planning area is heavily dependent on the agricultural economy. Any severe plant or animal disease outbreak which may impact this sector would negatively impact the entire planning area's economy.

### Historical Occurrences

#### Animal Disease

The NDA provides reports on diseases occurring in the planning area. There were 98 instances of animal disease reported between January 2014 and April 2021 by the NDA (Table 33). These outbreaks affected 3,303 animals.

**Table 33: Livestock Diseases Reported in the Planning Area**

Disease	Year	County	Population Impacted
Avian Infectious Bursal Disease	2019	Hall	1
Avian Mycoplasmosis (M. gallisepticum)	2017	Hall	2
Avian Mycoplasmosis (M. Synoviae)	2017	Hall	2
Bovine Anaplasmosis	2014	Buffalo; Merrick	1; 1
	2015	Polk	1
	2016	Dawson	1
	2017	Dawson	1
	2018	Dawson; Polk	1; 1
	2019	Buffalo; Hall	1; 2
	2020	Buffalo; Dawson; Merrick	3; 1; 1
Bovine Bluetongue	2014	Dawson	4
	2016	Dawson	4
Bovine Leptospirosis	2014	Dawson	1
	2015	Buffalo; Dawson; Merrick	1; 1; 1
	2016	Buffalo; Dawson	1; 2
	2018	Merrick	1
Bovine Paratuberculosis	2014	Buffalo; Hall	1; 3
	2015	Buffalo; Dawson; Hall; Merrick	1; 1; 1; 1
	2016	Buffalo; Polk	2; 1
	2017	Dawson; Hall; Merrick	13; 1; 62
	2018	Dawson; Hall; Merrick	11; 1; 4
	2019	Buffalo; Dawson; Hall; Merrick	6; 7; 1; 3
	2020	Buffalo; Dawson; Merrick	12; 6; 1
Bovine Trichomoniasis	2021	Buffalo; Dawson	3; 4
	2015	Merrick	1
Bovine Viral Diarrhea	2014	Dawson	5
	2015	Dawson	1
	2016	Dawson; Hall	2; 1
	2017	Dawson	2
	2018	Buffalo; Dawson	140; 216
	2019	Buffalo; Dawson	4; 5
	2020	Buffalo; Merrick	2; 1
Caprine/Ovine Paratuberculosis	2021	Dawson	1
	2017	Buffalo; Polk	147; 60
Enzootic Bovine Leukosis	2018	Buffalo	1,437
	2015	Merrick	1
	2016	Merrick; Polk	1; 1
	2017	Dawson	1
	2018	Merrick	3
	2019	Buffalo; Merrick	1; 3
	2020	Hall; Merrick	2; 2
Equine Herpes Myeloencephalopathy	2016	Hall	1
Equine Vesicular Stomatitis	2020	Buffalo	3
Infectious Bovine Rhinotracheitis/Infectious Pustul	2014	Buffalo	1
	2015	Dawson	1
	2018	Dawson	5
	2020	Dawson	1
Ovine Salmonellosis	2017	Dawson	1

Disease	Year	County	Population Impacted
<b>Porcine Circovirus</b>	2014	Merrick	520
	2019	Buffalo	1
	2020	Polk	1
<b>Porcine Circovirus Type 2</b>	2020	Polk	1
<b>Porcine Delta Coronavirus</b>	2016	Buffalo; Polk	1; 1
<b>Porcine Epidemic Diarrhea</b>	2014	Polk	2
	2015	Polk	1
	2016	Buffalo; Merrick; Polk	1; 2; 2
<b>Porcine Reproductive and Respiratory Syndrome</b>	2014	Merrick	520
	2017	Buffalo; Hall; Polk	2; 1; 3
	2018	Polk	2
	2019	Polk	1
	2020	Dawson; Polk	3; 1
<b>Porcine Seneca Valley Virus</b>	2017	Buffalo; Polk	1; 1

Source: Nebraska Department of Agriculture, January 2014- April 2021<sup>52</sup>

### Plant Disease

A variety of diseases can impact crops and often vary from year to year. The NDA provides information on some of the most common plant diseases, which are listed below.

**Table 34: Common Crop Diseases in Nebraska by Crop Types**

Crop Diseases		
<b>Corn</b>	Anthraxnose	Southern Rust
	Bacterial Stalk Rot	Stewart's Wilt
	Common Rust	Common Smut
	Fusarium Stalk Rot	Gross's Wilt
	Fusarium Root Rot	Head Smut
	Gray Leaf Spot	Physoderma
	Maize Chlorotic Mottle Virus	
<b>Soybeans</b>	Anthraxnose	Pod and Stem Blight
	Bacterial Blight	Purple Seed Stain
	Bean Pod Mottle	Rhizoctonia Root Rot
	Brown Spot	Sclerotinia Stem Rot
	Brown Stem Rot	Soybean Mosaic Virus
	Charcoal Rot	Soybean Rust
	Frogeye Leaf Spot	Stem Canker
	Phytophthora Root and Stem Rot	Sudden Death Syndrome
<b>Wheat</b>	Barley Yellow Dwarf	Leaf Rust
	Black Chaff	Tan Spot
	Crown and Root Rot	Wheat Soy-borne Mosaic
	Fusarium Head Blight	Wheat Streak Mosaic
<b>Sorghum</b>	Ergot	Zonate Leaf Spot
	Sooty Stripe	
<b>Other Pests</b>	Grasshoppers	Western Bean Cutworm

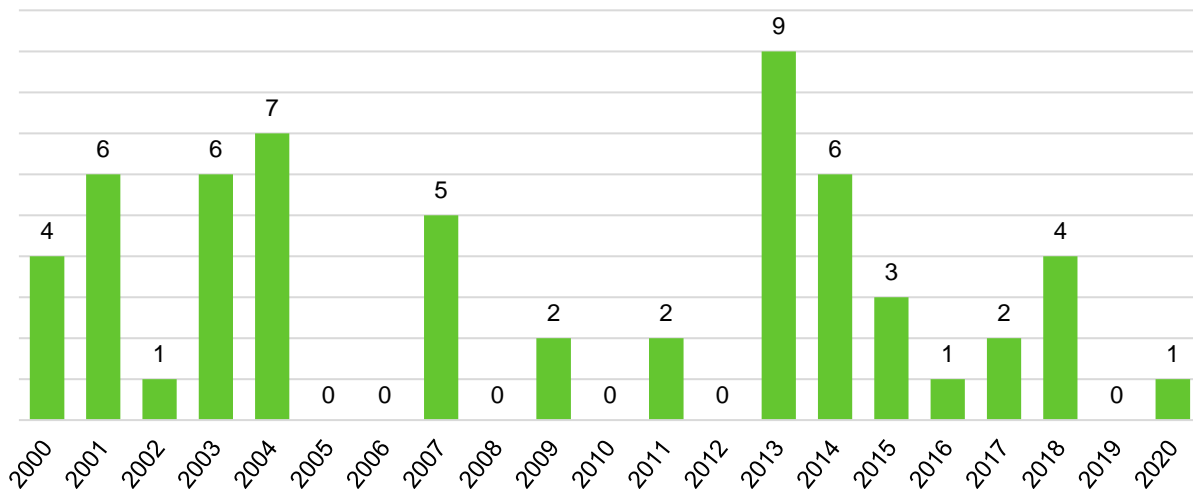
52 Nebraska Department of Agriculture. 2021. "Livestock Disease Reporting."  
<http://www.nda.nebraska.gov/animal/reporting/index.html>.



European Corn Borer	Corn Rootworm
Corn Nematodes	Bean Weevil
Mexican Bean Beetle	Soybean Aphids
Rootworm Beetles	Eastern Ash Borer

The RMA provides data on plant disease events and plant losses in the planning area. There are 59 instances of plant diseases reported from 2000-2020 by the RMA (Figure 13). These outbreaks caused \$770,256 in crop losses.

**Figure 13: Plant Disease Events by Year**



Source: NDA, 2000-2020

#### Emerald Ash Borer

The spread and presence of the Emerald Ash Borer (EAB) have become a rising concern for many Nebraskan communities in recent years. The beetle spreads through transport of infected ash trees, lumber, and firewood. All species of North American ash trees are vulnerable to infestation. Confirmed cases of EAB have been found in three Canadian provinces and 45 US states, primarily in the eastern, southern, and midwestern regions. The two most recent infestation confirmations came from Georgia and Vermont in 2020. Nebraska's first confirmed cases occurred on private land in Omaha and Greenwood in 2016.<sup>53</sup> Figure 14 shows the locations of Nebraska's confirmed EAB cases as of August 2021. Additional confirmed cases have likely occurred and many communities across the state are prioritizing the removal of ash trees to help curb potential infestations and tree mortality.

While adult beetles cause little damage, larvae damage trees by feeding on the inner bark of mature and growing trees, causing tunnels. Effects of EAB infestation include extensive damage to trees by birds, canopy dieback, bark splitting, and water sprout growth at the tree base, and eventual tree mortality. EAB has impacted millions of trees across North America, killing young trees one to two years after infestation and mature trees three to four years after infestation.<sup>54</sup> Estimated economic impacts to Nebraska's 44 million ash trees exceed \$981 million.<sup>55</sup> Dead or dying trees affected by EAB are also more likely to cause damage during high winds, severe

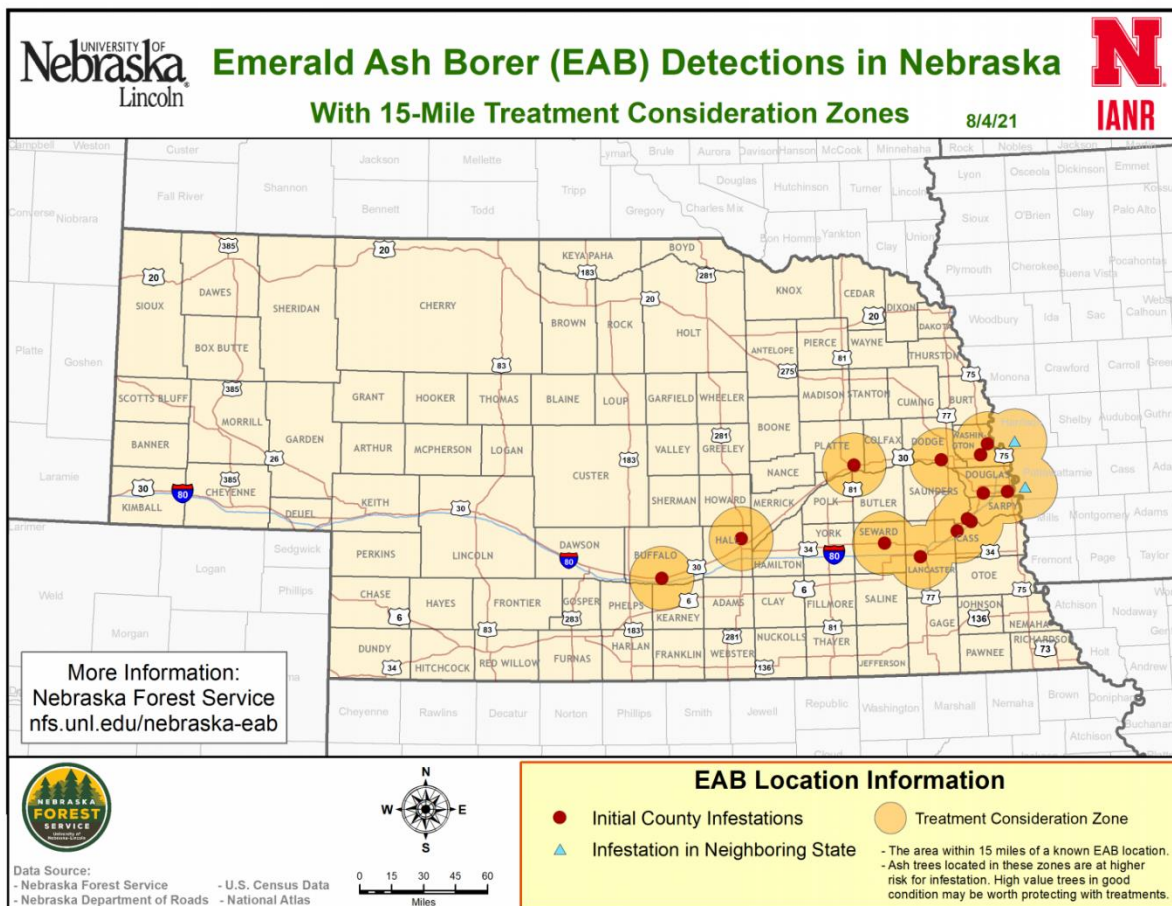
53 Emerald Ash Borer Information Network. April 2018. "Emerald Ash Borer." <http://www.emeraldashborer.info/>.

54 Arbor Day Foundation. 2015. "Emerald Ash Borer." <https://www.arborday.org/trees/health/pests/emerald-ash-borer.cfm>.

55 "Nebraska Emerald Ash Borer Response Plan." May 2015. <https://nfs.unl.edu/NebraskaEABResponsePlan.pdf>.

thunderstorms, or severe winter storms from weakened or hazardous limbs and can contribute a significant fuel load to grass/wildfire events.

**Figure 14: EAB Detections in Nebraska**



### Phragmites

Non-native *Phragmites australis*, or Common Reed, is a perennial wetland grass located across North America and in the planning area. *Phragmites* continue to expand rapidly within Nebraska due to their ability to reproduce through wind and water dispersal of seeds and aggressive reproduction through rhizomes, which can grow 30 feet or more in one year. The plant threatens riparian ecosystems and spreads rapidly throughout river systems.<sup>56</sup> The non-native species outcompetes native species by blocking and slowing water flow and taking up large amounts of scarce water. *Phragmites* also impact hydrology by trapping sediment typically flushed through the river system. The plant can change how water drains and dry out wetlands, creating situations of localized flooding. Accumulated dead and dry growth from the plant can also increase fire hazards, especially in the spring.

56 Lancaster County Weed Control Authority. "Guide for Phragmites Control." Accessed March 2022.  
<https://www.lancaster.ne.gov/DocumentCenter/View/694/Guide-for-Phragmites-Control-PDF#:~:text=In%20Nebraska%2C%20phragmites%20is%20growing,Platte%20River%20and%20other%20rivers.>

In the planning area, the entire Platte River system is threatened by the large infestation of invasive Phragmites that have colonized floodplain woodlands and meadows. The river has had significant water depletion in recent years and dried out in parts during the summer. Phragmites also impact the health of forestlands which become less resilient with infestations.<sup>57</sup>

The Platte River Resilience Fund, established in June 2020, aims to support Platte Valley Weed Management Area activities focusing on the control of invasive plant species and support water conveyance for the Platte River System from Kingsley Dam to the South Platte River at the Colorado border downstream to the Highway 81 bridge in Columbus, Nebraska. The fund is led by a group of local private and government organizations and individuals and is affiliated with the Nebraska Community Foundation.<sup>58</sup>

Methods to control Phragmites on the Platte River include intensive grazing, mowing, prescribed burns, and herbicide annual application. Herbicide application has proven to be the most effective management practice to control Phragmites and other invasive species such as Russian Olive, Purple Loosestrife, and Leafy Spurge.

### Average Annual Losses

According to the USDA RMA (2000-2020) there were 59 plant disease events in the planning area. While the RMA does not track losses for livestock, annual crop losses from plant disease can be estimated. Agricultural livestock disease losses are determined from the Nebraska Department of Agriculture.

**Table 35: Plant Disease Losses**

Hazard Type	Number of Events	Events per Year	Total Crop Loss	Average Annual Crop Loss
Plant Disease	59	3	\$770,256	\$38,513

Source: RMA, 2000-2020

**Table 36: Animal Disease Losses**

Hazard Type	Number of Events	Events per Year	Total Animal Losses	Average Animal Losses per Event
Animal Disease	98	12.3	3,303	413

Source: NDA, 2014-April 2021

### Probability

Given the historic record of occurrence for animal disease (at least one animal disease outbreak reported in all eight years), for the purposes of this plan, the annual probability of animal disease occurrence is 100 percent. Given the historic record of occurrence for agricultural plant disease events (15 out of 20 years with a reported event), for the purposes of this plan, the annual probability of agricultural plant disease occurrence is 75%.

57 Nebraska Forest Service. 2020. "2020 Nebraska Forest Action Plan."

<https://nfs.unl.edu/documents/ForestActionPlan/2020%20FAP%20Public%20Comment%20-%20Final.pdf>.

58 Nebraska Community Foundation. 2022. "Platte River Resilience Fund." <https://www.nebcommfound.org/give/platte-river-resilience-fund/>.

### Community Top Hazard Status

The following table lists jurisdictions which identified animal and plant disease as a top hazard of concern.

Jurisdiction	
Buffalo County Kearney	Polk County

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 37: Regional Agricultural Disease Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Those in direct contact with infected livestock</li> <li>-Potential food shortage during prolonged events</li> <li>-Residents in poverty if food prices increase</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-Regional economy is reliant on the agricultural industry</li> <li>-Large scale or prolonged events may impact tax revenues and local capabilities</li> <li>-Land value may largely drive population changes within the planning area</li> </ul>
<b>Built Environment</b>	None
<b>Infrastructure</b>	-Transportation routes can be closed during quarantine
<b>Critical Facilities</b>	None
<b>Climate</b>	<ul style="list-style-type: none"> <li>-Exacerbate outbreaks, impacts, and/or recovery period</li> <li>-Changes in seasonal normals can promote spread of invasive species and agricultural disease</li> </ul>

# Dam Failure

According to the Nebraska Administrative Code, dams are “any artificial barrier, including appurtenant works, with the ability to impound water, wastewater, or liquid-borne materials and which is:

- twenty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier, or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse, to the maximum storage elevation or
- has an impounding capacity at maximum storage elevation of fifty acre-feet or more, except that any barrier described in this subsection which is not in excess of six feet in height or which has an impounding capacity at maximum storage elevation of not greater than fifteen acre-feet shall be exempt, unless such barrier, due to its location or other physical characteristics, is classified as a high hazard potential dam.

Dams do not include:

- an obstruction in a canal used to raise or lower water;
- a fill or structure for highway or railroad use, but if such structure serves, either primarily or secondarily, additional purposes commonly associated with dams it shall be subject to review by the department;
- canals, including the diversion structure, and levees; or
- water storage or evaporation ponds regulated by the United States Nuclear Regulatory Commission.”<sup>59</sup>

The NeDNR uses a classification system for dams throughout the state, including those areas participating in this plan. The classification system includes three classes, which are defined in the table below.

**Table 38: Dam Size Classification**

Size	Effective Height (feet) x Effective Storage (acre-feet)	Effective Height
<b>Small</b>	≤ 3,000 acre-feet	and ≤ 35 feet
<b>Intermediate</b>	> 3,000 acre-feet to < 30,000 acre-feet	or > 35 feet
<b>Large</b>	≥ 30,000 acre-feet	Regardless of Height

Source: NeDNR, 2013<sup>60</sup>

The effective height of a dam is defined as the difference in elevation in feet between the natural bed of the stream or watercourse measured at the downstream toe (or from the lowest elevation of the outside limit of the barrier if it is not across stream) to the auxiliary spillway crest. The effective storage is defined as the total storage volume in acre-feet in the reservoir below the elevation of the crest of the auxiliary spillway. If the dam does not have an auxiliary spillway, the effective height and effective storage should be measured at the top of dam elevation.

59 Nebraska Department of Natural Resources. “Department of Natural Resources Rules for Safety of Dam and Reservoirs.” Nebraska Administrative Code, Title 458, Chapter 1, Part 001.09.

60 Nebraska Department of Natural Resources. 2013. “Classification of Dams: Dam Safety Section.” <https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/dam-safety/resources/Classification-Dams.pdf>.

Dam failure, as a hazard, is described as a structural failure of a water-impounding structure. Structural failure can occur during extreme conditions, which include, but are not limited to:

- Reservoir inflows in excess of design flows
- Flood pools higher than previously attained
- Unexpected drop in pool level
- Pool near maximum level and rising
- Excessive rainfall or snowmelt
- Large discharge through spillway
- Erosion, landslide, seepage, settlement, and cracks in the dam or area
- Earthquakes
- Vandalism/Terrorism

The NeDNR and U.S. Army Corps of Engineers (USACE) regulate dam safety in Nebraska. Dams are classified by the potential hazard each poses to human life and economic loss. The following are classifications and descriptions for each hazard class:

- **Low Hazard Potential:** Failure of the dam expected to result in no probable loss of human life and in low economic loss. Failure may damage storage buildings, agricultural land, and county roads.
- **Significant Hazard Potential:** Failure of the dam expected to result in no probable loss of human life but could result in major economic loss, environmental damage, or disruption of lifeline facilities. Failure may result in shallow flooding of homes and commercial buildings or damage to main highways, minor railroads, or important public utilities.
- **High Hazard Potential:** Failure of the dam expected to result in loss of human life is probable. Failure may cause serious damage to homes, industrial or commercial buildings, four-lane highways, or major railroads. Failure may cause shallow flooding of hospitals, nursing homes, or schools.

## Location

According to USACE's National Inventory of Dams, there are a total of 183 dams located within the planning area, with classifications ranging from low to high hazard. Figure 15 maps the location of these dams in the planning area.

**Table 39: Dams in the Planning Area**

County	Low Hazard	Significant Hazard	High Hazard
Buffalo	39	5	6
Dawson	77	6	2
Hall	7	1	0
Merrick	1	0	0
Polk	36	3	0
<b>Total</b>	<b>160</b>	<b>15</b>	<b>8</b>

Source: USACE, 2020<sup>61</sup>

61 United States Army Corps of Engineers. 2020. "National Inventory of Dams." <https://nid.sec.usace.army.mil/ords/f?p=105:1:.....>



Dams classified with high hazard potential require the creation of an Emergency Action Plan (EAP). The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the structural integrity of the dam within sufficient time to take mitigating actions and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam. The EAP may also be used to provide notification when flood releases will create major flooding. An emergency situation can occur at any time; however, emergencies are more likely to happen when extreme conditions are present. There are eight high hazard dams located within the planning area. Six are in Buffalo County and two are in Dawson County.

**Table 40: High Hazard Dams in the Planning Area**

County	Dam Name	NID ID	Dam Height (Feet)	Max Storage (Acre Ft)	Last Inspection Date
Buffalo	Kearney Dam	NE00465	27	161	4/25/2018
Buffalo	4 <sup>th</sup> Avenue Storm Detention Dam	NE02332	19	91	4/25/2018
Buffalo	Ravenna Northwest Dam	NE02492	22	295	4/27/2017
Buffalo	Stoneridge Dam	NE03239	11.5	393.3	4/25/2018
Buffalo	Prairie Creek Upland Dam 2	NE09348	34.5	4,465.3	4/6/2017
Buffalo	Prairie Creek Upland Dam 1	NE09349	38.5	5,776.3	4/6/2017
Dawson	Spring Creek 19-B	NE01734	53.8	17,745	4/25/2018
Dawson	Lake Helen Dam	NE02393	27.2	547.5	6/6/2018

Source: USACE, 2020<sup>62</sup>

#### Upstream Dams Outside the Planning Area

According to the Buffalo, Dawson, Hall, Merrick, and Polk Counties' Local Emergency Operations Plans, Kingsley Dam and Jeffrey Dam are upstream dams that could impact the planning area.<sup>63,64,65,66,67</sup>

**Table 41: Upstream Dams Outside the Planning Area**

County	Dam Name	NID ID	Dam Height (Feet)	Max Storage (Acre Ft)	Last Inspection Date
Keith	Kingsley Dam	NE01048	162	1,900,600	9/30/2020
Lincoln	Jeffrey Dam	NE01036	90	6,937	9/30/2020

Source: USACE, 2020

62 United States Army Corps of Engineers. 2020. "National Inventory of Dams." <https://nid.sec.usace.army.mil/ords/f?p=105:1:.....>

63 Buffalo County Emergency Management Agency. 2019. "Buffalo County Local Emergency Operations Plan."

64 Dawson County Emergency Management Agency. 2020. "Dawson County Local Emergency Operations Plan."

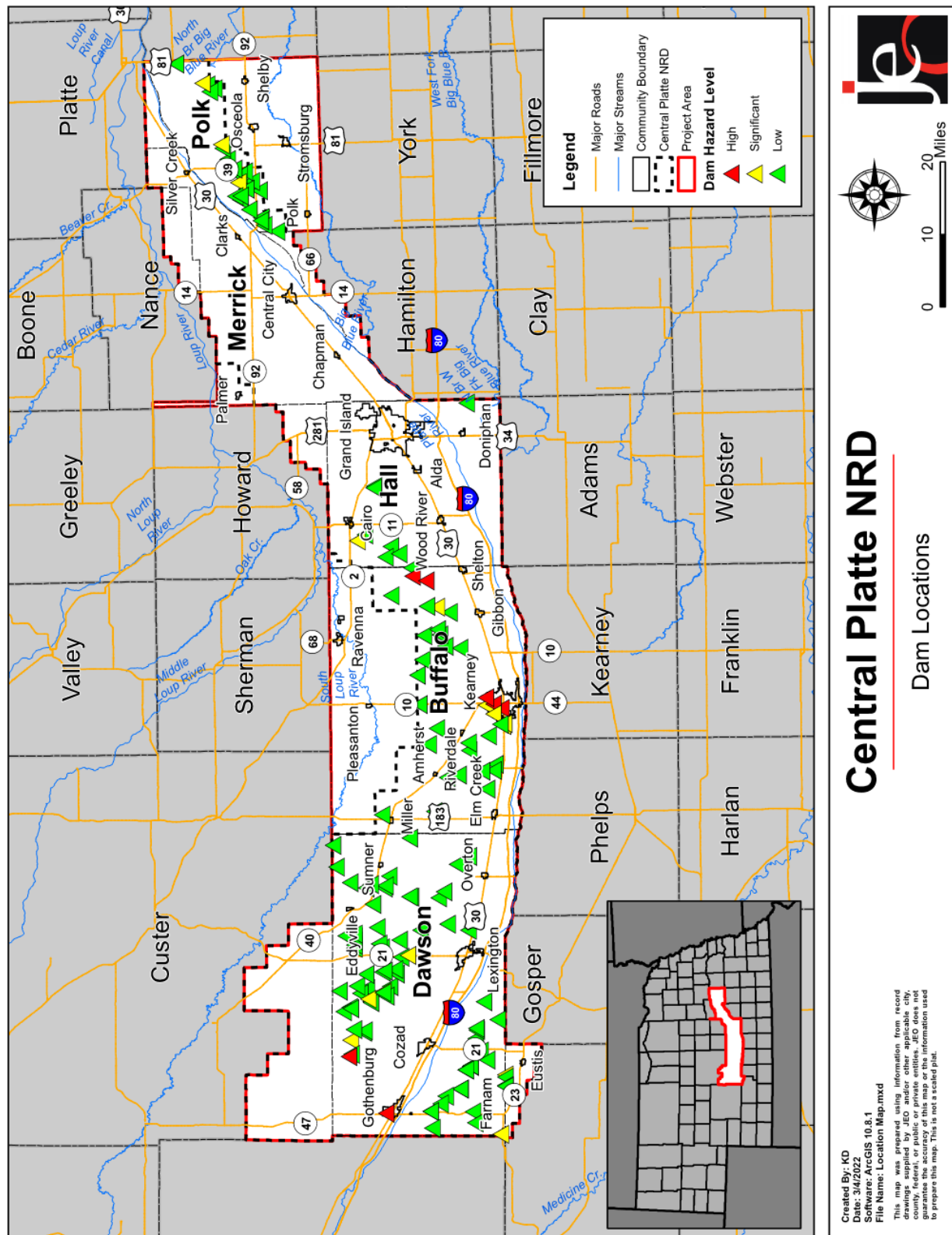
65 Hall County Emergency Management Agency. 2020. "Hall County Local Emergency Operations Plan."

66 Merrick County Emergency Management Agency. 2020. "Merrick County Local Emergency Operations Plan."

67 Polk County Emergency Management Agency. 2020. "Polk County Local Emergency Operations Plan."



Figure 15: Dam Locations



### Extent

Areas (i.e., agricultural land, out buildings, county roads, and communities) directly downstream of dams are at greatest risk in the case of dam failure. The extent of dam failure is indicated by its hazard classification and location. Note that hazard classification does not indicate the likelihood of a dam failure event to occur, but rather the extent of potential damages that may occur in case of a failure. Thus, the high hazard dams in the planning area would have the greatest impact if they were to fail. Inundation maps are not publicly available due to concerns of vandalism and terrorism. Key facilities located in inundation areas are discussed in each county's LEOP.

### Historical Occurrences

According to the NeDNR, there were six reported dam failures within the planning area. There was only minor cropland damage reported.

**Table 42: Dam Failures**

Dam Name	Hazard Class	County	Failure Year	Failure Mode	Downstream Damage
Sartoria Dam	Low	Buffalo	2007	Spillway Erosion	No Damages Reported
Walter Dam	Low	Buffalo	2019	Overtopped	Minor Damage to Cropland
Kopf Dam	Low	Dawson	Unknown	Spillway Erosion	No Damages Reported
Krone Dam	Low	Dawson	1993	Overtopped	No Damages Reported
Lewis Dam	Low	Dawson	1993	Spillway Erosion	No Damages Reported
Hinrikus Dam	Low	Hall	1980	Spillway Erosion	No Damages Reported

Source: NeDNR, 2021

### Average Annual Losses

Only minor cropland damage was reported from the dam failure events. In general, dam failure events would be confined to damage in the inundation area. Community members in the planning area that wish to quantify and evaluate the threat of dam failure should contact their County Emergency Management, local NRD, or the NeDNR to view EAPs and breach inundation area maps.

### Probability

Based on the historic record of reported incidents, there is a four percent probability (5 out of 130 years with an occurrence) that dam failure will occur annually in the planning area.

### Community Top Hazard Status

The following table lists jurisdictions which identified dam failure as a top hazard of concern.

Jurisdiction	
Buffalo County	Gothenburg
Central Platte NRD	Ravenna
Kearney	

## Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven | Community Profiles*.

**Table 43: Regional Dam Failure Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Those living downstream of high hazard dams</li> <li>-Those at recreational sites situated near high hazard dams</li> <li>-Evacuation needs likely with high hazard dam failure events</li> <li>-Hospitals, nursing homes, and the elderly at greater risk due to low mobility</li> <li>-Buffalo County: LEOP estimated 10% of the population could be affected</li> <li>-Dawson County: LEOP estimated 90% of the population could be affected</li> <li>-Hall County: LEOP estimated 5.9% of the population could be affected</li> <li>-Merrick County: LEOP estimated 54% of the population could be affected</li> <li>-Polk County: LEOP gave no estimation</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-Loss of downstream agricultural land</li> <li>-Businesses or recreation sites located in inundation areas would be impacted and closed for an extended period of time</li> <li>-Employees of closed businesses may be out of work for an extended period of time</li> </ul>
<b>Built Environment</b>	<ul style="list-style-type: none"> <li>-Damage to facilities, recreation areas, and roads</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-Transportation routes could be closed for extended period of time</li> <li>-Dawson County: LEOP indicated Interstate 80 and Highway 30 could be affected</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Any critical facilities in inundation areas are vulnerable to damages</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>-Increased annual precipitation contributes to sustained stress on systems</li> <li>-Changes in water availability and supply can constrain energy production and reservoir stores</li> </ul>

# Drought

Drought is generally defined as a natural hazard that results from a substantial period of below normal precipitation. Although many erroneously consider it a rare and random event, drought is a normal, recurrent feature of climate. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. A drought often coexists with periods of extreme heat, which together can cause significant social stress, economic losses, and environmental degradation. The planning area is largely rural, which presents an added vulnerability to drought events; drought conditions can significantly and negatively impact the agricultural economic base.

Drought is a slow onset, creeping phenomenon that can affect a wide range of people, livestock, and industries. While many impacts of these hazards are non-structural, there is the potential that during prolonged drought events structural impacts can occur. Drought normally affects more people than other natural hazards, and its impacts are spread over a larger geographical area. As a result, the detection and early warning signs of drought conditions and assessment of impacts are more difficult to identify than that of quick-onset natural hazards (e.g., flood) that results in more visible impacts. According to the National Drought Mitigation Center (NDMC), droughts are classified into four major types:

**Drought** is a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another.

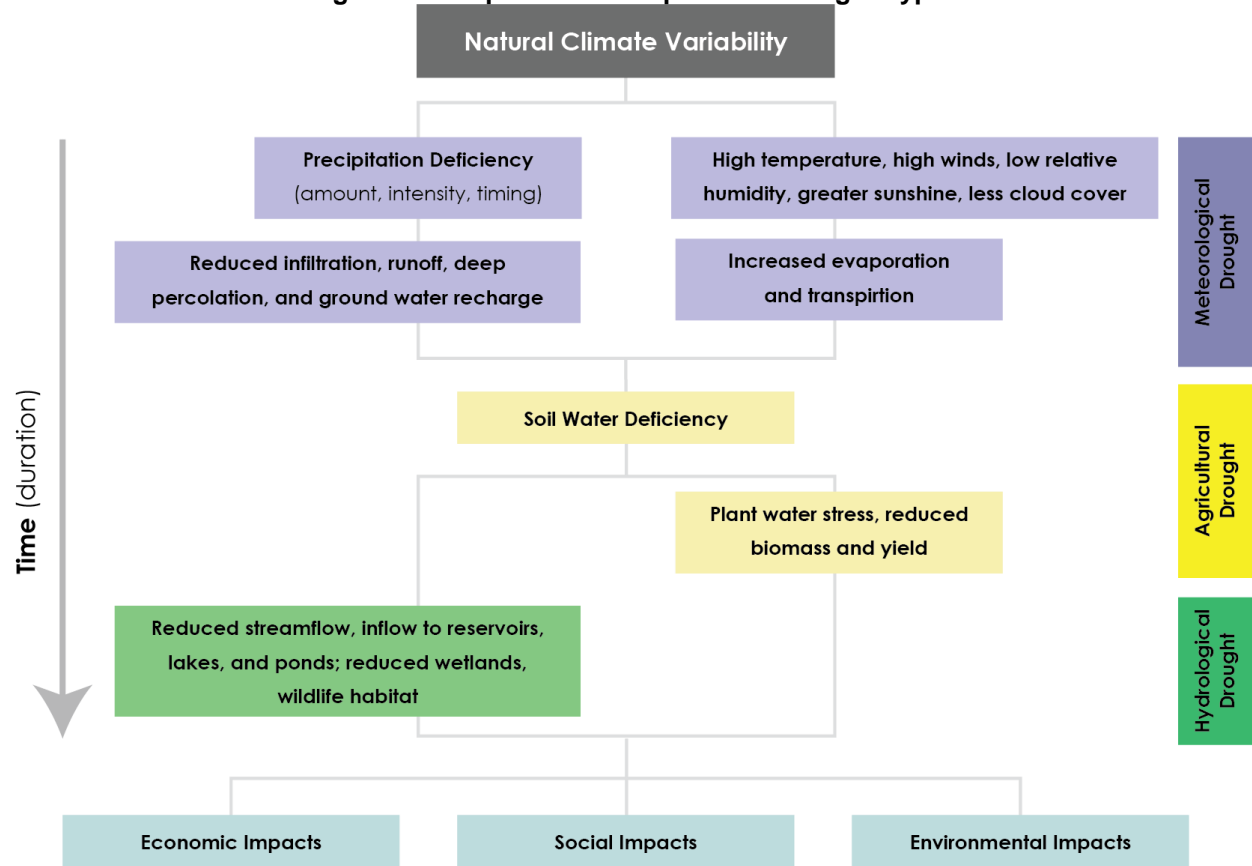
~National Drought Mitigation Center

- **Meteorological Drought** is defined based on the degree of dryness and the duration of the dry period. Meteorological drought is often the first type of drought to be identified and should be defined regionally as precipitation rates and frequencies (norms) vary.
- **Agricultural Drought** occurs when there is deficient moisture that hinders planting germination, leading to low plant population per hectare and a reduction of final yield. Agricultural drought is closely linked with meteorological and hydrological drought; as agricultural water supplies are contingent upon the two sectors.
- **Hydrologic Drought** occurs when water available in aquifers, lakes, and reservoirs falls below the statistical average. This situation can arise even when the area of interest receives average precipitation. This is due to the reserves diminishing from increased water usage, usually from agricultural use or high levels of evapotranspiration, resulting from prolonged high temperatures. Hydrological drought often is identified later than meteorological and agricultural drought. Impacts from hydrological drought may manifest themselves in decreased hydropower production and loss of water-based recreation.
- **Socioeconomic Drought** occurs when the demand for an economic good exceeds supply due to a weather-related shortfall in water supply. The supply of many economic goods includes, but are not limited to, water, forage, food grains, fish, and hydroelectric power.<sup>68</sup>

The following figure indicates different types of droughts, their temporal sequence, and the various types of effects they can have on a community.

68 National Drought Mitigation Center. 2017. "Drought Basics." <https://drought.unl.edu/>.

**Figure 16: Sequence and Impacts of Drought Types**



Source: National Drought Mitigation Center, University of Nebraska-Lincoln, 2017<sup>69</sup>

## Location

The entire planning area is susceptible to drought impacts.

## Extent

The Palmer Drought Severity Index (PDSI) is utilized by climatologists to standardize global long-term drought analysis. The data for the planning area was collected for Climate Division 5, which includes the planning area. This particular station's period of record started in 1895. Table 44 shows the details of the Palmer classifications. Figure 17 shows drought data from this time period. The negative Y axis represents the extent of a drought, for which '-2' indicates a moderate drought, '-3' a severe drought, and '-4' an extreme drought. The planning area has experienced several extreme droughts and moderate, severe, and extreme droughts are likely in the future.

<sup>69</sup> National Drought Mitigation Center. 2017. "Types of Drought." <https://drought.unl.edu/>.

**Table 44: Palmer Drought Severity Index Classification**

Numerical Value	Description	Numerical Value	Description
4.0 or more	Extremely wet	-0.5 to -0.99	Incipient dry spell
3.0 to 3.99	Very wet	-1.0 to -1.99	Mild drought
2.0 to 2.99	Moderately wet	-2.0 to -2.99	Moderate drought
1.0 to 1.99	Slightly wet	-3.0 to -3.99	Severe drought
0.5 to 0.99	Incipient wet spell	-4.0 or less	Extreme drought
0.49 to -0.49	Near Normal	--	--

Source: Climate Prediction Center<sup>70</sup>**Figure 17: Palmer Drought Severity Index**

Nebraska, Climate Division 5 Palmer Drought Severity Index (PDSI)

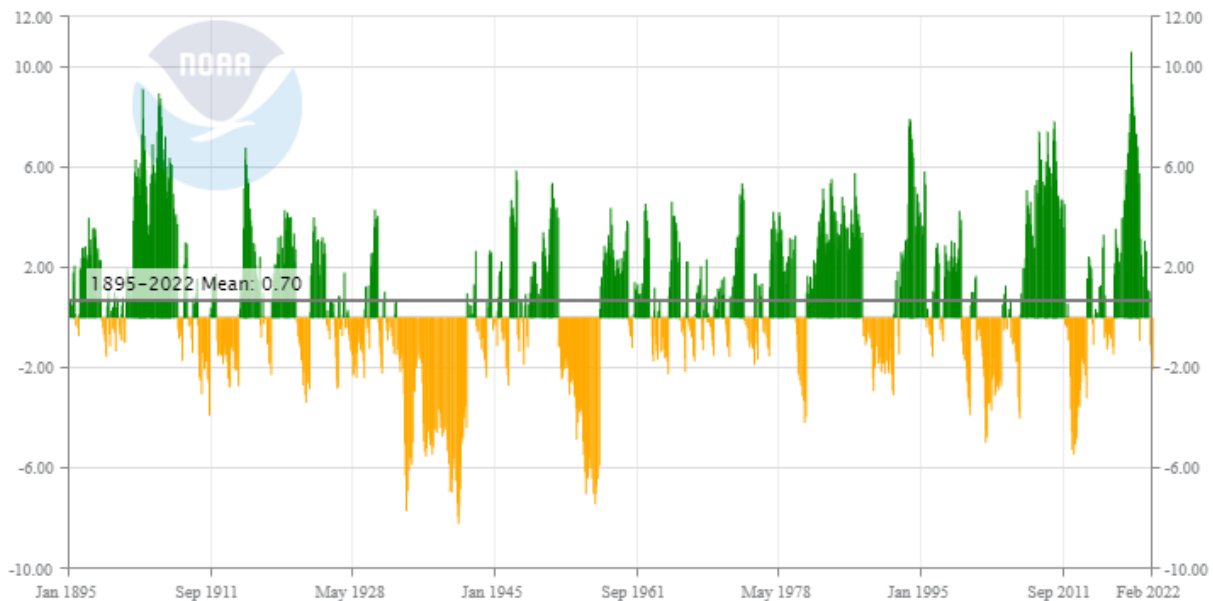
Source: NCEI, Jan. 1895-Feb. 2022<sup>71</sup>

Figure 18 shows the normal average monthly precipitation for the planning area, which is helpful in determining whether any given month is above, below, or near normal in precipitation. Prolonged deviation from the norm showcases drought conditions and influence growing conditions for farmers.

70 National Weather Service. 2017. "Climate Prediction Center." <https://www.cpc.ncep.noaa.gov/>.

71 National Centers for Environmental Information. 1895-2022. Accessed March 2022. "Climate at a Glance." [https://www.ncdc.noaa.gov/cag/divisional/time-series/2505/pdsi/all/8/1895-2022?base\\_prd=true&begbaseyear=1895&endbaseyear=2022](https://www.ncdc.noaa.gov/cag/divisional/time-series/2505/pdsi/all/8/1895-2022?base_prd=true&begbaseyear=1895&endbaseyear=2022).

**Figure 18: Average Monthly Precipitation for the Planning Area**Source: NCEI, 2021<sup>72</sup>

### Historical Occurrences

Table 45 indicates it is reasonable to expect extreme drought to occur 7.1% of the time for the planning area (107 extreme drought months in 1,513 months). Severe drought occurred in 49 months of the 1,513 months of record (3.2% of months). Moderate drought occurred in 100 months of the 1,513 months of record (6.6% of months), and mild drought occurred in 188 of the 1,513 months of record (12.4% of months). Non-drought conditions occurred in 1,069 months, or 70.7% percent of months. These statistics show that the drought conditions of the planning area are highly variable. The average annual planning area precipitation is approximately 26.7 inches according to the NCEI.<sup>73</sup>

**Table 45: Historic Droughts**

Drought Magnitude	Months in Drought	Percent Chance
-1 Magnitude (Mild)	188/1,513	12.4%
-2 Magnitude (Moderate)	100/1,513	6.6%
-3 Magnitude (Severe)	49/1,513	3.2%
-4 Magnitude or Greater (Extreme)	107/1,513	7.1%
<b>Total Months in Drought</b>	<b>444/1,513</b>	<b>29.3%</b>

Source: NCEI

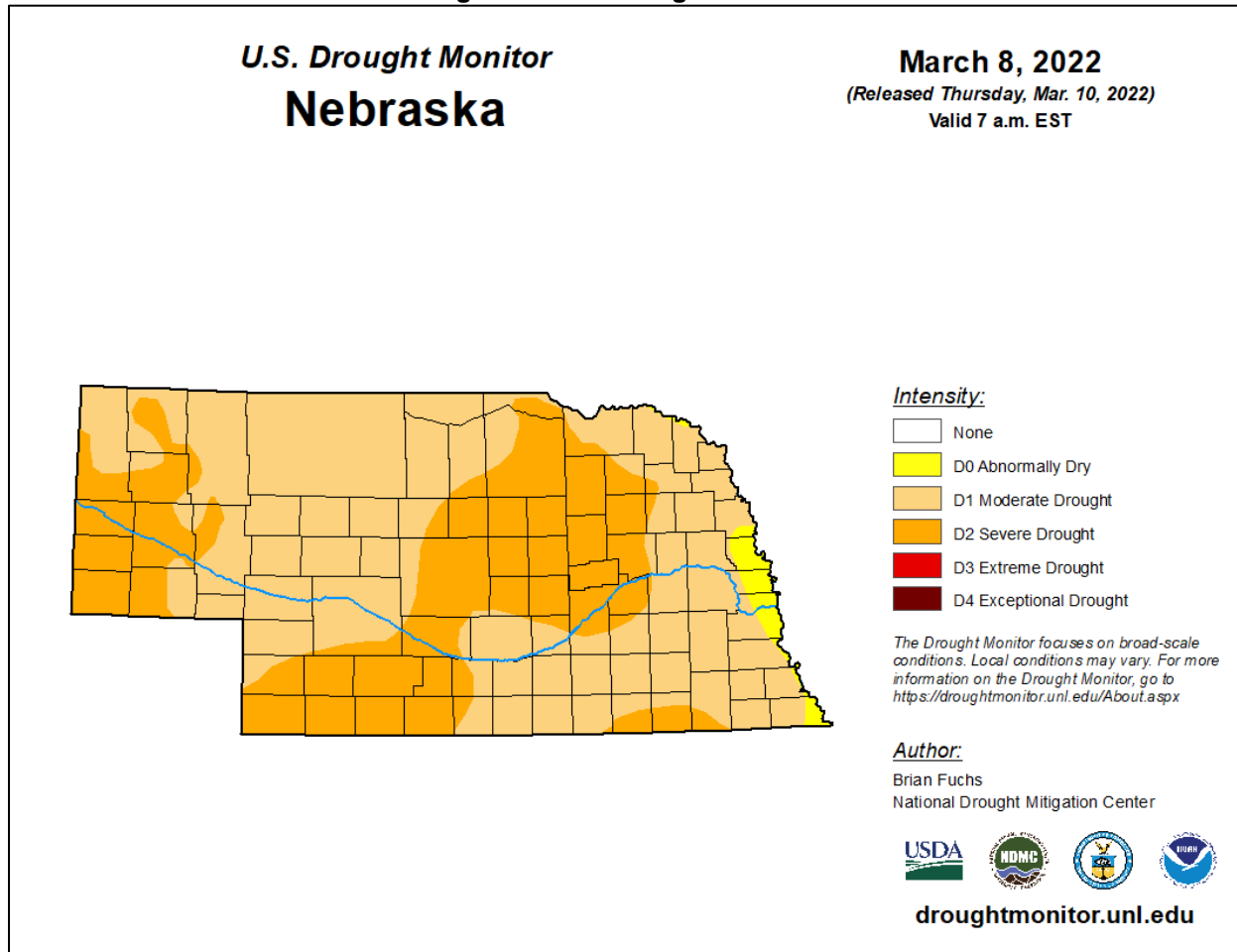
As of February 2022, the planning area is experiencing either a D1 (Moderate Drought) or D2 (Severe Drought), per the US Drought Monitor (Figure 19).

72 NOAA National Centers for Environmental Information. Feb 2021. "Data Tools: 1981-2010 Normals." [datafile]. <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>.

73 NOAA National Centers for Environmental Information. July 2021. "Data Tools: 1981-2010 Normals." [datafile]. <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>.



Figure 19: US Drought Monitor



Source: National Drought Mitigation Center, Feb 2022

The 2012 drought event is the most recent significant event on record for the planning area; however, the overall event did not warrant a presidential disaster declaration within Nebraska. The whole state of Nebraska was in severe drought conditions from the middle of July in 2012 to the end of May in 2013 and over 70% of the state was in exceptional drought conditions for over eight months. Numerous cities implemented mandatory water restrictions, and some encouraged voluntarily water conservation during the period of drought. As many as 81 municipal water systems in the state experienced drought-related water supply issues in 2021 according to the Nebraska Department of Health and Human Services.

### Average Annual Losses

The annual property estimate was determined based upon NCEI Storm Events Database since 1996. The annual crop loss was determined based upon the RMA Cause of Loss Historical Database since 2000. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of drought are difficult to quantify. Potential losses such as power outages could affect businesses, homes, and critical facilities. High demand and intense use of air conditioning or water pumps can overload the electrical systems and damage infrastructure.

**Table 46: Loss Estimate for Drought**

Hazard Type	Total Property Loss <sup>2</sup>	Average Annual Property Loss <sup>2</sup>	Total Crop Loss <sup>3</sup>	Average Annual Crop Loss <sup>3</sup>
<b>Drought</b>	\$0	\$0	\$76,993,162	\$3,849,658

Source: 1 HPRCC (1878-2021); 2 Indicates data is from NCEI (Jan 1996 to June 2021); 3 Indicates data is from USDA RMA (2000 to 2020)

### Probability

Drought conditions are also likely to occur regularly in the planning year. The following table summarizes the magnitude of drought and monthly probability of occurrence.

**Table 47: Period of Record in Drought**

PDSI Value	Magnitude	Drought Occurrences by Month	Monthly Probability
<b>4 or more to -0.99</b>	No Drought	1,069/1,513	71.0%
<b>-1.0 to -1.99</b>	Mild Drought	188/1,513	12.0%
<b>-2.0 to -2.99</b>	Moderate Drought	100/1,513	0.7%
<b>-3.0 to -3.99</b>	Severe Drought	49/1,513	0.3%
<b>-4.0 or less</b>	Extreme Drought	107/1,513	0.7%

Source: NCEI, Jan 1895-June 2021

### Community Top Hazard Status

The following table lists jurisdictions which identified drought as a top hazard of concern.

Jurisdiction	
Buffalo County	Lexington Fire District
Clarks	Merrick County
Cozad	Osceola
Dawson County	Ravenna
Gibbon Fire District	Shelby
Kearney	Silver Creek

### Regional Vulnerabilities

The Drought Impact Reporter is a database of drought impacts throughout the United States, with data going back to 2000. The Drought Impact Reporter has recorded a total of 136 drought-related impacts throughout the region. One drought impact in 2003 cost Central Nebraska Public Power District approximately \$5 million after water shortages in Lake McConaughy reduced the ability to generate hydroelectricity. The event impacted residents in multiple counties, including Dawson County. Other notable drought impacts are summarized in the following table. This is not a comprehensive list of droughts that may have impacted the planning area, however.

**Table 48: Notable Drought Impacts in Planning Area**

Category	Date	Affected Counties	Title
Energy, Water Supply & Quality	5/10/2013	Dawson	Electric power generation levels below peak production for Central Nebraska Public Power District
Plants & Wildlife, Water Supply & Quality	8/6/2012	Buffalo, Hall, Merrick, and Polk	Thousands of fish dead in dry Lower Platte River in Nebraska
Agriculture, Relief, Response & Restrictions, Water Supply & Quality	7/19/2012	Buffalo, Dawson, Hall, Merrick, and Polk	Low flow in several Nebraska rivers brought surface irrigation closures
Plants & Wildlife	6/1/2012	Dawson	Many trees in western Nebraska died from drought, high temperatures and strong winds in 2012
Water Supply & Quality	1/1/2003	Dawson	Central Nebraska Public Power and Irrigation District, which owns Lake McConaughy, lost a total of about \$5 million dollars in 2003-2004 because there was not enough water in the lake to generate hydroelectricity

Source: NDMC, 2000-Sept 2021<sup>74</sup>

The following table provides information related to regional vulnerabilities. For jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*. The Central Platte NRD completed a Drought Management Plan in 2020 to help respond to and manage the impacts of future drought events.

**Table 49: Regional Drought Vulnerabilities**

Sector	Vulnerability
People	-Insufficient water supply -Loss of jobs in agricultural sector -Residents in poverty if food prices increase
Economic	-Closure of water intensive businesses (carwashes, pools, etc.) -Short-term interruption of business -Loss of tourism dollars -Decrease in cattle prices -Decrease of land prices → jeopardizes educational funds
Built Environment	-Cracking foundations (residential and commercial structures) -Damages to landscapes
Infrastructure	-Damages to waterlines below ground -Damages to roadways (prolonged extreme events)
Critical Facilities	-Loss of power and impact on infrastructure
Climate	-Increased risk of wildfire events, damaging buildings and agricultural land

<sup>74</sup> National Drought Mitigation Center. 2021. "U.S. Drought Impact Reporter." Accessed September 2021. <http://droughtreporter.unl.edu/map/>.

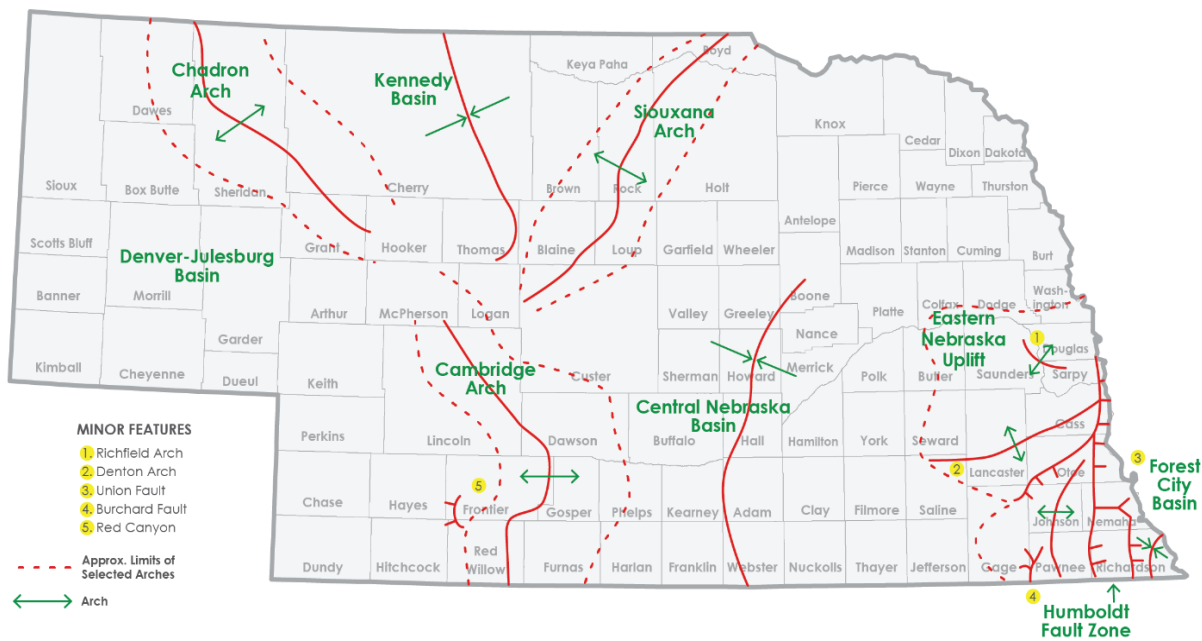
# Earthquakes

An earthquake is the result of a sudden release of energy in the Earth's tectonic plates that creates seismic waves. The seismic activity of an area refers to the frequency, type, and size of earthquakes experienced over a period of time. Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to a fault, earthquake magnitude, and type of earthquake. Although rather uncommon, earthquakes do occur in Nebraska and are usually small, generally not felt, and cause little to no damage.

- **Ground shaking** is the motion felt on the earth's surface caused by seismic waves generated by an earthquake. Ground shaking is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.
- **Earthquake-induced landslides** are secondary earthquake hazards that occur from ground shaking. They can destroy roads, buildings, utilities, and other critical facilities necessary to respond to recover from an earthquake.
- **Liquefaction** occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures.
- **Amplification** is the phenomenon when soils and soft sedimentary rocks near the earth's surface increase the magnitude of the seismic waves generated by the earthquake. The amount of amplification is determined by the thickness of geologic materials and their physical properties. Buildings and structures built on soft and unconsolidated soils face greater risk.

## Location

The planning area has two fault lines crossing it. The Cambridge Arch Fault is active in Dawson County, and the Central Nebraska Basin fault is active in Hall County. The following figure shows the fault lines in Nebraska.

**Figure 20: Fault Lines in Nebraska**

Source: Nebraska Department of Natural Resources

## Extent

Earthquakes are measured by magnitude and intensity. Magnitude is measured by the Richter Scale, a base-10 logarithmic scale, which uses seismographs around the world to measure the amount of energy released by an earthquake. Intensity is measured by the Modified Mercalli Intensity Scale, which determines the intensity of an earthquake by comparing actual damage against damage patterns of earthquakes with known intensities. The following tables summarize the Richter Scale and Modified Mercalli Scale. Any earthquake that was to occur in the planning area, it would likely measure between 4.0 or less on the Richter Scale.

**Table 50: Richter Scale**

Richter Magnitudes	Earthquake Effects
<b>Less than 3.5</b>	Generally not felt, but recorded.
<b>3.5 – 5.4</b>	Often felt, but rarely causes damage.
<b>Under 6.0</b>	At most, slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
<b>6.1 – 6.9</b>	Can be destructive in areas up to about 100 kilometers across where people live.
<b>7.0 – 7.9</b>	Major earthquake. Can cause serious damage over larger areas.
<b>8 or greater</b>	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: FEMA, 2021<sup>75</sup>

75 Federal Emergency Management Agency. 2021. "Earthquake Risk." <https://www.fema.gov/emergency-managers/risk-management/earthquake>

**Table 51: Modified Mercalli Intensity Scale**

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs	
II	Feeble	Some people feel it	< 4.2
III	Slight	Felt by people resting, like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	< 5.4
VII	Very Strong	Mild Alarm; walls crack; plaster falls	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	> 8.1

Source: FEMA, 2021

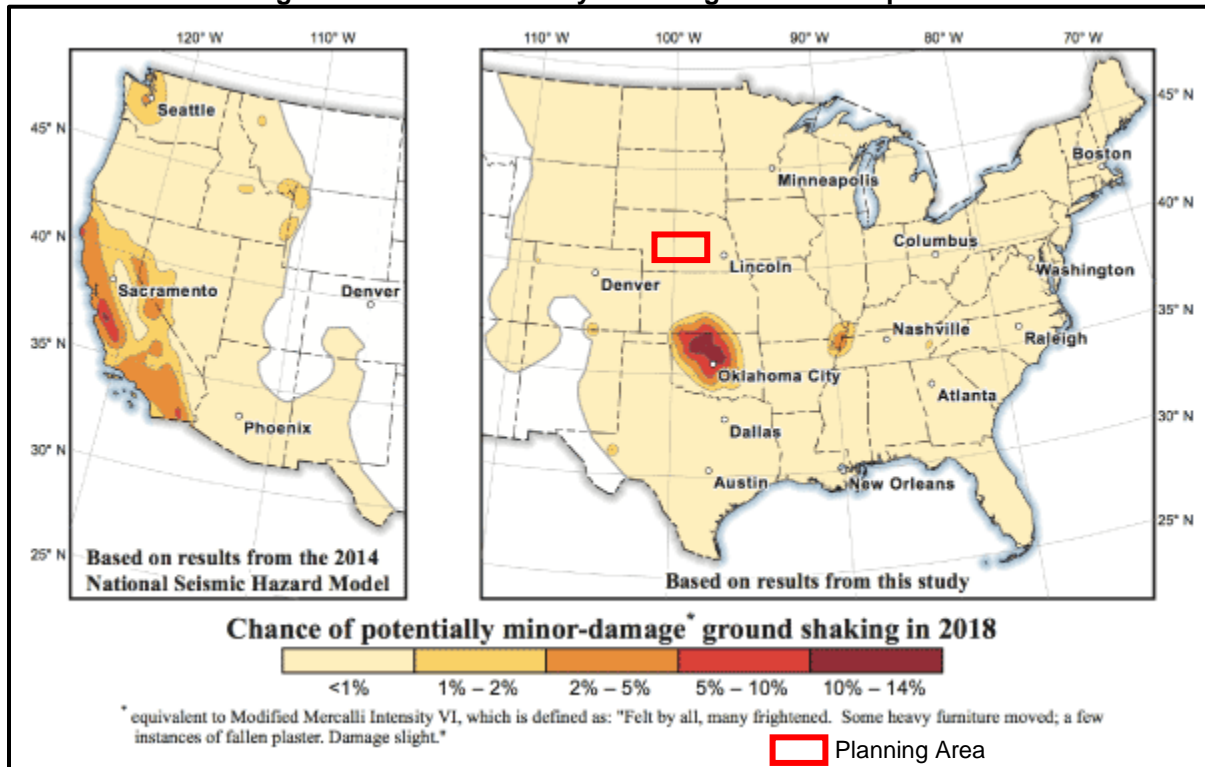
### Historical Occurrences

According to the United States Geological Survey (USGS), there has been one earthquake that has occurred in the planning area since 1900. The earthquake occurred in northern Dawson County on September 26, 2010. The earthquake had a magnitude of 3.1.

### Average Annual Losses

Due to the lack of sufficient earthquake data, limited resources, extremely low earthquake risk for the area, and no recorded damages with the reports of historical occurrences, it is not feasible to utilize the 'event damage estimate formula' to estimate potential losses for the planning area. Figure 21 shows the probability of damage from earthquakes, according to the USGS. The figure shows that the planning area has a less than one percent chance of damages from earthquakes.

**Figure 21: 2018 Probability of Damage from Earthquakes**



Source: USGS, 2018<sup>76</sup>

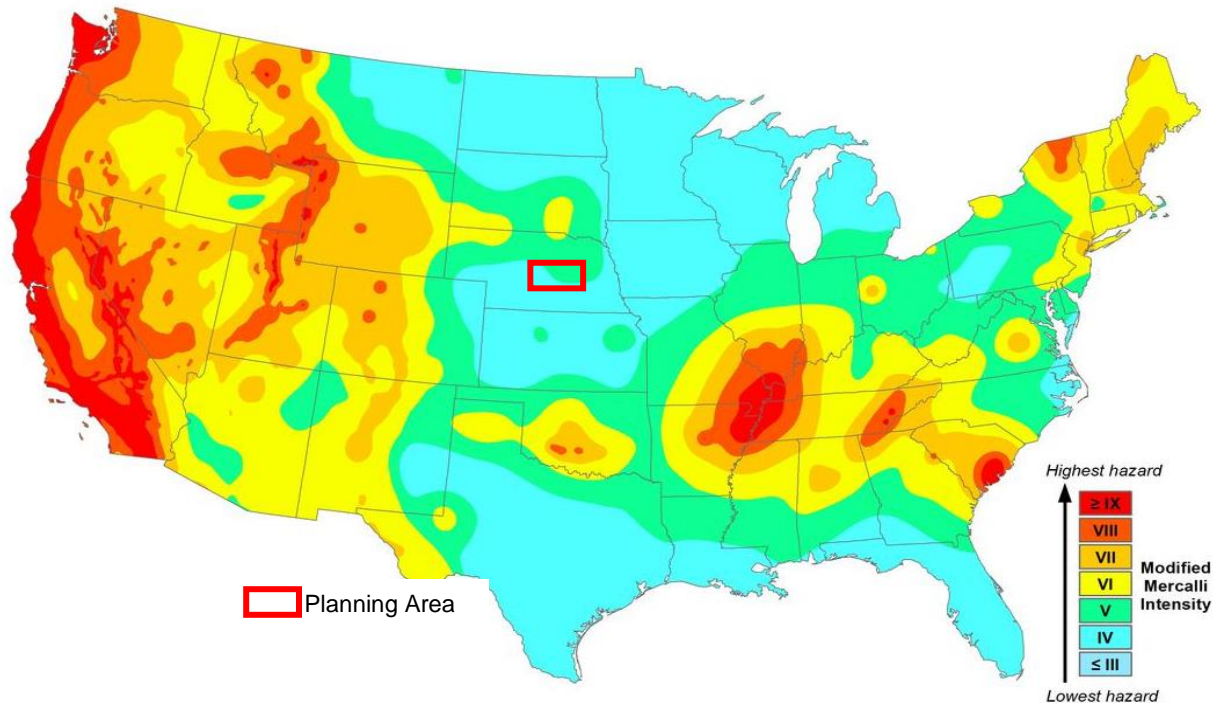
### Probability

The following figure visualizes the probability of a 5.0 or greater earthquake occurring in the planning area within 50 years. Based on only one earthquakes occurrence over 120-year period, the probability of an earthquake in the five-county region in any given year is less than one percent.

76 United States Geological Survey. 2018. "Short-term Induced Seismicity Models: 2018 One-Year Model." <https://www.usgs.gov/programs/earthquake-hazards/science/short-term-induced-seismicity-models>.



Figure 22: Earthquake Probability



### Community Top Hazard Status

The following table lists jurisdictions which identified levee failure as a top hazard of concern.

Jurisdiction	
Central Platte NRD	

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 52: Regional Earthquakes Vulnerabilities**

Sector	Vulnerability
People	-Risk of injury or death from falling objects and structures
Economic	-Short term interruption of business
Built Environment	-Damage to buildings, homes, or other structures from foundation cracking, falling objects, shattered windows, etc.
Infrastructure	-Damage to subterranean infrastructure (i.e. waterlines, gas lines, etc.)
Critical Facilities	-Damage to roadways
Climate	-Same as all other structures
	-None

# Extreme Heat

Extreme heat is often associated with periods of drought but can also be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulty cooling through the normal method of the evaporation of perspiration. Health risks arise when a person is overexposed to heat. Extreme heat can also cause people to overuse air conditioners, which can lead to power failures. Power outages for prolonged periods increase the risk of heat stroke and subsequent fatalities due to loss of cooling and proper ventilation. The planning area is largely rural, which presents an added vulnerability to extreme heat events; those suffering from an extreme heat event may be farther away from medical resources as compared to those living in an urban setting.

Along with humans, animals also can be affected by high temperatures and humidity. Cattle and other farm animals respond to heat by reducing feed intake, increasing their respiration rate, and increasing their body temperature. These responses assist the animal in cooling itself, but this is usually not sufficient. When animals overheat, they will begin to shut down body processes not vital to survival, such as milk production, reproduction, or muscle building.

Other secondary concerns connected to extreme heat hazards include water shortages brought on by drought-like conditions and high demand. Government authorities report that civil disturbances and riots are more likely to occur during heat waves. In cities, pollution becomes a problem because the heat traps pollutants in densely populated urban areas. Adding pollution to the stresses associated with the heat magnifies the health threat to the urban population.

The National Weather Service (NWS) is responsible for issuing excessive heat outlooks, excessive heat watches, and excessive heat warnings.

- **Excessive heat outlooks** are issued when the potential exists for an excessive heat event in the next three to seven days. Excessive heat outlooks can be utilized by public utility staffs, emergency managers, and public health officials to plan for extreme heat events.
- **Excessive heat watches** are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours.
- **Excessive heat warnings** are issued when an excessive heat event is expected in the next 36 hours. Excessive heat warnings are issued when an extreme heat event is occurring, is imminent, or has a very high probability of occurring.

## Location

The entire planning area is susceptible to extreme heat impacts.

### Extent

A key factor to consider regarding extreme heat situations is the humidity level relative to the temperature. As is indicated in the following figure from the National Oceanic and Atmospheric Administration, as the relative humidity increases, the temperature needed to cause a dangerous situation decreases. For example, for 100% relative humidity, dangerous levels of heat begin at 86°F whereas a relative humidity of 50%, require 94°F. The combination of relative humidity and temperature result in a heat index as demonstrated below:

Figure 23 is designed for shady and light wind conditions. Exposure to full sunshine or strong winds can increase hazardous conditions and raise heat index values by up to 15°F. For the purposes of this plan, extreme heat is being defined as temperatures of 100°F or greater. In the planning area, the months with the highest temperatures are June, July, and August.

**Figure 23: NOAA Heat Index  
Temperature (°F)**

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

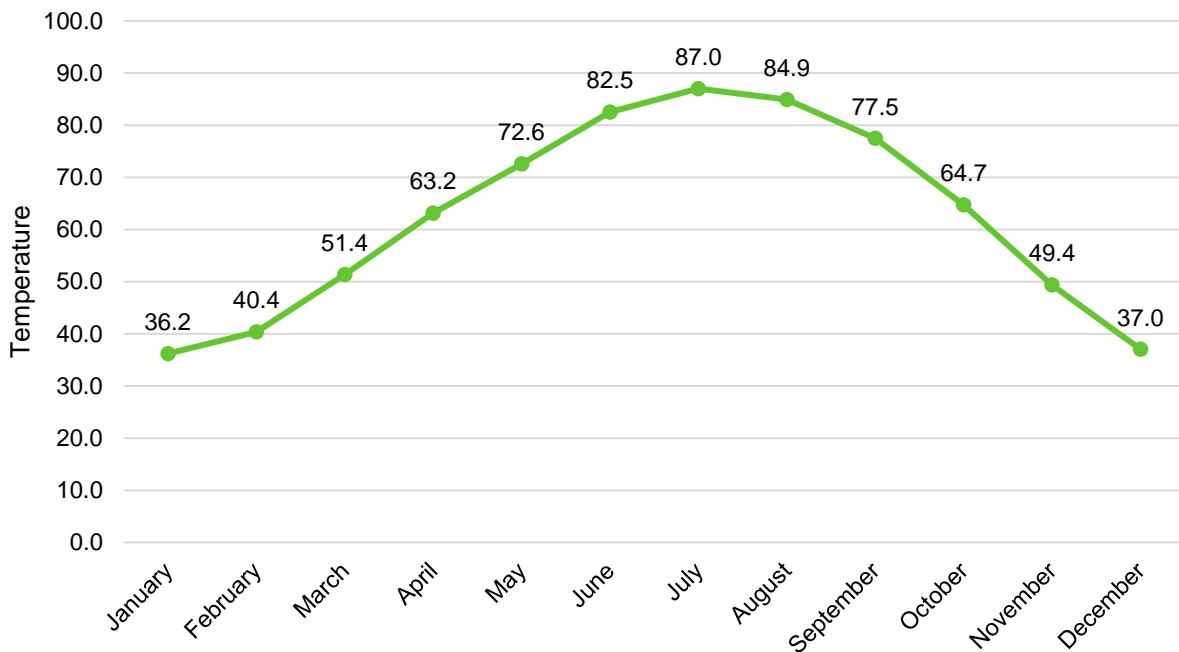
Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
  Extreme Caution
  Danger
  Extreme Danger



Source: NOAA, 2020<sup>77</sup>

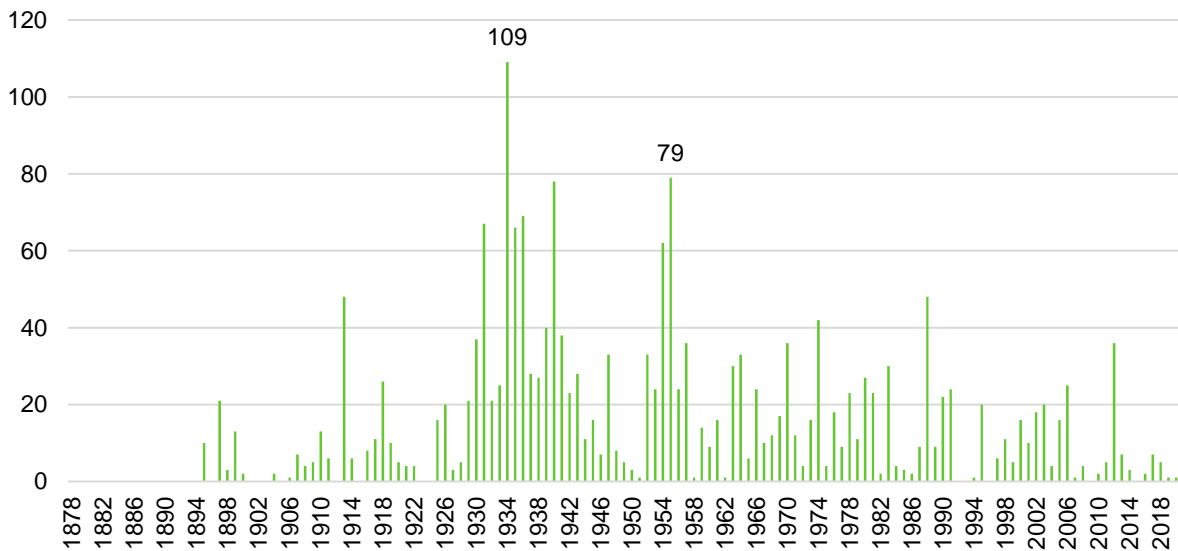
77 National Oceanic and Atmospheric Administration, National Weather Service. 2020. "Heat Index."  
[http://www.nws.noaa.gov/om/heat/heat\\_index.shtml](http://www.nws.noaa.gov/om/heat/heat_index.shtml).

**Figure 24: Monthly Climate Normals Max Temperature (1981-2010)**

Source: NCEI, 2021

### Historical Occurrences

According to the High Plains Regional Climate Center (HPRCC), on average, the planning area experiences six days above 100°F per year. The planning area experienced the most days on record above 100°F in 1934 with 109 days and in 1955 with 79 days. Conversely, 2020 was the most recent “coolest” year on record, with only one day above 100°F.

**Figure 25: Number of Days Above 100°F**

Source: HPRCC, 1878-2021

### Average Annual Losses

The annual property estimate was determined based upon NCEI Storm Events Database since 1996. The annual crop loss was determined based upon the RMA Cause of Loss Historical Database since 2000. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of extreme heat are difficult to quantify. Potential losses such as power outages could affect businesses, homes, and critical facilities. High demand and intense use of air conditioning or water pumps can overload the electrical systems and damage infrastructure.

**Table 53: Loss Estimate for Extreme Heat**

Hazard Type	Avg. Number of Days Above 100°F <sup>1</sup>	Total Property Loss <sup>2</sup>	Average Annual Property Loss <sup>2</sup>	Total Crop Loss <sup>3</sup>	Average Annual Crop Loss <sup>3</sup>
Extreme Heat	6 days	\$0	\$0	\$25,937,061	\$1,296,853

Source: 1 HPRCC (1899-2021); 2 Indicates data is from NCEI (Jan 1996 to June 2021); 3 Indicates data is from USDA RMA (2000 to 2020)

### Estimated Loss of Electricity

According to the FEMA Benefit Cost Analysis Reference Guide, if an extreme heat event occurred within the planning area, the following table assumes the event could potentially cause a loss of electricity for 10% of the population at a cost of \$126 per person per day.<sup>78</sup> In rural areas, the percent of the population affected, and duration may increase during extreme events. The assumed damages do not take into account physical damages to utility equipment and infrastructure.

**Table 54: Loss of Electricity - Assumed Damage by Jurisdiction**

Jurisdiction	(est.) 2020 Population	Population Affected (Assumed)	Electric Loss of Use Assumed Damage Per Day
Buffalo	50,084	5,008	\$631,008
Dawson	24,111	2,411	\$303,786
Hall	62,895	6,290	\$792,540
Merrick	7,668	767	\$96,642
Polk	5,214	521	\$65,646
<b>Total</b>	<b>149,972</b>	<b>14,997</b>	<b>\$1,889,622</b>

### Probability

Extreme heat is a regular part of the climate for the planning area; with 112 years out of 144 having at least one day of 100°F. The probability that extreme heat will occur in any given year in the planning area is 78 percent.

The Union for Concerned Scientists released a report in July 2019 titled *Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days*<sup>79</sup> which included predictions for extreme heat events in the future dependent on future climate actions. The table below summarizes those findings for the planning area.

<sup>78</sup> Federal Emergency Management Agency. June 2009. "BCA Reference Guide."

<sup>79</sup> Union of Concerned Scientists. 2019. "Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days." <https://www.ucsusa.org/sites/default/files/attach/2019/07/killer-heat-analysis-full-report.pdf>.

**Table 55: Extreme Heat Predictions for Days over 100F**

Jurisdiction	Midcentury Prediction 2036-2065 (Days per year)	Late Century Prediction 2070-2099 (Days per year)
Buffalo	25	51
Dawson	21	47
Hall	30	57
Merrick	34	61
Polk	36	63

Source: Union of Concerned Scientists, 1971-2000<sup>80</sup>

### Community Top Hazard Status

The following table lists jurisdictions which identified extreme heat as a top hazard of concern.

Jurisdiction	
Cross Country Community Schools	Lexington Public Schools
Eustis-Farnam Public Schools	Riverdale
Lexington	

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities. For jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 56: Regional Extreme Heat Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Heat exhaustion</li> <li>-Heat stroke</li> <li>Vulnerable populations include:               <ul style="list-style-type: none"> <li>-People working outdoors</li> <li>-People without air conditioning</li> <li>-Young children outdoors or without air conditioning</li> <li>-Elderly outdoors or without air conditioning</li> </ul> </li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-Short-term interruption of business</li> <li>-Loss of power</li> <li>-Agricultural losses</li> </ul>
<b>Built Environment</b>	<ul style="list-style-type: none"> <li>-Damage to air conditioning/HVAC systems if overworked</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-Damages to roadways (prolonged extreme events)</li> <li>-Stressing electrical systems (brownouts during peak usage)</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Loss of power</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>-Increased risk of wildfire events</li> <li>-Increases in extreme heat conditions are likely, adding stress on livestock, crops, people, and infrastructure</li> </ul>

80 Union of Concerned Scientists. 2022. "Extreme Heat and Climate Change: Interactive Tool".  
<https://www.ucsusa.org/resources/killer-heat-interactive-tool?location=polk-county--ne>



# Flooding

Flooding can occur on a local level, sometimes affecting only a few streets, but can also extend throughout an entire district, affecting whole drainage basins and impacting property in multiple states. Heavy accumulations of ice or snow can also cause flooding during the melting stage. These events are complicated by the freeze/thaw cycles characterized by moisture thawing during the day and freezing at night. There are four main types of flooding: riverine flooding, flash flooding, stormwater flooding, and ice jam flooding.

## Riverine Flooding

Riverine flooding, typically slower developing with a moderate to long warning time, is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater called floodplains. A floodplain or flood risk area is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100-year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin or watershed, which is defined as all the land draining to a river and its tributaries.

## Flash Flooding

Flash floods, typically rapidly developing with little to no warning time, result from convective precipitation usually due to intense thunderstorms or sudden releases due to a failure of an upstream impoundment created behind a dam, landslide, or levee. Flash floods are distinguished from regular floods by a timescale of fewer than six hours. Flash floods cause the most flood-related deaths because of this shorter timescale.

## Stormwater Flooding

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage capacity. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as stormwater flooding, is becoming increasingly prevalent as development exceeds the capacity of drainage infrastructure, therefore limiting its ability to convey stormwater. Flooding also occurs due to combined storm and sanitary sewers being overwhelmed by the high flows that often accompany storm events. Typical impacts range from dangerously flooded roads to water backing up into homes or basements, which damages mechanical systems and can create serious public health and safety concerns.

## Ice Jam Flooding

Ice jams occur when ice breaks up in moving waterways, and then stacks on itself where channels narrow, or human-made obstructions constrict the channel. This creates an ice dam, often causing flooding within minutes of the dam formation. The thickness of this ice sheet depends upon the degree and duration of cold weather in the area. This ice sheet can freeze to the bottom of the channel in places. During spring thaw or winter freezing, rivers frequently become clogged with this winter accumulation of ice. Because of relatively low stream banks and channels blocked with ice, rivers overtop existing banks and flow overland. This type of flooding tends to occur frequently on wide, shallow rivers such as the Platte, although other rivers can be impacted.



## Location

The region resides in the Middle Platte, Loup, and Big Blue watersheds. These rivers as well as their tributaries are potential locations for flooding to occur. Table 57 shows current statuses of Flood Insurance Rate Map (FIRM) panels. Figure 26 shows the FIRM data for the planning area. For jurisdictional-specific maps as well as an inventory of structures in the floodplain, please refer to *Section Seven: Participant Sections*.

**Table 57: FEMA FIRM Panel Status**

Jurisdiction	Participating in NFIP (Y/N)	Panel Number	Effective Date
<b>Buffalo County</b>	Y	31019CIND0A, 31019C0025D, 31019C0050D, 31019C0075D, 31019C0100D, 31019C0150D, 31019C0175D, 31019C0250D, 31019C0275D, 31019C0300D, 31019C0325D, 31019C0350D, 31019C0375D, 31019C0400D, 31019C0525D, 31019C0550D, 31019C0575D, 31019C0675D, 31019C0700D	11/26/2010
<b>Amherst</b>	Y	31019CIND0A, 31019C0385D, 31019C0425D	11/26/2010
<b>Elm Creek</b>	Y	31019CIND0A, 31019C0535D, 31019C0555D	11/26/2010
<b>Gibbon</b>	Y	31019CIND0A, 31019C0475D, 31019C0490D, 31019C0650D, 31019C0655D	11/26/2010
<b>Kearney</b>	Y	31019CIND0A, 31019C0420D, 31019C0440D, 31019C0450D, 31019C0585D, 31019C0600D, 31019C0605D, 31019C0610D, 31019C0615D, 31019C0620D, 31019C0650D	11/26/2010
<b>Miller</b>	Y	31019CIND0A, 31019C0195D, 31019C0200D, 31019C0225D	11/26/2010
<b>Pleasanton</b>	Y	31019CIND0A, 31019C0255D	11/26/2010
<b>Ravenna</b>	Y	31019CIND0A, 31019C0120D, 31019C0125D	11/26/2010
<b>Riverdale</b>	Y	31019CIND0A, 31019C0420D	11/26/2010
<b>Shelton</b>	Y	31019CIND0A, 31019C0500D, 31019C0515D	11/26/2010
<b>Dawson County</b>	Y	31047CIND0A, 31047C0025C, 31047C0050C, 31047C0075C, 31047C0100C, 31047C0125C, 31047C0150C, 31047C0175C, 31047C0275C, 31047C0300C, 31047C0375C, 31047C0400C, 31047C0425C, 31047C0525C, 31047C0575C, 31047C0600C, 31047C0700C	05/03/2011
<b>Cozad</b>	Y	31047CIND0A, 31047C0220C, 31047C0250C, 31047C0385C, 31047C0405C	05/03/2011
<b>Eddyville</b>	Y	31047CIND0A, 31047C0120C, 31047C0140C	05/03/2011
<b>Farnam</b>	Y	31047CIND0A, 31047C0530C, 31047C0550C	05/03/2011
<b>Gothenburg</b>	Y	31047CIND0A, 31047C0185C, 31047C0191C, 31047C0192C, 31047C0195C, 31047C0200C, 31047C0225C	05/03/2011
<b>Lexington</b>	Y	31047CIND0A, 31047C0435C, 31047C0442C, 31047C0444C, 31047C0450C, 31047C0461C, 31047C0462C, 31047C0463C, 31047C0464C, 31047C0475C, 31047C0625C, 31047C0626C, 31047C0650C	05/03/2011
<b>Overton</b>	Y	31047CIND0A, 31047C0500C, 31047C0660C, 31047C0675C	05/03/2011
<b>Sumner</b>	Y	31047CIND0A, 31047C0310C, 31047C0325C, 31047C0350C	05/03/2011
<b>Hall County</b>	Y	31001CIND0A, 31035CIND0A, 31079CIND0A, 31081CIND0A, 31001C0100C, 31035C0025C,	09/26/2008

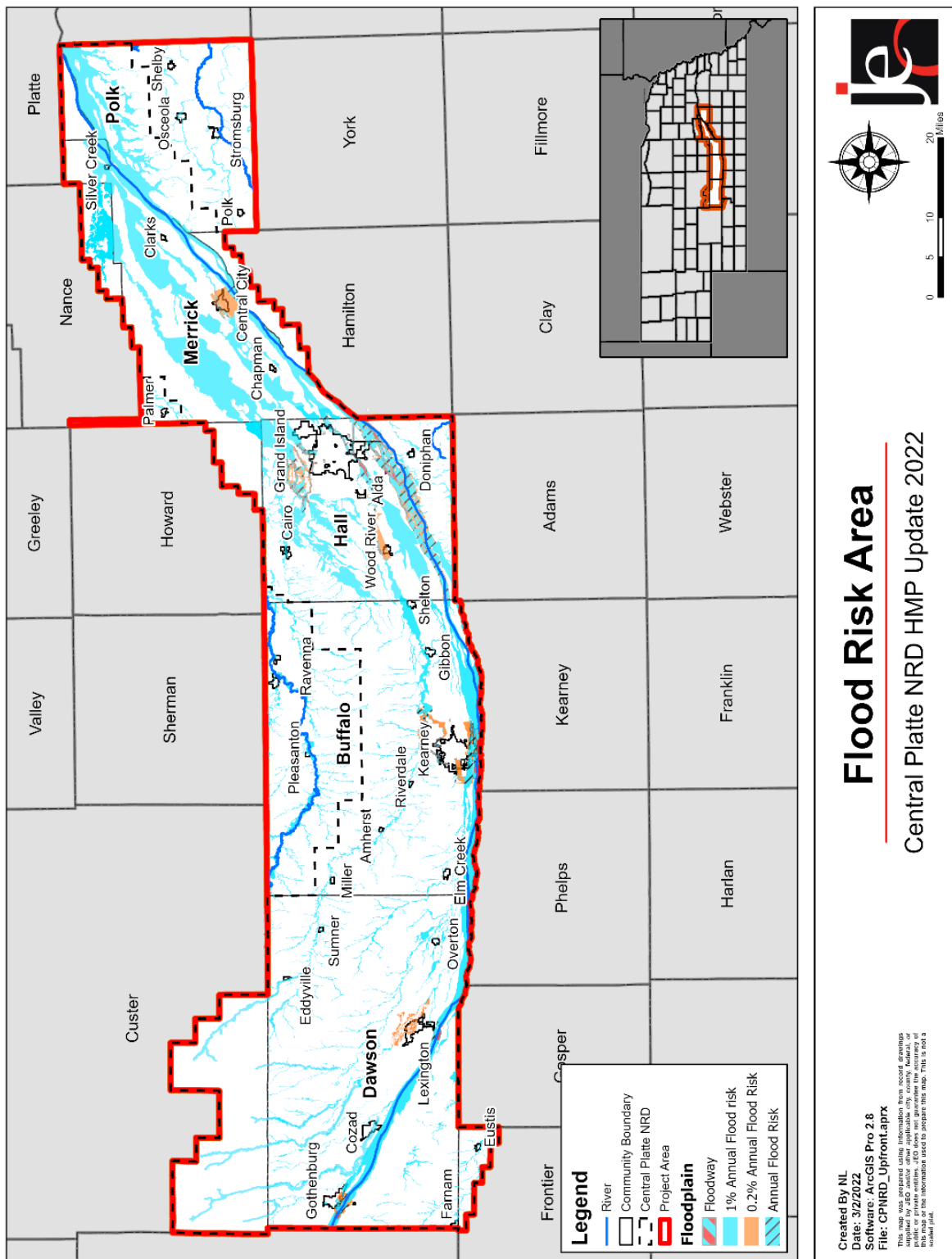
Jurisdiction	Participating in NFIP (Y/N)	Panel Number	Effective Date
		31035C0050C, 31079C0025D, 31079C0050D, 31079C0075D, 31079C0125D, 31079C0150D, 31079C0250D, 31079C0325D, 31079C0350D, 31079C0375D, 31079C0400D, 31081C0375D	
<b>Alda</b>	Y	31079CIND0A, 31079C0163D, 31079C0251D, 31079C0252D, 31079C0256D	09/26/2008
<b>Cairo</b>	Y	31079CIND0A, 31079C0019D, 31079C0038D, 31079C0039D, 31079C0107D, 31079C0127D	09/26/2008
<b>Doniphan</b>	Y	31079CIND0A, 31079C0267D, 31079C0269D, 31079C0286D, 31079C0288D, 31079C0289D	
<b>Grand Island</b>	Y	31079CIND0A, 31079C0100D, 31079C0157D, 31079C0158D, 31079C0159D, 31079C0167D, 31079C0168D, 31079C0169D, 31079C0175D, 31079C0178D, 31079C0183D, 31079C0186D, 31079C0187D, 31079C0188D, 31079C0189D, 31079C0191D, 31079C0193D, 31079C0200D, 31079C0252D, 31079C0256D, 31079C0257D, 31079C0275D, 31079C0276D, 31079C0277D, 31079C0300D	09/26/2008
<b>Wood River</b>	Y	31079CIND0A, 31079C0209D, 31079C0225D, 31079C0228D, 31079C0229D, 31079C0236D, 31079C0237D	09/26/2008
<b>Merrick County</b>	Y	31121CIND0A, 31121C0100D, 31121C0125D, 31121C0175D, 31121C0200D, 31121C0250D, 31121C0300D, 31121C0315D, 31121C0325D, 31121C0350D, 31121C0375D, 31121C0400D, 31121C0425D, 31121C0470D, 31121C0475D, 31121C0500D, 31121C0525D, 31121C0550D, 31121C0575D, 31121C0585D	01/06/2010
<b>Central City</b>	Y	31121CIND0A, 31121C0320D, 31121C0340D, 31121C0460D, 31121C0480D	01/06/2010
<b>Chapman</b>	Y	31121CIND0A, 31121C0450D	01/06/2010
<b>Clarks</b>	Y	31121CIND0A, 31121C0355D, 31121C0360D	01/06/2010
<b>Palmer</b>	Y	31121CIND0A, 31121C0275D	01/06/2010
<b>Silver Creek</b>	Y	31121CIND0A, 31121C0225D	01/06/2010
<b>Polk County</b>	Y	31143CIND0A, 31143C0025C, 31143C0050C, 31143C0075C, 31143C0100C, 31143C0125C, 31143C0150C, 31143C0175C, 31143C0200C, 31143C0250C, 31143C0275C, 31143C0325C, 31143C0375C, 31143C0400C	08/19/2008
<b>Osceola</b>	Y	31143CIND0A, 31143C0220C, 31143C0225C	08/19/2008
<b>Polk</b>	Y	31143CIND0A, 31143C0300C	08/19/2008
<b>Shelby</b>	Y	N/A	
<b>Stromsburg</b>	Y	31143CIND0A, 31143C0220C, 31143C0225C, 31143C0326C, 31143C0327C, 31143C0350C	08/19/2008
<b>Eustis (Frontier County)</b>	Y	31063CIND0A, 31063C0175C	04/02/2008

Source: FEMA, 2022<sup>81, 82</sup>

81 Federal Emergency Management Agency. 2021. "FEMA Flood Map Service Center." Accessed March 2022. <http://msc.fema.gov/portal/advanceSearch>.

82 Federal Emergency Management Agency. 2020. "Community Status Book Report." Accessed March 2022. <https://www.fema.gov/national-flood-insurance-program-community-status-book>.

Figure 26: 1% and 0.2% Annual Flood Risk Hazard Areas



## Risk Map Products

Risk Mapping, Assessment, and Planning (Risk MAP) is a FEMA program that provides communities with flood information and additional flood risk data (e.g., flood depth grids, percent chance grids, areas of mitigation interest, etc.) that can be used to enhance their mitigation plans and better protect their citizens. A portion of Hall County and Polk County, including the Village of Doniphan, City of Osceola, Village of Polk, Village of Shelby, and Village of Polk have gone through the Risk MAP process. Specific Risk MAP information is included in the individual community profiles for those jurisdictions. Figure 28 and Figure 29 show the boundary for the Risk MAP projects. There are currently no planned Risk MAP projects in the planning area. NeDNR hosts the Risk MAP products on an interactive web map, which can be viewed on their webpage: <https://dnr.nebraska.gov/floodplain>.

## Extent

The NWS has three categories to define the severity of a flood once a river reaches flood stage as indicated in Table 58.

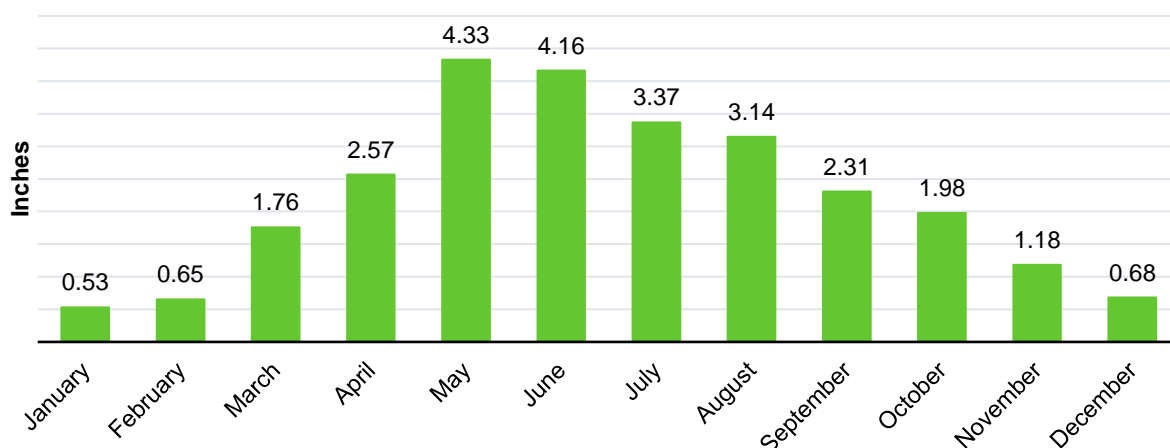
**Table 58: Flooding Stages**

Flood Stage	Description of flood impacts
<b>Minor Flooding</b>	Minimal or no property damage, but possibly some public threat or inconvenience
<b>Moderate Flooding</b>	Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary
<b>Major Flooding</b>	Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations

Source: NOAA, 2017<sup>83</sup>

Figure 27 shows the normal average monthly precipitation for the planning area, which is helpful in determining whether any given month is above, below, or near normal in precipitation. As indicated in Figure 30, the most common months for flooding within the planning area are May and June.

**Figure 27: Average Monthly Precipitation for Planning Area**



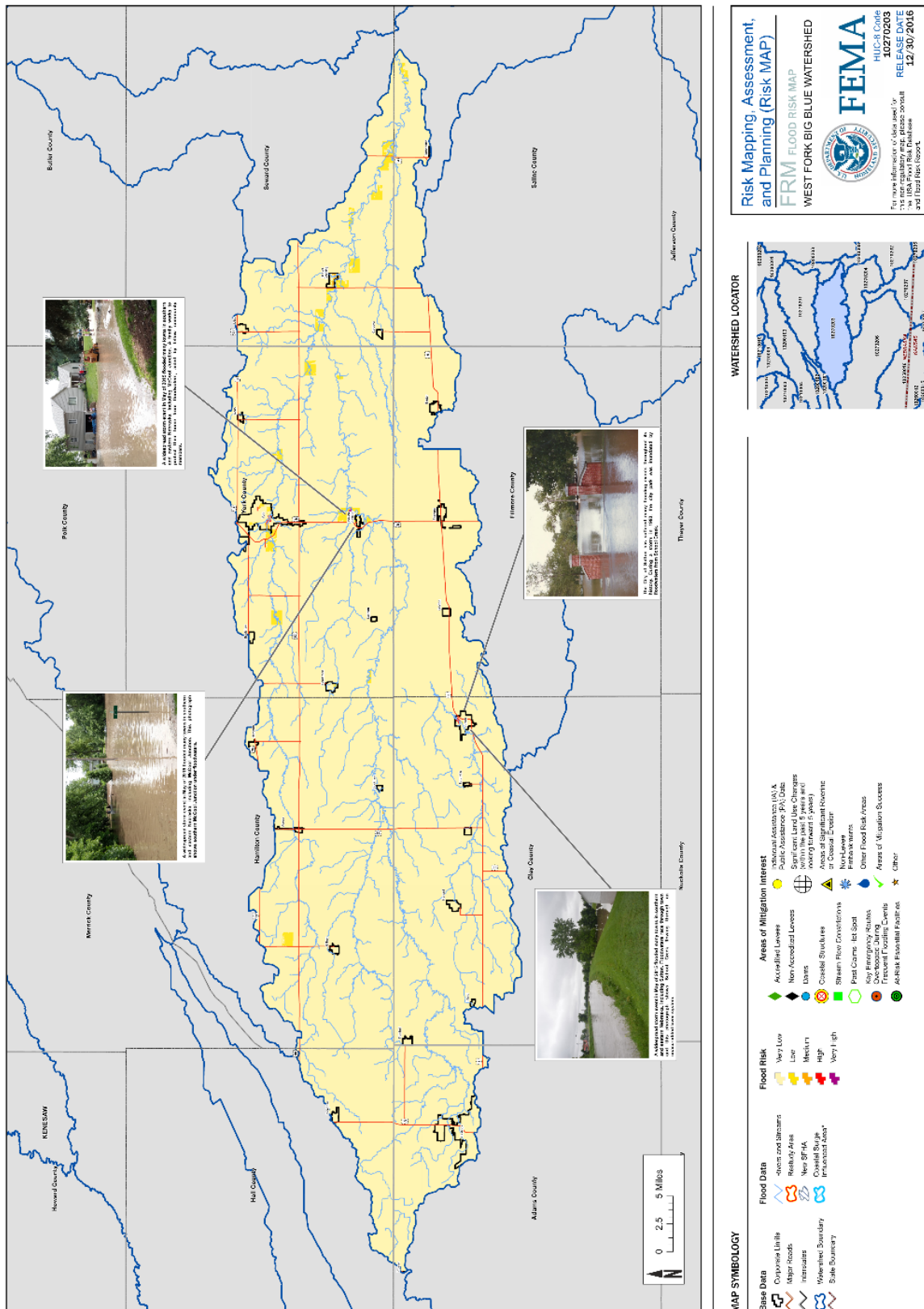
Source: NCEI, 2021<sup>84</sup>

83 National Weather Service. 2017. "Flood Safety." <https://www.weather.gov/safety/flood>.

84 NOAA National Centers for Environmental Information. December 2019. "Data Tools: 1981-2010 Normals." [datafile]. <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>.

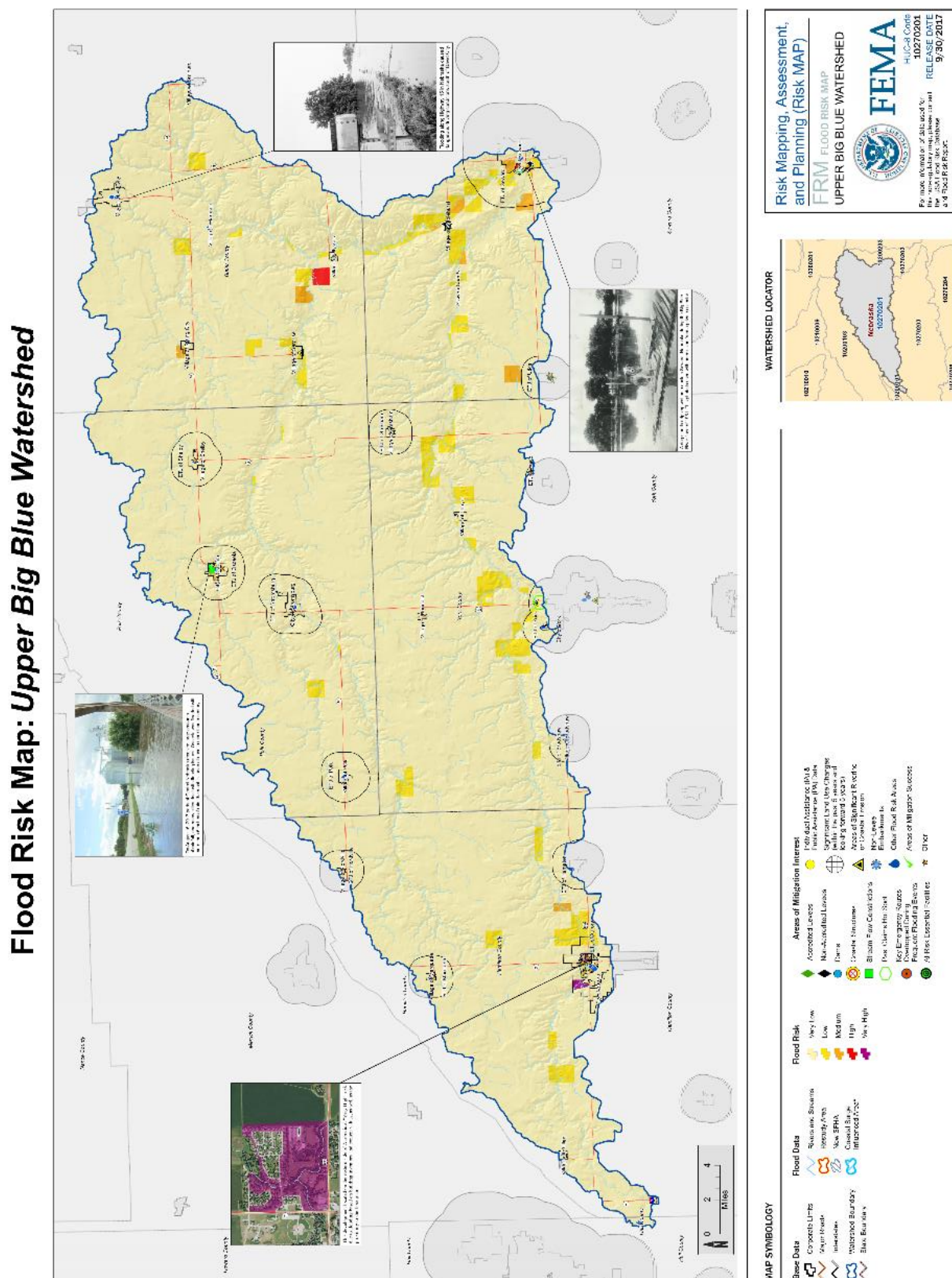
Figure 28: Flood Risk Map - West Fork Big Blue Watershed

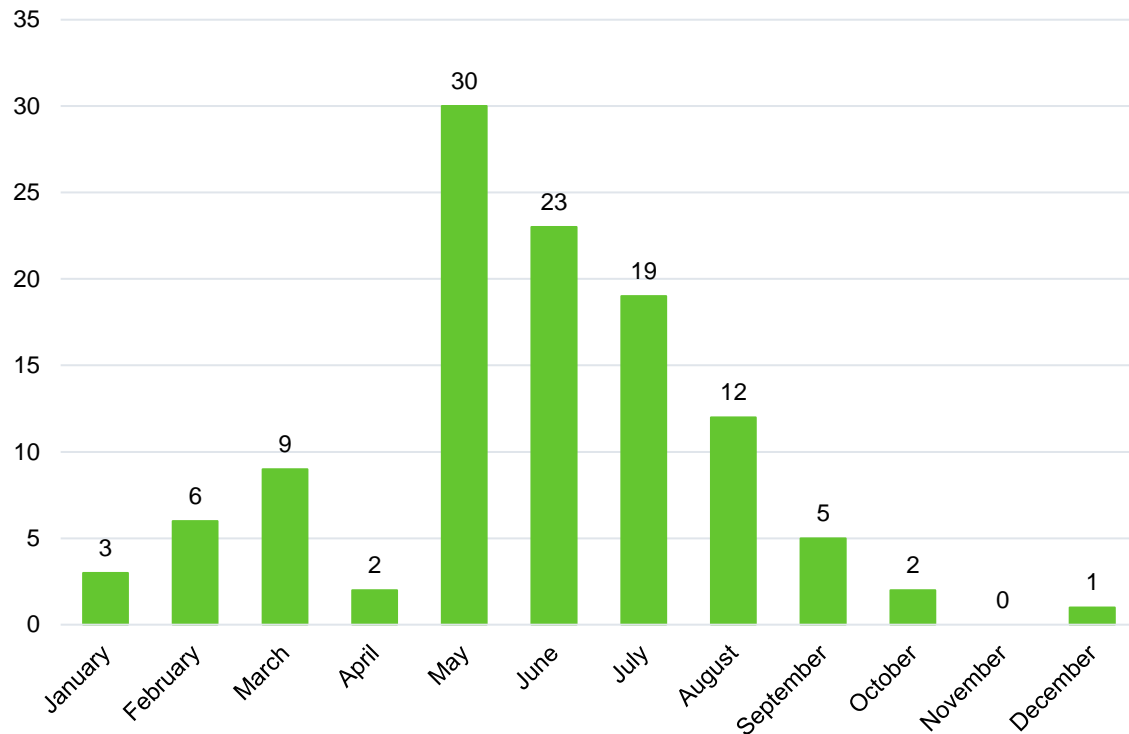
# Flood Risk Map: West Fork Big Blue Watershed





**Figure 29: Flood Risk Map - Upper Big Blue Watershed**



**Figure 30: Monthly Events for Floods/Flash Floods**

Source: NCEI, 1996-2021

**National Flood Insurance Program (NFIP)**

The NFIP was established in 1968 to reduce flood losses and disaster relief costs by guiding future development away from flood hazard areas where feasible; by requiring flood resistant design and construction practices; and by transferring the costs of flood losses to the residents of floodplains through flood insurance premiums.

In return for availability of federally backed flood insurance, jurisdictions participating in the NFIP must agree to adopt and enforce floodplain management standards to regulate development in special flood hazard areas as defined by FEMA's flood maps. One of the strengths of the program has been keeping people away from flooding rather than keeping the flooding away from people—through historically expensive flood control projects. The following tables summarize NFIP participation and active policies within the planning area.

**Table 59: NFIP Participants**

Jurisdiction	Participate in NFIP	Eligible-Regular Program	Date Current Map	Sanction	Suspension	Rescinded
Alda	Yes	6/20/1978	9/26/2008	-	-	-
Amherst	Yes	9/27/1985	11/26/10(M)	-	-	-
Buffalo County	Yes	3/1/1990	11/26/2010	-	-	-
Cairo	Yes	6/20/1978	09/26/08(M)	-	-	-
Central City	Yes	8/15/1979	1/6/2010	-	-	-
Chapman	Yes	2/1/2002	(NSFHA)	-	-	-



Jurisdiction	Participate in NFIP	Eligible-Regular Program	Date Current Map	Sanction	Suspension	Rescinded
Clarks	Yes	8/19/1987	1/6/2010	-	-	-
Cozad	Yes	6/30/1976	05/03/11(M)	-	-	-
Dawson County	Yes	7/1/1988	5/3/2011	-	-	-
Doniphan	Yes	8/1/1978	09/26/08(M)	-	-	-
Eddyville	No	-	-	-	-	-
Elm Creek	Yes	8/19/1987	11/26/10(M)	-	-	-
Eustis	Yes	3/1/1990	04/02/08(M)	-	-	-
Farnam	Yes	12/20/2021	05/03/11(M)	-	-	-
Gibbon	Yes	9/27/1985	11/26/10(M)	-	-	-
Gothenburg	Yes	1/3/1990	5/3/2011	-	-	-
Grand Island	Yes	3/2/1983	9/26/2008	-	-	-
Hall County	Yes	8/1/1980	9/26/2008	-	-	-
Kearney	Yes	7/5/1984	11/26/2010	-	-	-
Lexington	Yes	5/15/1984	5/3/2011	-	-	-
Merrick County	Yes	1/31/1994	1/6/2010	-	-	-
Miller	No	-	-	-	-	-
Osceola	Yes	7/2/1987	08/19/08(M)	-	-	-
Overton	Yes	9/27/1985	05/03/11(M)	-	-	-
Palmer	No	-	-	-	-	-
Pleasanton	Yes	9/27/1985	11/26/10(M)	-	-	-
Polk County	Yes	8/19/2008	8/19/2008	-	-	-
Polk	Yes	8/19/2008	8/19/2008	-	-	-
Ravenna	Yes	9/4/1985	11/26/10(M)	-	-	-
Riverdale	Yes	12/21/2010	11/26/10(M)	-	-	-
Shelby	No	-	-	-	-	-
Shelton	Yes	9/27/1985	11/26/10(M)		1/3/1986, 11/1/1985	9/24/1993, 11/1/1985
Silver Creek	Yes	8/26/1977	1/6/2010	-	-	-
Stromsburg	Yes	6/17/1986	8/19/2008	-	-	-
Sumner	Yes	9/27/1985	05/03/11(M)	-	-	-
Wood River	Yes	12/1/1978	9/26/2008	-	-	-

Source: Federal Emergency Management Agency, National Flood Insurance Program, 2022<sup>85</sup>

\*(M) indicates no elevation determined – All Zone A, C, and X

\*(NSFHA) indicates No Special Flood Hazard Area – All Zone C

85 Federal Emergency Management Agency. 2022. "Community Status Book Report." Accessed February 2022.  
<https://www.fema.gov/cis/NE.html>

The NFIP Emergency Program allows a community to voluntarily participate in the NFIP if no flood hazard information is available for their area; the community has a Flood Hazard Bound Map but no FIRM; or the community has been identified as flood-prone for less than a year.

**Table 60: NFIP Policies in Force and Total Payments**

Jurisdiction	Policies In-force	Total Coverage	Total Premiums	Total Losses	Total Payments
<b>Buffalo County</b>	52	\$11,905,400	\$45,333	16	\$282,833
Amherst	0	N/A	N/A	0	N/A
Elm Creek	2	\$424,000	\$4,102	2	\$19,380
Gibbon	17	\$3,880,300	\$14,330	11	\$55,329
Kearney	129	\$45,606,400	\$125,991	33	\$6,730,087
Miller	0	N/A	N/A	0	N/A
Pleasanton	13	\$1,054,900	\$16,031	3	\$18,305
Ravenna	4	\$385,800	\$3,909	2	\$5,664
Riverdale	3	\$555,000	\$2,016	0	\$0
Shelton	4	\$283,600	\$4,725	2	\$2,738
<b>Dawson County</b>	36	\$6,715,500	\$31,884	30	\$165,370
Cozad	7	\$1,341,100	\$3,551	7	\$96,322
Eddyville	0	N/A	N/A	0	N/A
Farnam	0	N/A	N/A	0	N/A
Gothenburg	10	\$5,458,000	\$20,661	9	\$20,130
Lexington	130	\$25,329,200	\$99,280	34	\$160,743
Overton	2	\$144,300	\$763	10	\$49,278
Sumner	0	N/A	N/A	0	N/A
<b>Hall County</b>	32	\$4,148,900	\$25,766	21	\$155,275
Alda	1	\$175,000	\$375	0	\$0
Cairo	4	\$616,400	\$4,090	0	\$0
Doniphan	0	\$0	\$0	1	\$619
Grand Island	50	\$11,315,600	\$74,416	111	\$620,318
Wood River	9	\$2,058,000	\$3,811	2	\$39,089
<b>Merrick County</b>	56	\$10,930,600	\$58,420	6	\$34,134
Central City	13	\$844,700	\$8,354	6	\$2,140
Chapman	0	N/A	N/A	0	N/A
Clarks	1	\$350,000	\$467	1	\$0
Palmer	0	N/A	N/A	0	N/A
Silver Creek	3	\$495,900	\$2,456	0	\$0
<b>Polk County</b>	26	\$2,833,300	\$30,949	1	\$0
Osceola	4	\$514,900	\$2,629	1	\$150
Polk	0	N/A	N/A	0	N/A
Shelby	0	N/A	N/A	0	N/A
Stromsburg	0	N/A	N/A	0	N/A

Jurisdiction	Policies In-force	Total Coverage	Total Premiums	Total Losses	Total Payments
<b>Eustis (Frontier County)</b>	0	N/A	N/A	0	N/A

Source: FEMA, HUDEX Policy Loss Data, March 2022<sup>86</sup>

This plan highly recommends and strongly encourages each plan participant to remain in good standing and continue involvement with the NFIP. Compliance with the NFIP should remain a top priority for each participant, regardless of whether or not a flooding hazard area map has been delineated for the jurisdiction. Jurisdictions are encouraged to initiate activities above the minimum participation requirements, which are described in the Community Rating System Coordinator's Manual (FIA-15/2017). As of March 2022, no communities in the five-county planning area participate in the CRS.

### NFIP Repetitive Loss Structures

NeDNR and FEMA Region VII were contacted to determine if any existing buildings, infrastructure, or critical facilities are classified as NFIP Repetitive Loss Structures. Note there are two definitions for repetitive loss structures. Severe repetitive loss is a grant definition for HMA purposes that has specific criteria while repetitive loss is a general NFIP definition. There are ten repetitive loss properties located in the planning area as of October 2021. Only jurisdictions with reported properties are included in the following table.

**Table 61: Repetitive Loss Structures**

Jurisdiction	Repetitive Loss	Severe Repetitive Loss	Type of Property	Total Losses	Total Payments
<b>Buffalo County</b>	2	0	Single Family	2	\$68,838.98
<b>Cozad</b>	2	0	Single Family, Two-Four Family	2	\$64,817.85
<b>Dawson County</b>	3	0	Single Family	3	\$24,061.84
<b>Elm Creek</b>	1	0	Single Family	1	\$19,379.76
<b>Gibbon</b>	4	0	Non-Residential Business	4	\$38,560.48
<b>Gothenburg</b>	2	0	Non-Residential Business	2	\$14,387.66
<b>Grand Island</b>	2	0	Single Family	2	\$47,941.13
<b>Hall County</b>	1	0	Single Family	1	\$56,292.77
<b>Kearney</b>	0	1	Single Family	1	\$101,156.43
<b>Overton</b>	1	0	Single Family	1	\$4,891.97

Source: NeDNR, October 2021

86 Federal Emergency Management Agency: National Flood Insurance Program. December 2019. Policy & Claim Statistics for Flood Insurance." Accessed November 2020. <https://www.fema.gov/policy-claim-statistics-flood-insurance>.

**NFIP RL:** Repetitive Loss Structure refers to a structure covered by a contract for flood insurance under the NFIP that has incurred flood-related damage on two occasions during a 10-year period, each resulting in at least a \$1,000 claim payment.

**NFIP SRL:** Severe Repetitive Loss Properties are defined as single or multifamily residential properties that are covered under an NFIP flood insurance policy and:

- (1) That have incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding \$5,000, and with the cumulative amount of such claim payments exceeding \$20,000; or
- (2) For which at least two separate claims payments (building payments only) have been made under such coverage, with cumulative amount of such claims exceeding the market value of the building.
- (3) In both instances, at least two of the claims must be within 10 years of each other, and claims made within 10 days of each other will be counted as one claim.

**HMA RL:** A repetitive loss property is a structure covered by a contract for flood insurance made available under the NFIP that:

- (1) Has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such food event; and
- (2) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

**HMA SRL:** A severe repetitive loss property is a structure that:

- (1) Is covered under a contract for flood insurance made available under the NFIP.
- (2) Has incurred flood related damage –
  - (a) For which four or more separate claims payments (includes building and contents) have been made under flood insurance coverage with the amount of each such claim exceeding \$5,000, and with the cumulative amount of such claim payments exceeding \$20,000; or
  - (b) For which at least two separate claims payments (includes only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

### Historical Occurrences

The NCEI reports events as they occur in each community. A single flooding event can affect multiple communities and counties at a time; the NCEI reports these large scale, multi-county events as separate events. The result is a single flood event covering a large portion of the planning area could be reported by the NCEI as several events. According to the NCEI, 47 flash flooding events resulted in \$42,655,000 in property damage, while 37 riverine flooding events

resulted in \$9,118,000 in property damage. USDA RMA data does not distinguish the difference between riverine flooding damages and flash flooding damages. The total crop loss according to the RMA is \$ \$4,140,050. Descriptions of the most damaging flood events from the NCEI are below:

- **May 11, 2005 – Flash Flood – Buffalo, Hall, Dawson, and Merrick Counties:** On the night of May 11<sup>th</sup>, thunderstorms ravaged a large part of south-central Nebraska with hail, high winds, a tornado and catastrophic flooding. During evening and early morning hours, four to 12 inches of fell from Dawson County east to York County. At Kenesaw and Wood River, over 11 inches of rain was measured. The City of Grand Island set a rainfall record for a single event with 7.21 inches of rain. Statistically, this event was a 100-year rain and flood event for the area. In Wood River, 12 people were evacuated due to rising water. It was estimated every structure in Wood River sustained some sort of storm damage and wave after wave of severe thunderstorms pounded the town. Twelve homes sustained severe damage. The Wood River crested at nine feet in town and flooded most streets. Thirty-six homes were evacuated in the City of Grand Island as flooding was rampant over the west and north part of the city. The city's sewer system handled about 75 million gallons of water, or about six times the normal amount during the storm. Many parts of the business and residential districts sustained flood damage as the Prairie, Silver and Moores Creeks flooded. The Wood River near Alda, which had been dry for three years, tied a record with a crest of 12.2 feet early on the 12<sup>th</sup>. Elsewhere, ten bridges were damaged in Merrick County. Hall County was declared a Federal Disaster Area. According to the NCEI, the event caused property damages in multiple counties for the following amounts: \$5,000,000 in Hall County, \$1,000,000 in Dawson County, \$500,000 in Merrick County, and \$5,000,000 in Buffalo County.
- **March 13, 2019 – Flood, Flash Flood – Buffalo, Dawson, Hall, and Merrick Counties:** Widespread flash flooding occurred the night of Wednesday March 13<sup>th</sup> into Thursday the 14<sup>th</sup>. People were trapped in vehicles Wednesday evening after driving into flood waters on roads that crossed the Wood River in Buffalo County. Multiple rescues were necessary. Two cars were swept off the road into the swollen Wood River north of Kearney. One woman waited for a rescue team on the roof of her car. She was rescued using a jet ski. A man was also rescued from a semi that was swamped by flood waters. U.S. Highway 30 was closed in both directions between Shelton and Alda due to flooding of the Wood River. Water one to two ft deep covered Highway 30 in Gibbon. Highway 30 was also closed from Silver Creek to Highway 81 due to flooding. In Hall County, 163 of the gravel roads were damaged. Preliminary cost estimates for repairing them was \$2-3 million, with \$700-800,000 to repair paved roads. The preliminary estimated cost to damaged roads and bridges in Buffalo County was \$1.5-2 million, where ruts in some gravel roads were two to three feet deep. 150 miles of road and eight bridges were impassible. In northwest Buffalo County, six homes could not be reached via gravel road. Homeowners had to drive through approximately one-half mile of pasture to get to and from their homes. At the peak of the flooding, so many roads were closed that Buffalo and Dawson counties ran out of barricades.

Flooding was extensive in Pleasanton, Gibbon, Wood River, and Alda. In the City of Wood River, water was three to four feet deep between 11th and 13th streets. The post office in Pleasanton were temporarily evacuated with mail operations moved to nearby post offices. People were evacuated in Gibbon, Pleasanton, Shelton, and Wood River, some even by boat. A Red Cross shelter was opened at the high school in Wood River. Trains were also severely impacted. The Union Pacific railroad tracks between Gibbon and Columbus were

shut down for several days. Rushing water eroded and washed out the bed underneath all three tracks in Gibbon. Six Union Pacific trains were parked at Central City and Clarks because they were unable to continue to their destinations. The Burlington Northern Santa Fe rail line from Litchfield to Ravenna to York was also shut down for several days. Several miles of BNSF track were damaged between Gibbon and Alexandria due to flooding along the Little Blue River. Options for rerouting trains were limited because the flooding was so widespread over eastern Nebraska and western Iowa. Ethanol plants in Ravenna, Ord, and Central City were impacted and could not get ethanol to market because of damaged tracks. Several records were set at Turkey Creek, The Loup River, The North Loup River, and The Wood River. Despite the major flooding that occurred on The Wood River, from Gibbon to Alda, the Wood River Diversion at Grand Island worked as designed and protected the south side of Grand Island from flooding. A new record water level was set at the Wood River Diversion, with water cresting at 18.15 feet. As flood waters receded, pastureland, and fields next to rivers and creeks were covered in sand and silt inches to feet deep, which ruined many acres for grazing. This flooding occurred in the middle of calving season. Hundreds of calves perished. Due to the magnitude of the flooding in central and eastern Nebraska, the State Emergency Operations Center was activated. Emergencies were declared by most counties in south central Nebraska. Governor Ricketts applied for and received a federal disaster declaration for Buffalo, Hall, and Merrick counties. The NeDNR has collected and reviewed extensive data records from the flood event. An event-wide ArcGIS Story Map has been developed and provides an excellent resource to understand the cause, duration, impacts, and recovery efforts from this event. The ArcGIS Story Map can be viewed at:

<https://storymaps.arcgis.com/stories/9ce70c78f5a44813a326d20035cab95a>.

- July 8, 2019 – Flash Flood – Buffalo and Dawson Counties:** Excessive rainfall and flash flooding occurred in the afternoon and evening of July 8<sup>th</sup> in parts of Dawson and Buffalo counties. Numerous gravel county roads were inundated by flood waters and impassible. Many of them were severely damaged. Roads in the City of Kearney were flooded from one curb to the other, and in at least two separate places, water was three to four feet deep. Almost 40 vehicles were stranded in the streets of Kearney. Basements were flooded in some homes due to egress windows breaking. The student union was flooded on the University of Nebraska campus in Kearney. Two to three feet of water was reported in the lower level of the food court. In Lexington, cars were stalled in flood waters and 23 people were evacuated from an apartment building due to flooding. The Red Cross opened a shelter to care for those evacuated. In some areas, the impacts worsened the following day as creeks swelled out of their banks. Gibbon, Kearney, Elm Creek, and Lexington were all severely impacted. U.S. Highway 30 was closed due to floodwater from Shelton to Kearney to Elm Creek, as well as near Lexington. Turkey Creek drains into the North Channel of the Platte River, which runs through the south side of Kearney. Water rapidly rose on the south side of the city Tuesday morning, inundating numerous hotels, restaurants, businesses, and basements. At least 200 people had to be evacuated from hotels using construction grade front-end loaders. Approximately 100 other nearby residents needed to be evacuated as well. At its peak, water was two to four feet high inside the hotels, and four to five feet high in the parking lots. The water rose so quickly that many people staying at the hotels did not have time to move their vehicles. Most vehicles at the hotels were lost and hundreds of vehicles in the city had to be towed. Some businesses were closed for weeks, others for months, as repairs and remodeling were completed, and kitchen equipment was ruined at some restaurants. Of the 1,800 hotel rooms in Kearney, only about 600 were available for use because first floor services, such as check-in desks, laundry facilities, and kitchens were damaged. Second avenue, which

is the main north-south thoroughfare through the city, was closed from Interstate 80 to 11th avenue. The Interstate 80 off-ramp was also closed. All traffic to and from the Interstate and from the city, had to use the Kearney East Expressway. Approximately 400 Kearney homes were damaged by the flood, and many more beyond city limits. One home with an egress window gave way in a home on the southeast side of Kearney. Water rushed into the basement, filling it nearly to the ceiling. Extensive flooding resulted in the closure of Yanney Park. A power substation flooded and resulted in power outages to about 450 customers. Flood waters began to subside Wednesday, July 10th, which allowed for one lane of 2<sup>nd</sup> avenue to be reopened in each direction. The Platte River, which is very wide and shallow, rose three feet in 12 hours from 6:00 PM Monday to 6:00 AM Tuesday, and four feet in 24 hours. The Platte River has a flood stage of seven feet, but it crested at 8.3 feet at 5:15 PM Tuesday. In the town of Elm Creek, many roads and basements were flooded. A gauge on Elm Creek indicated that the water level rose eight feet in two hours Monday evening. The City of Lexington issued a disaster declaration due to the disruption of utility services. Streets and homes were flooded with sewers backing up into homes. Flooding was extensive along the Wood River. Moderate flooding occurred at Riverdale with water covering the bridge just north of town. Further to the north, flooding forced the closure of state highway 10 between Pleasanton and Hazard. In Gibbon, water flooded streets and basements for the second time this year. The northeast side of the community was impacted the worst with at least 30 homes and several businesses inundated by floodwater. People had to sandbag their homes and businesses. It is believed that flooding on the Wood River was wider with this event, due to changes in the riverbed from the prior flood in March. Some places that did not flood in that event, flooded this time. Several businesses affected by the March flood still remained closed due to damage. Amtrak trains that travel between Chicago and Emeryville, CA were halted in Lincoln and McCook due to the flooding. Widespread flooding of low-lying areas, creeks, and rivers continued for several days following the excessive rain. Flood waters did not recede in some locations until Monday, July 15th. According to the NCEI, the event caused \$30,000,000 in property damages in Buffalo County and \$2,000,000 in Dawson County.

The CPNRD has several projects underway to address flooding issues in the planning area. Projects include The Wood River Watershed Flood Risk Reduction Plan, the Elm and Turkey Creeks Watershed Flood Risk Reduction Plan, and the Spring and Buffalo Creeks Watershed Flood Risk Reduction Plan. Additional information on the CPNRD flood risk reduction projects can be found at <https://www.cpnrd.org/flood-reduction/projects-built/>.

One recently completed project that significantly reduced damages from the 2019 floods is the Upper Prairie Silver Moores Project (USPM). The USPM project was a multi-year flood risk reduction project designed to reduce flooding risk for northwestern Grand Island. Goals of the project included reducing flooding, updating FEMA flood maps, and educating citizens on the risks associated living near flood control structures. The project entailed the construction of a detention cell on both the east and west sides of Dannenbrog Road, construction of dry dams, and the construction of the Silver Creek RB Levee. It was estimated that Grand Island avoided \$47 million in potential damages in March 2019 because of the project. In addition, 600 properties were removed from the 100-year floodplain. Additional information about the USPM project can found on the NRD's website: <https://www.floodsafe-cpnrd.org/>.



### Average Annual Damages

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and the number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Flooding causes an average of \$1,991,269 in property damages and \$207,003 in crop losses per year for the planning area.

**Table 62: Flood Loss Estimate**

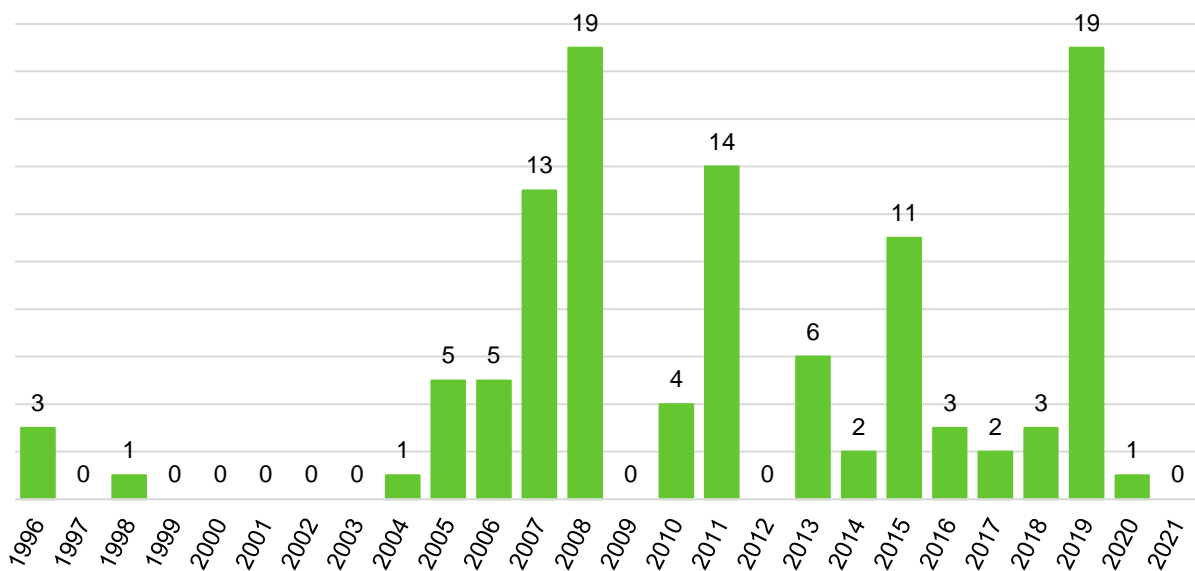
Hazard Type	Number of Events <sup>1</sup>	Average Events Per Year	Total Property Loss <sup>1</sup>	Average Annual Property Loss <sup>1</sup>	Total Crop Loss <sup>2</sup>	Average Annual Crop Loss <sup>2</sup>
<b>Flooding</b>	84	3.2	\$51,773,000	\$1,991,269	\$4,140,050	\$207,003

Source: 1 Indicates data is from NCEI (Jan 1996 to June 2021); 2 Indicates data is from USDA RMA (2000 to 2020)

### Probability

The NCEI reports 37 flooding and 47 flash flooding events for a total of 84 events from January 1996 to June 2021. Some years had multiple flooding events. Figure 31 shows the events broken down by year. Based on the historic record and reported incidents by participating communities, there is a 65 percent probability that flooding will occur annually in the planning area.

**Figure 31: Yearly Events for Floods/Flash Floods**



Source: NCEI, 1996-June 2021

### Community Top Hazard Status

The following table lists jurisdictions which identified flooding as a top hazard of concern.

Jurisdiction	
Alda	Kearney
Amherst	Lexington
Buffalo County	Merrick County
Cairo	Osceola
Central City	Pleasanton Fire District
Central Platte NRD	Pleasanton
Cozad	Polk County
Dawson County	Polk
Dawson County Drainage District No.2	Ravenna Public Schools
Dawson County Drainage District No.3	Ravenna
Doniphan Fire District	Riverdale
Doniphan	Shelby
Elm Creek Fire District	Shelton
Elm Creek	Silver Creek
Eustis	Stromsburg
Four Corners Health Department	Two Rivers Public Health Department
Gibbon Fire District	University of Nebraska - Kearney
Gibbon Public Schools	Wood River Public Schools
Gibbon	Wood River
Grand Island	
Hall County	

### Regional Vulnerabilities

Low-income and minority populations are disproportionately vulnerable to flood events.<sup>87</sup> These groups may lack needed resources to mitigate potential flood events as well as resources that are necessary for evacuation and response. In addition, low-income residents are more likely to live in areas vulnerable to the threat of flooding but lack the resources necessary to purchase flood insurance. The study found that flash floods are more often responsible for injuries and fatalities than prolonged flood events.

Other groups that may be more vulnerable to floods, specifically flash floods, include the elderly, those outdoors during rain events, and those in low-lying areas. Elderly residents may suffer from a decrease or complete lack of mobility and as a result, be caught in flood-prone areas. Residents in campgrounds or public parks may be more vulnerable to flooding events. Many of these areas exist in natural floodplains and can experience rapid rise in water levels resulting in injury or death.

On a state level, the Nebraska's State National Flood Insurance Coordinator's office has studied who lives in special flood hazard areas. According to the NeDNR, floodplain areas have a few unique characteristics which differ from non-floodplain areas:

- Higher vacancy rates within floodplain
- Far higher percentage of renters within floodplain
- Higher percentage of non-family households in floodplain
- More diverse population in floodplain
- Much higher percentage of Hispanic/Latino populations in the floodplain

<sup>87</sup> Cutter, Susan and Finch, Christina. February 2008. "Temporal and Spatial Changes in Social Vulnerability to Natural Hazards".

To analyze parcels and populations located in the floodplain, GIS parcel data were acquired from each County Assessor. This data was analyzed for the location, number, and value of property improvements at the parcel level. Property improvements include any built structures such as roads, buildings, and paved lots. The data did not contain the number of structures on each parcel. A summary of the results of this analysis for the five-county planning area is provided in the following table. Specific jurisdictional parcel improvements in the floodplain can be found in the corresponding community profiles in *Section Seven*.

**Table 63: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

County	Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
<b>Buffalo</b>	17,665	\$3,634,232,115	1,868	\$429,161,590	10.6%
<b>Dawson</b>	9,520	\$1,234,924,706	1,631	\$266,349,541	17.1%
<b>Hall</b>	22,119	\$3,796,958,806	1,765	\$423,220,613	8.0%
<b>Merrick</b>	4,064	\$506,965,716	1,350	\$183,232,985	33.2%
<b>Polk</b>	3,143	\$284,566,436	846	\$71,993,788	26.9%
<b>Total</b>	<b>56,511</b>	<b>\$9,457,647,779</b>	<b>7,460</b>	<b>\$1,373,958,517</b>	<b>13.2%</b>

Source: County Assessors, 2021

**Table 64: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

County	Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
<b>Buffalo</b>	17,665	\$3,634,323,115	682	\$258,243,980	3.9%
<b>Dawson</b>	9,520	\$1,234,924,706	2,143	\$257,598,525	22.5%
<b>Hall</b>	22,119	\$3,796,958,806	822	\$126,768,583	3.7%
<b>Merrick</b>	4,064	\$506,965,716	1,674	\$177,653,596	41.2%
<b>*Polk</b>	N/A	N/A	N/A	N/A	N/A
<b>Total</b>	<b>53,368</b>	<b>\$9,173,172,343</b>	<b>5,321</b>	<b>\$820,264,684</b>	<b>10.0%</b>

Source: County Assessors, 2021

\*Does not have a mapped 0.2% Annual Flood Risk Area

### Phragmites

A significant concern for the planning area includes the introduction of the invasive species Phragmites or Common Reed. The species may change how water drains and demand excessive water from wetlands, reducing the efficacy of wetlands in flood prevention. Because phragmites grow so densely, they can block drainage ditches and change the hydrology of a wetland area. Additionally, these plants grow densely and create a fleet of dry stalks which dry up wetland areas. Wetlands provide a natural flood prevention method in the planning area, so protecting them against invasive species such as phragmites will help further flood mitigation.

The following table is a summary of regional vulnerabilities. For jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 65: Regional Flooding Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Low income and minority populations may lack the resources needed for evacuation, response, or to mitigate the potential for flooding</li> <li>-Elderly or residents with decreased mobility may have trouble evacuating</li> <li>-Residents in low-lying areas, especially campgrounds, are vulnerable during flash flood events</li> <li>-Residents living in the floodplain may need to evacuate for extended periods</li> <li>-Buffalo County: LEOP estimates 10% of people reside within the one percent annual chance floodplain</li> <li>-Dawson County: LEOP estimates 75% of people reside within the one percent annual chance floodplain</li> <li>-Hall County: LEOP estimates 6% of people reside within the one percent annual chance floodplain</li> <li>-Merrick County: LEOP estimates 29% of people reside within the one percent annual chance floodplain</li> <li>-Polk County: No estimate given in LEOP</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-Business closures or damages may have significant impacts</li> <li>-Agricultural losses from flooded fields or cattle loss</li> <li>-Closed roads and railways would impact commercial transportation of goods</li> </ul>
<b>Built Environment Infrastructure</b>	<ul style="list-style-type: none"> <li>-Buildings may be damaged</li> <li>-Damages to roadways and railways</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Wastewater facilities are at risk, particularly those in the floodplain</li> <li>-Critical facilities, especially those in the floodplain, are at risk to damage (critical facilities are noted within individual community profiles)</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>-Changes in seasonal and annual precipitation normals will likely increase frequency and magnitude of flood events</li> </ul>

# Grass/Wildfire

Wildfires, also known as grassfires, brushfires, forest fires, or wildland fires, are any uncontrolled fire that occurs in the countryside or wildland. Wildland areas may include but are not limited to: grasslands; forests; woodlands; agricultural fields; pastures; and other vegetated areas. Wildfires range in size from a few acres (the most common) to thousands of acres in some cases. Fire events can quickly spread from their original source, change direction quickly, and jump gaps (such as roads, rivers, and fire breaks). Wildfire events are particularly dependent on the surrounding conditions including temperature, humidity, wind speed, wind direction, slope, and available fuel load. While some wildfires burn in remote forested regions, others can cause extensive destruction of homes and other property located in the wildland-urban interface (WUI), the zone of transition between developed areas and undeveloped wilderness.

Wildfires are a growing hazard in most regions of the United States, posing a threat to life and property, particularly where rural or native ecosystems meet urban developed areas or where local economies are heavily dependent on open agricultural land. Although fire is a natural and often beneficial process, fire suppression can lead to more severe fires due to the buildup of vegetation, which creates more fuel and increases the intensity and devastation of future fires.

Wildfires are characterized in terms of their physical properties including topography, weather, and fuels. Wildfire behavior is often complex and variably dependent on factors such as fuel type, moisture content in the fuel, humidity, wind speed, topography, geographic location, ambient temperature, the effect of weather on the fire, and the cause of ignition. Fuel and structure durability are the primary factors can control and are the target of most mitigation efforts. The NWS monitors the risk factors including high temperature, high wind speed, fuel moisture (greenness of vegetation), low humidity, and cloud cover in the state on a daily basis. Fire danger predictions are updated regularly and should be reviewed frequently by community leaders and fire department officials.

## Fire Protection

There were 34 local volunteer or rural fire districts identified in the planning area. The following table lists these fire districts by county.

- Alda Volunteer Fire Department
- Amherst Volunteer Fire Department
- Cairo Volunteer Fire Department
- Central City Volunteer Fire Department
- Chapman Fire District
- Clarks Fire District
- Cozad Fire and Rescue
- Doniphan Volunteer Fire Department
- Eddyville Volunteer Fire Department
- Elm Creek Fire and Rescue
- Farnam Volunteer Fire Department
- Gibbon Volunteer Fire Department
- Gothenburg Volunteer Fire Department
- Grand Island Fire Department
- Grand Island Rural Fire Department

- Kearney Fire Department/Suburban Protection District #1
- Kearney Volunteer Fire Department
- Lexington Volunteer Fire Department
- Miller Volunteer Fire Department
- Osceola Fire District
- Overton Volunteer Fire Department
- Palmer Fire District
- Pleasanton Volunteer Fire Department
- Polk Fire District
- Ravenna Volunteer Fire Department
- Shelby Fire District
- Shelton Volunteer Fire and Rescue
- Silver Creek Fire District
- Stromsburg Fire District
- Sumner Volunteer Fire Department
- Wood River Volunteer Fire Department

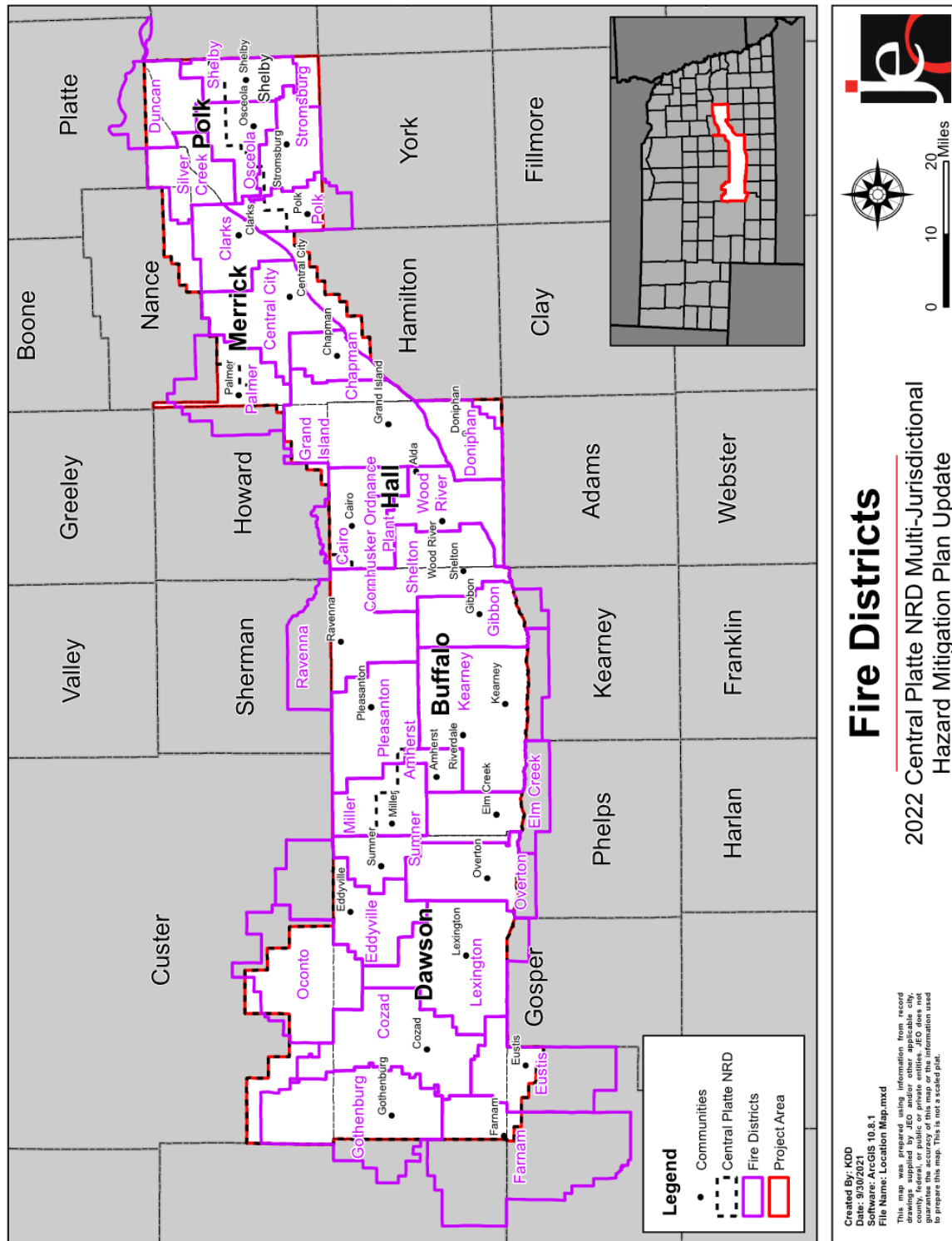
#### Community Wildfire Protection Plans

Even though grass/wildfires are a natural part of the ecosystem, they can present a substantial hazard to life and property, especially along the WUI. The planning area is covered by two Community Wildfire Protection Plans (CWPPs): Loess Canyons CWPP and Central Platte CWPP.<sup>88</sup> The purpose of the CWPPs is to help effectively manage wildfires and increase collaboration and communication among organizations who manage fire. The CWPPs discusses county-specific historical wildfire occurrences and impacts, identifies areas most at risk from wildfires, discusses protection capabilities, and identifies wildfire mitigation strategies.

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<sup>88</sup> Nebraska Forest Service. 2020. "Community Wildfire Protection Plans." <https://nfs.unl.edu/publications/community-wildfire-protection-plans>.

Figure 32: Fire Districts in the Planning Area

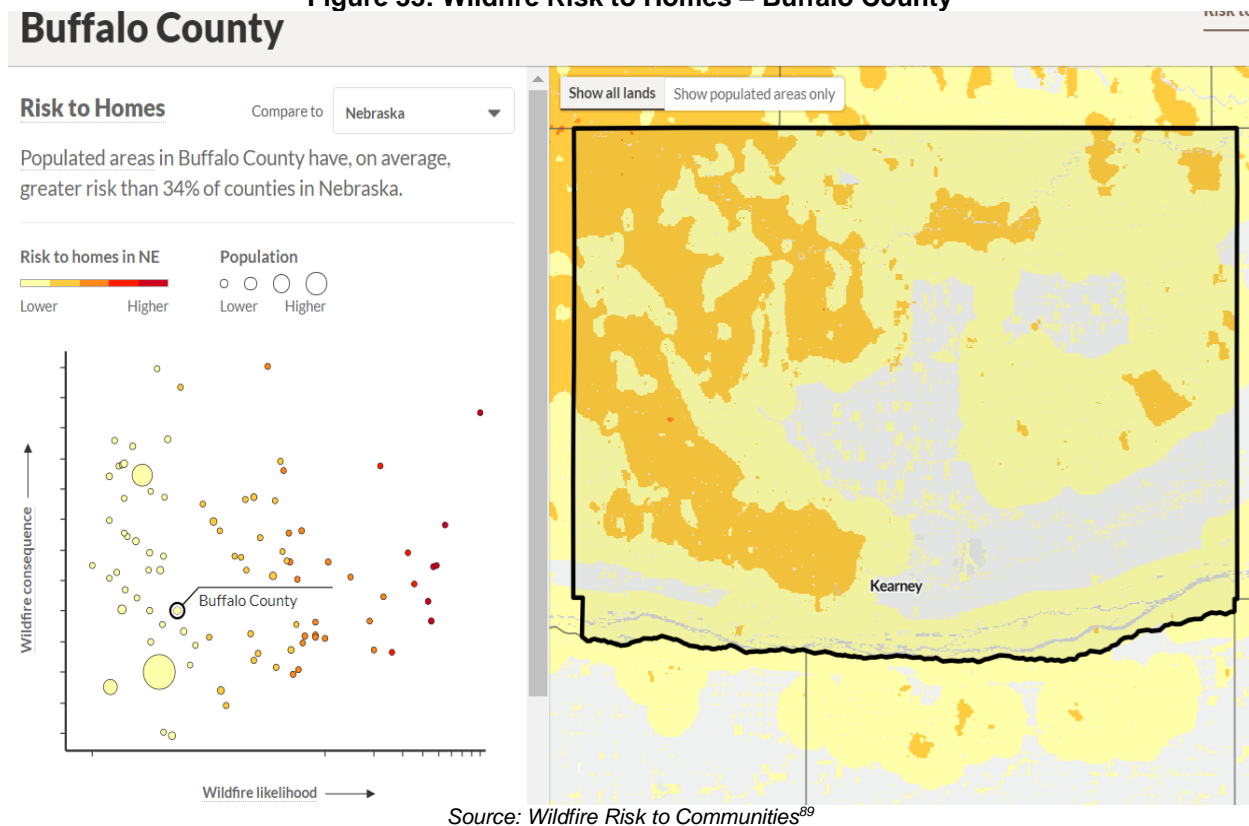




## Location

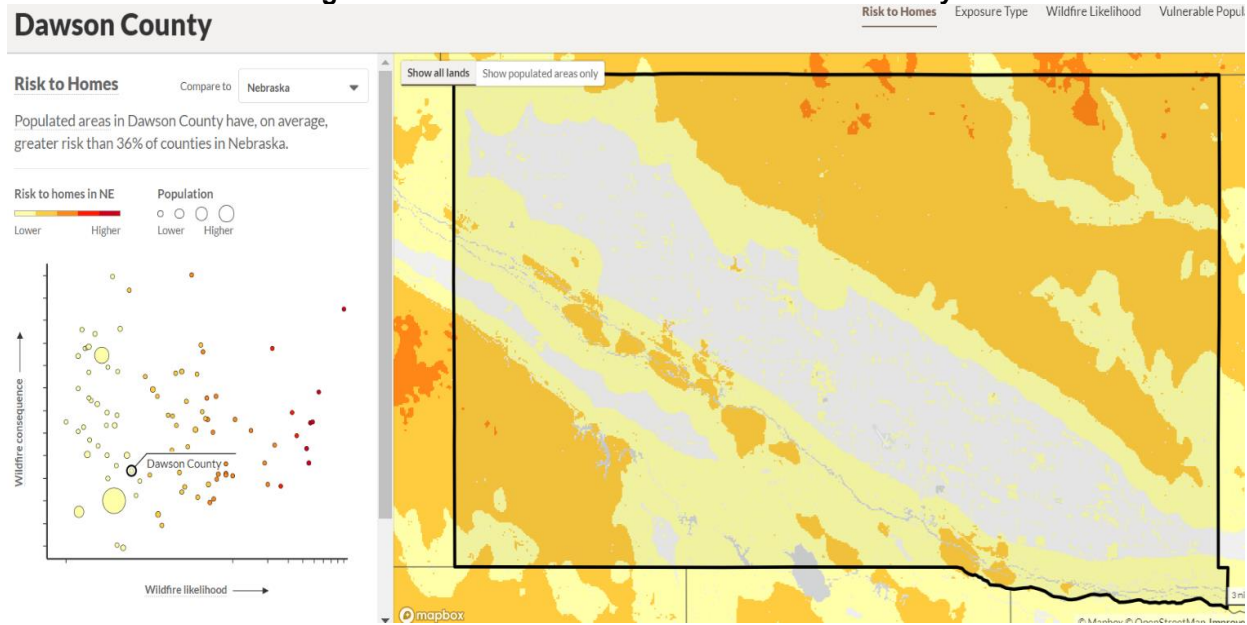
Grass/wildfires can occur throughout the planning area. The United States Department of Agriculture Forest Service created the interactive web resource *Wildfire Risk to Communities* to help communities and jurisdictions understand, explore, and reduce wildfire risk. The following figures show wildfire risk to homes by county in the planning area.

**Figure 33: Wildfire Risk to Homes – Buffalo County**



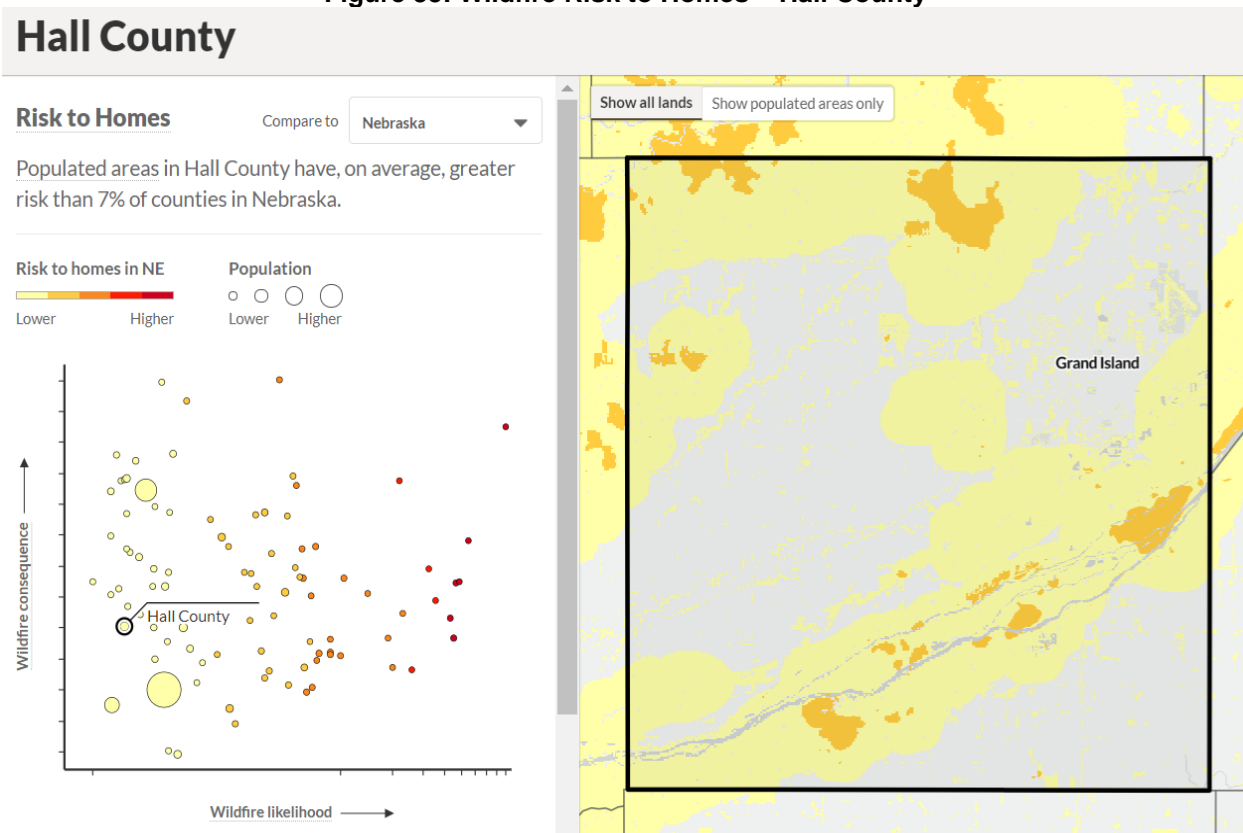
89 United States Department of Agriculture, United States Forest Service. 2022. "Wildfire Risk to Communities." <https://wildfirerisk.org/>.

**Figure 34: Wildfire Risk to Homes – Dawson County**



Source: Wildfire Risk to Communities

**Figure 35: Wildfire Risk to Homes – Hall County**



Source: Wildfire Risk to Communities

Figure 36: Wildfire Risk to Homes – Merrick County

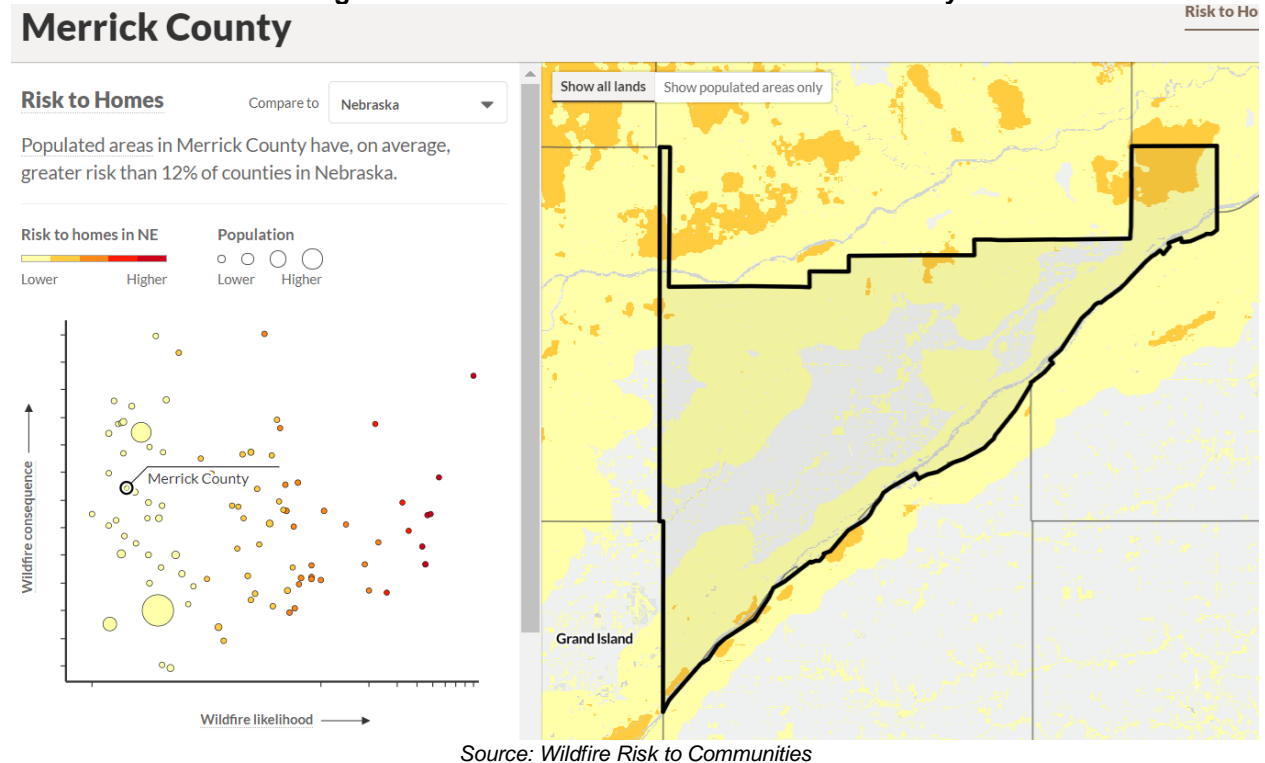
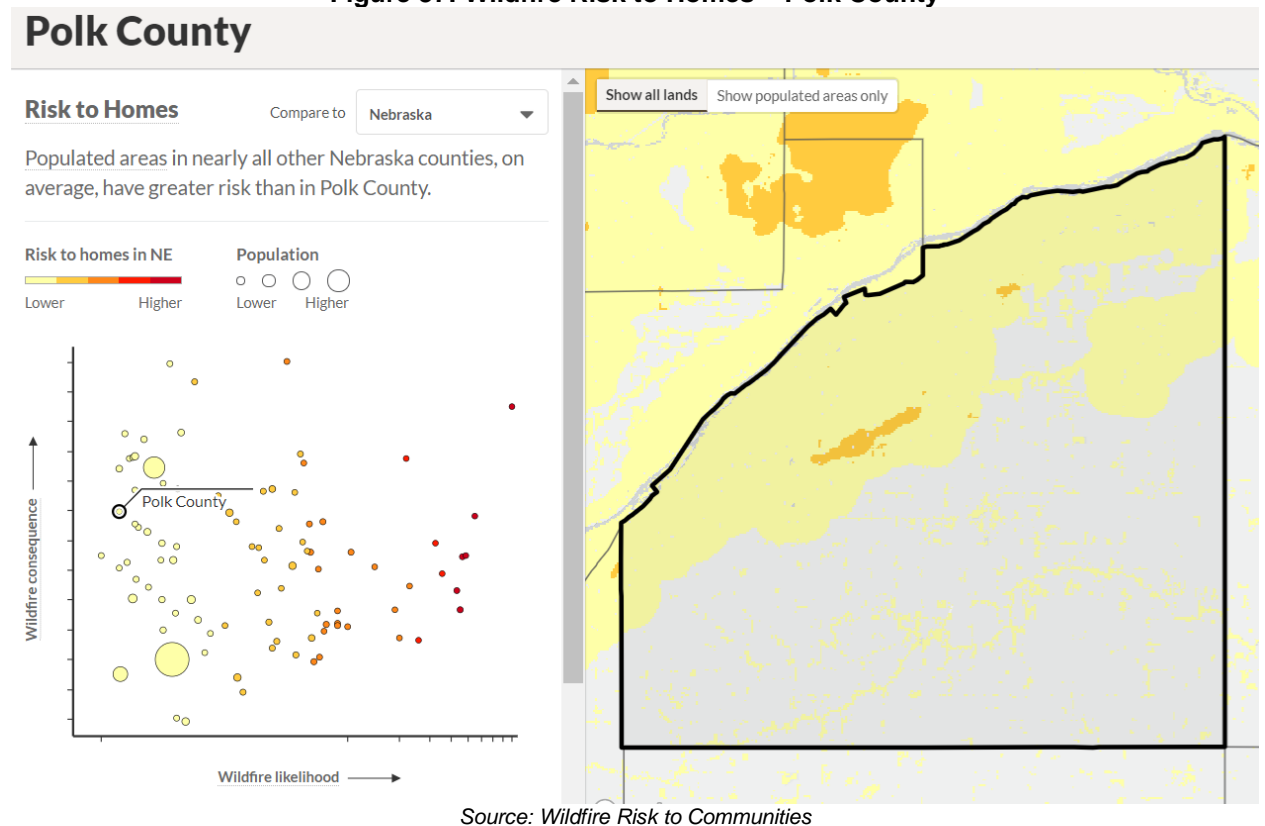


Figure 37: Wildfire Risk to Homes – Polk County



In recent decades, as the population of the United States has decentralized and residents have moved farther away from the center of villages and cities, the area known as the WUI has developed significantly, in both terms of population and building stock. The WUI is defined as the zone of transition between developed areas and undeveloped wilderness, where structures and other human development meet wildland. The expansion of the WUI increases the likelihood that wildfires will threaten people and homes, making it the focus of the majority of wildfire mitigation efforts.

The following figure produced by the USDA Forest Service displays the State of Nebraska's WUI conditions as of 2010. Areas that are indicated by the WUI (Figure 39

### **Fire Protection**

There were 34 local volunteer or rural fire districts identified in the planning area. The following table lists these fire districts by county.

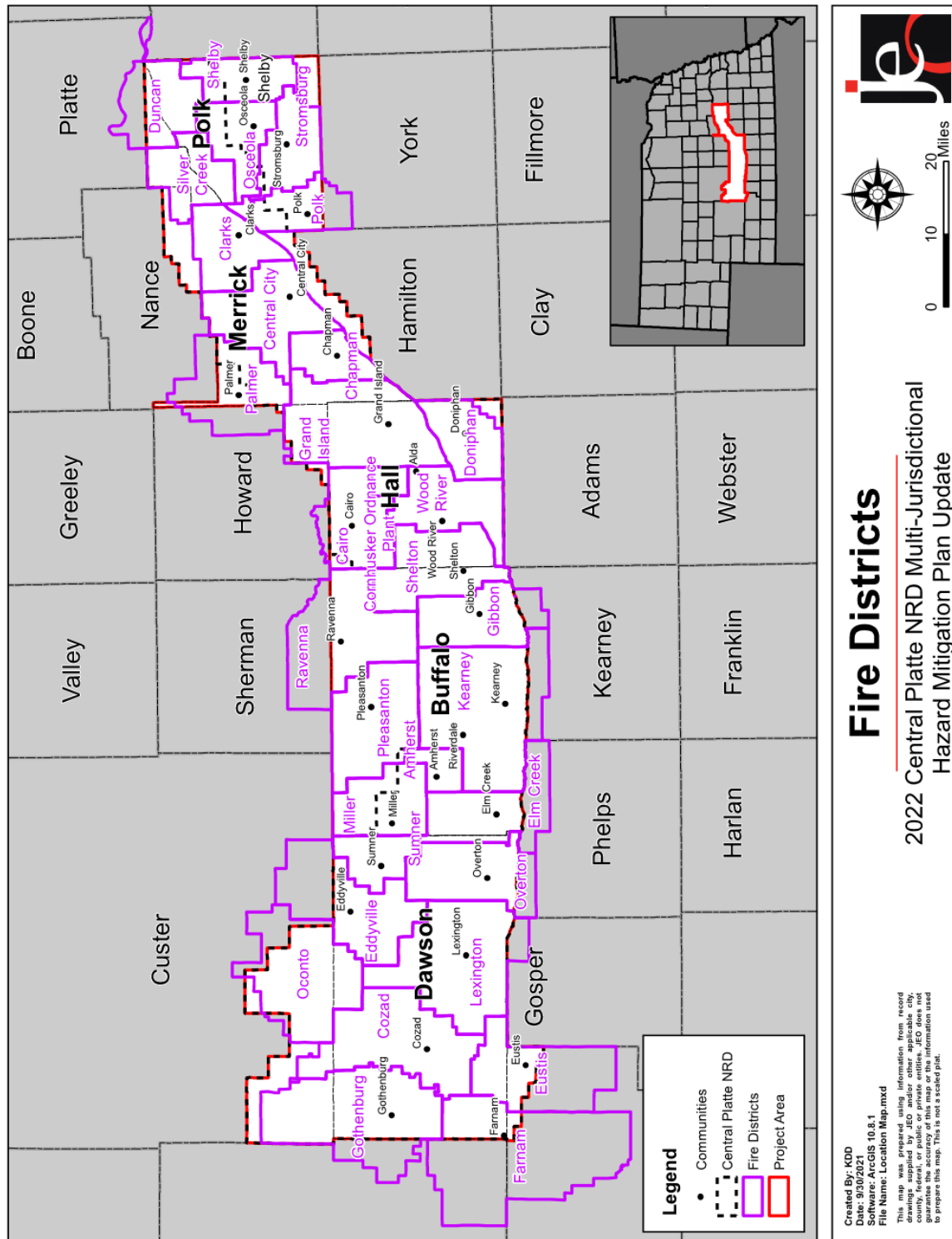
- Alda Volunteer Fire Department
- Amherst Volunteer Fire Department
- Cairo Volunteer Fire Department
- Central City Volunteer Fire Department
- Chapman Fire District
- Clarks Fire District
- Cozad Fire and Rescue
- Doniphan Volunteer Fire Department
- Eddyville Volunteer Fire Department
- Elm Creek Fire and Rescue
- Farnam Volunteer Fire Department
- Gibbon Volunteer Fire Department
- Gothenburg Volunteer Fire Department
- Grand Island Fire Department
- Grand Island Rural Fire Department
- Kearney Fire Department/Suburban Protection District #1
- Kearney Volunteer Fire Department
- Lexington Volunteer Fire Department
- Miller Volunteer Fire Department
- Osceola Fire District
- Overton Volunteer Fire Department
- Palmer Fire District
- Pleasanton Volunteer Fire Department
- Polk Fire District
- Ravenna Volunteer Fire Department
- Shelby Fire District
- Shelton Volunteer Fire and Rescue
- Silver Creek Fire District
- Stromsburg Fire District
- Sumner Volunteer Fire Department
- Wood River Volunteer Fire Department

### Community Wildfire Protection Plans

Even though grass/wildfires are a natural part of the ecosystem, they can present a substantial hazard to life and property, especially along the WUI. The planning area is covered by two

Community Wildfire Protection Plans (CWPPs): Loess Canyons CWPP and Central Platte CWPP. The purpose of the CWPPs is to help effectively manage wildfires and increase collaboration and communication among organizations who manage fire. The CWPPs discusses county-specific historical wildfire occurrences and impacts, identifies areas most at risk from wildfires, discusses protection capabilities, and identifies wildfire mitigation strategies.

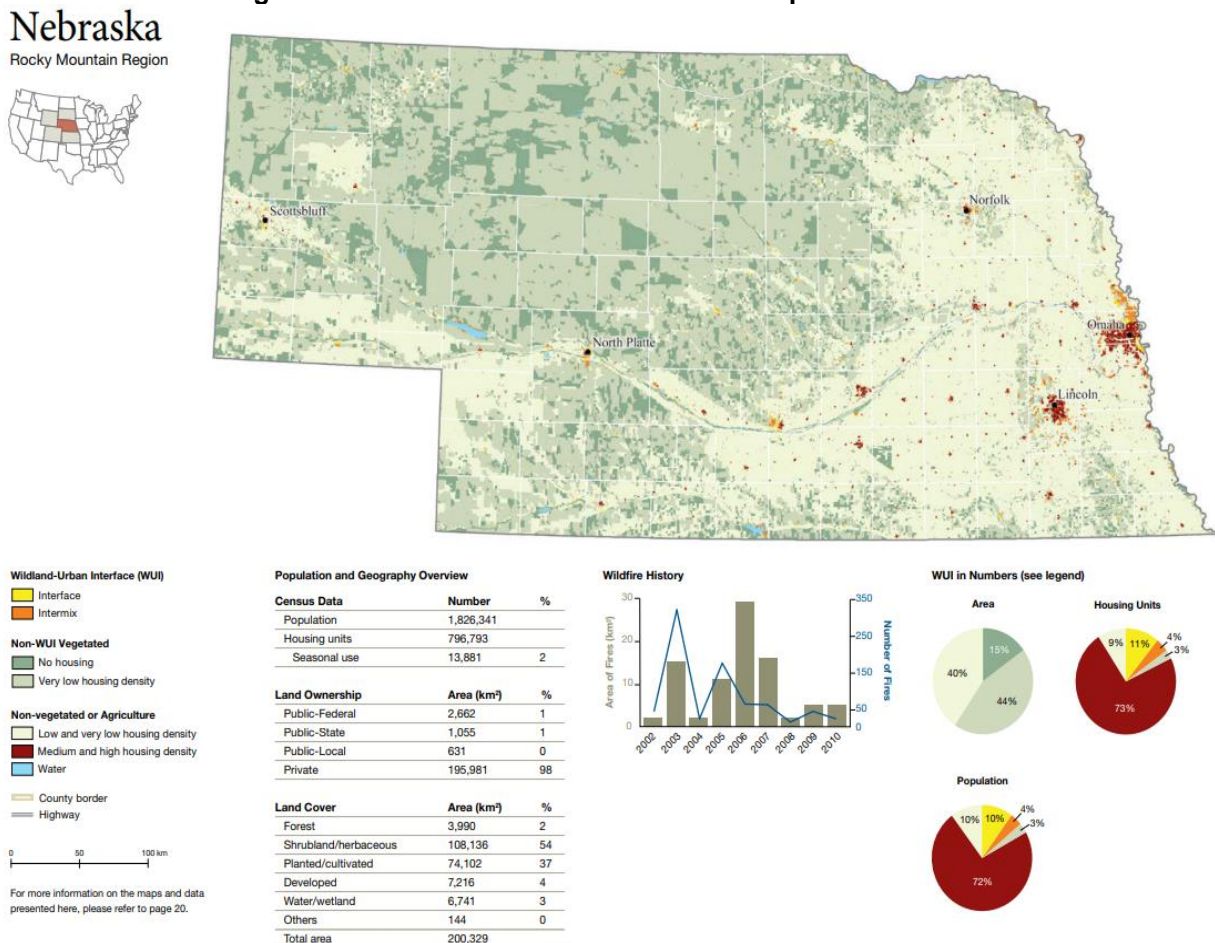
### Figure 32: Fire Districts in the Planning Area



## Location

Grass/wildfires can occur throughout the planning area.), either interface (yellow) or intermix (orange) are primarily found in portions of Dawson, Buffalo, and Hall Counties. The rest of the planning area is located in primarily non-WUI vegetated designated areas, with no or low-density housing with a mix of vegetated, non-vegetated, and agricultural land.

**Figure 38: 2010 Wildland Urban Interface Map of Nebraska**

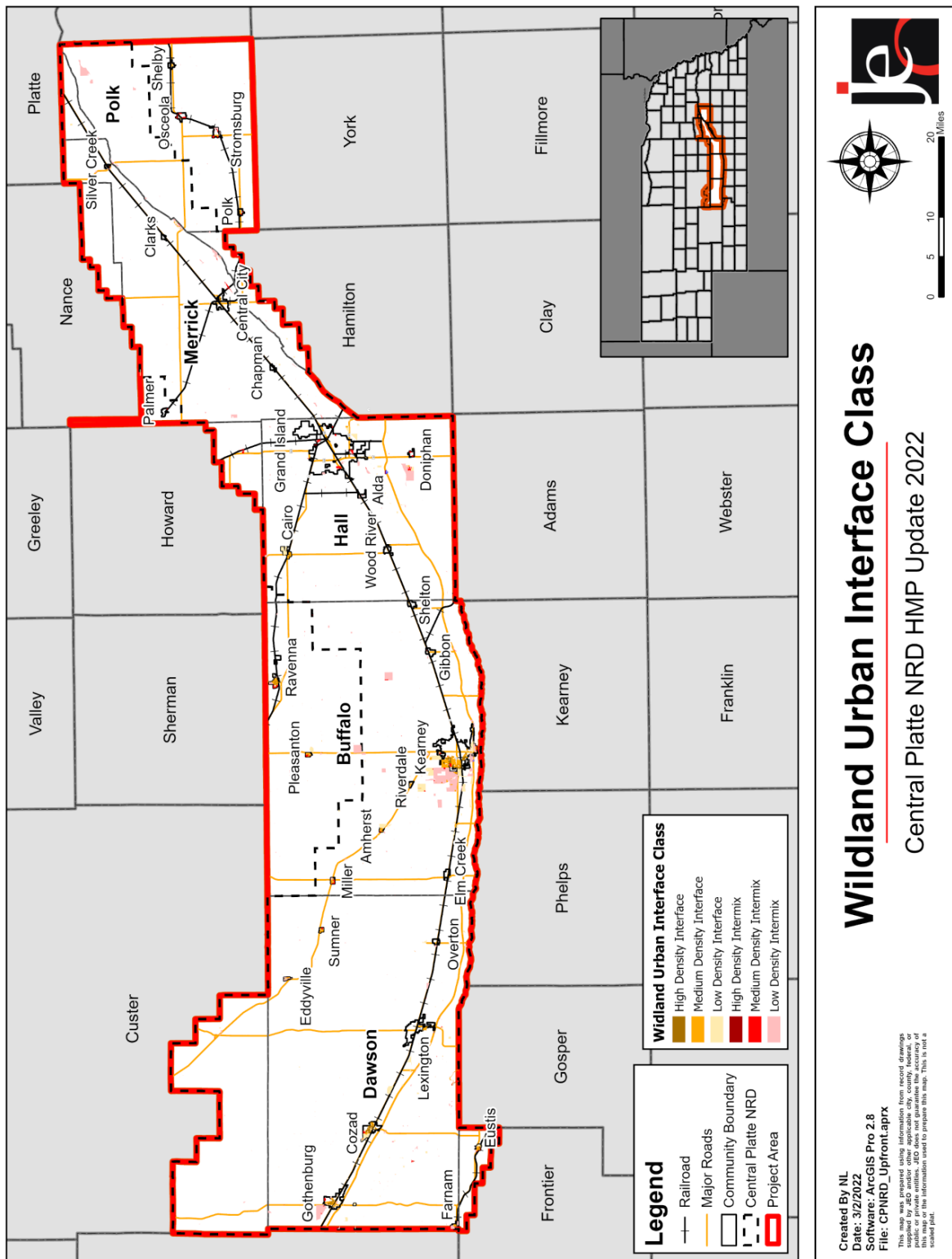


Source: USDA, 2010<sup>90</sup>

90 USDA, USFS, & University of Wisconsin. 2010. "The 2010 Wildland-Urban Interface of the Conterminous United States." [https://www.fs.fed.us/nrs/pubs/rmap/rmap\\_nrs8.pdf](https://www.fs.fed.us/nrs/pubs/rmap/rmap_nrs8.pdf)



Figure 39: Planning Area Wildland Urban Interface Map

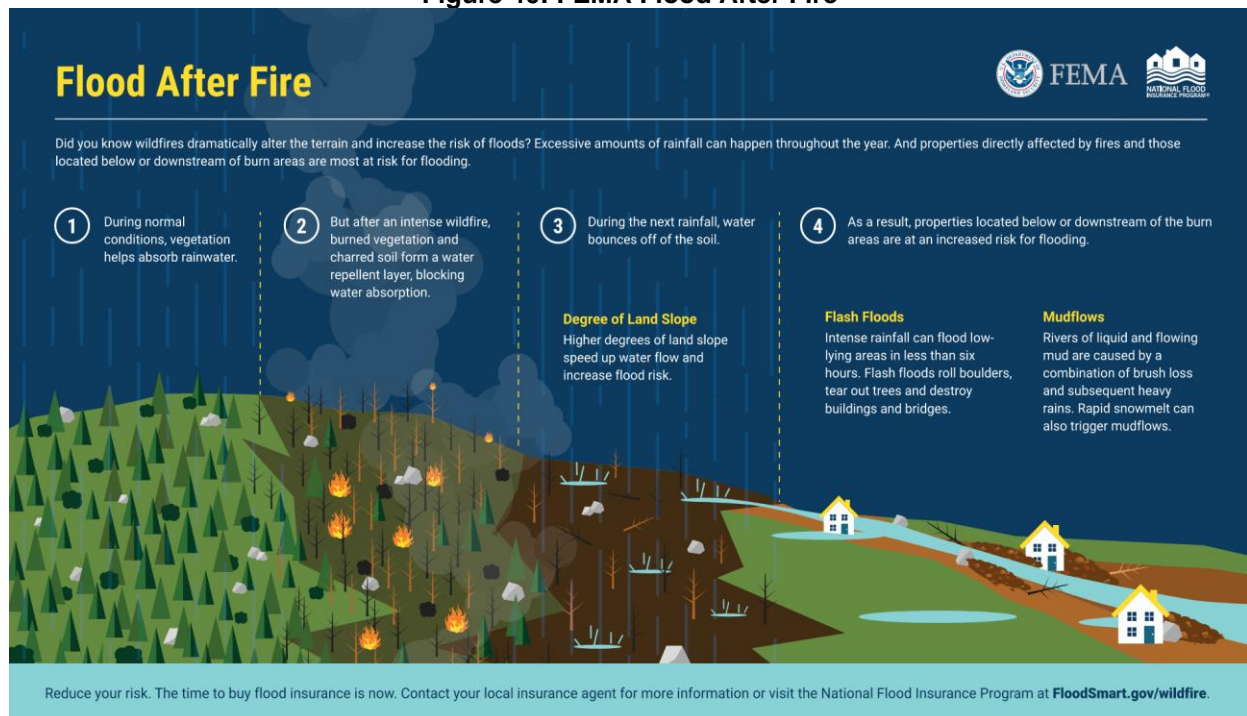


## Extent

Overall, 1,460 wildfires were reported in the planning area and burned 41,435 acres in total. Of these, 24 fires burned 100 acres or more, with the largest wildfire burning 22,000 acres in Dawson County in August 2002. The average area burned per wildfire was less than 32 acres indicating while many fires may occur, they are typically small in nature and easily contained.

Wildfire also contributes to an increased risk from other hazard events, compounding damages and straining resources. FEMA has provided additional information in recent years detailing the relationship between wildfire and flooding (Figure 40). Wildfire events remove vegetation and harden soil, reducing infiltration capabilities during heavy rain events. Subsequent severe storms that bring heavy precipitation can then escalate into flash flooding, dealing additional damage to jurisdictions.

**Figure 40: FEMA Flood After Fire**

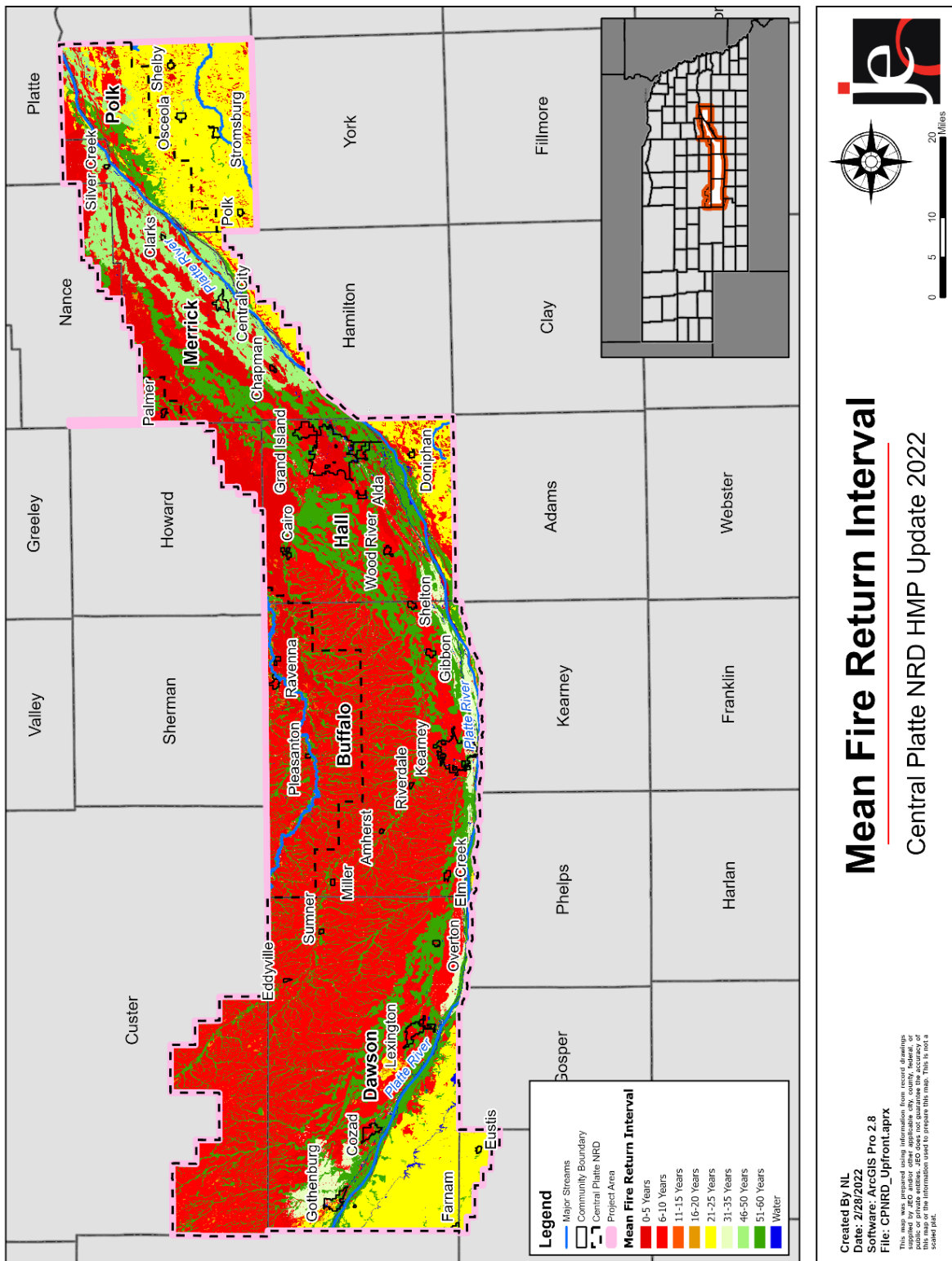


Source: FEMA, 2020<sup>91</sup>

Figure 41 shows the USGS' Mean Fire Return Interval. This model considers a variety of factors, including landscape, fire dynamics, fire spread, fire effects, and spatial context. These values show how often fires occur in each area under natural conditions.

91 FEMA and NFIP. 2020. "Flood After Fire." Accessed September 2020. [https://www.fema.gov/media-library-data/1573670012259-3908ab0344ff8bf5d537ee0c6fb531d/101844-019\\_FEMA\\_FAF\\_Infographic-ENG-web\\_v8\\_508.pdf](https://www.fema.gov/media-library-data/1573670012259-3908ab0344ff8bf5d537ee0c6fb531d/101844-019_FEMA_FAF_Infographic-ENG-web_v8_508.pdf).

Figure 41: Mean Fire Return Interval



### Historical Occurrences

For the planning area, 34 different fire departments reported a total of 1,460 wildfires between January 2000 and July 2020 according to the Nebraska Forest Service. The reported events burned 41,435 acres in total. While the RMA lists no damages from fire in the planning area, the NFS reported \$248,598 in crop loss and \$1,226,183 in property damages. Most fires occurred in 2006, 2012, and 2017 (Figure 43). The majority of wildfires were caused by Debris Burning or Miscellaneous causes (Figure 44). Wildfire events have ranged from less than one acre to 22,000 acres, with an average event burning 32.3 acres. It is important to note that there is no comprehensive fire event database. Fire events, magnitude, and local responses were reported voluntarily by local fire departments and local reporting standards can vary between departments. Actual fire events and their impacts are likely underreported in the available data.

Figure 42 shows the location and general size of wildfires from 2000 to 2020. Wildfire count data was provided by the Nebraska Forest Service from January 2000 to July 2020. As the number of reported wildfires by the county indicates, wildfire events can occur in any county within the planning area. Buffalo County has reported the greatest number of fires, but Dawson County had the highest number of acres burned.

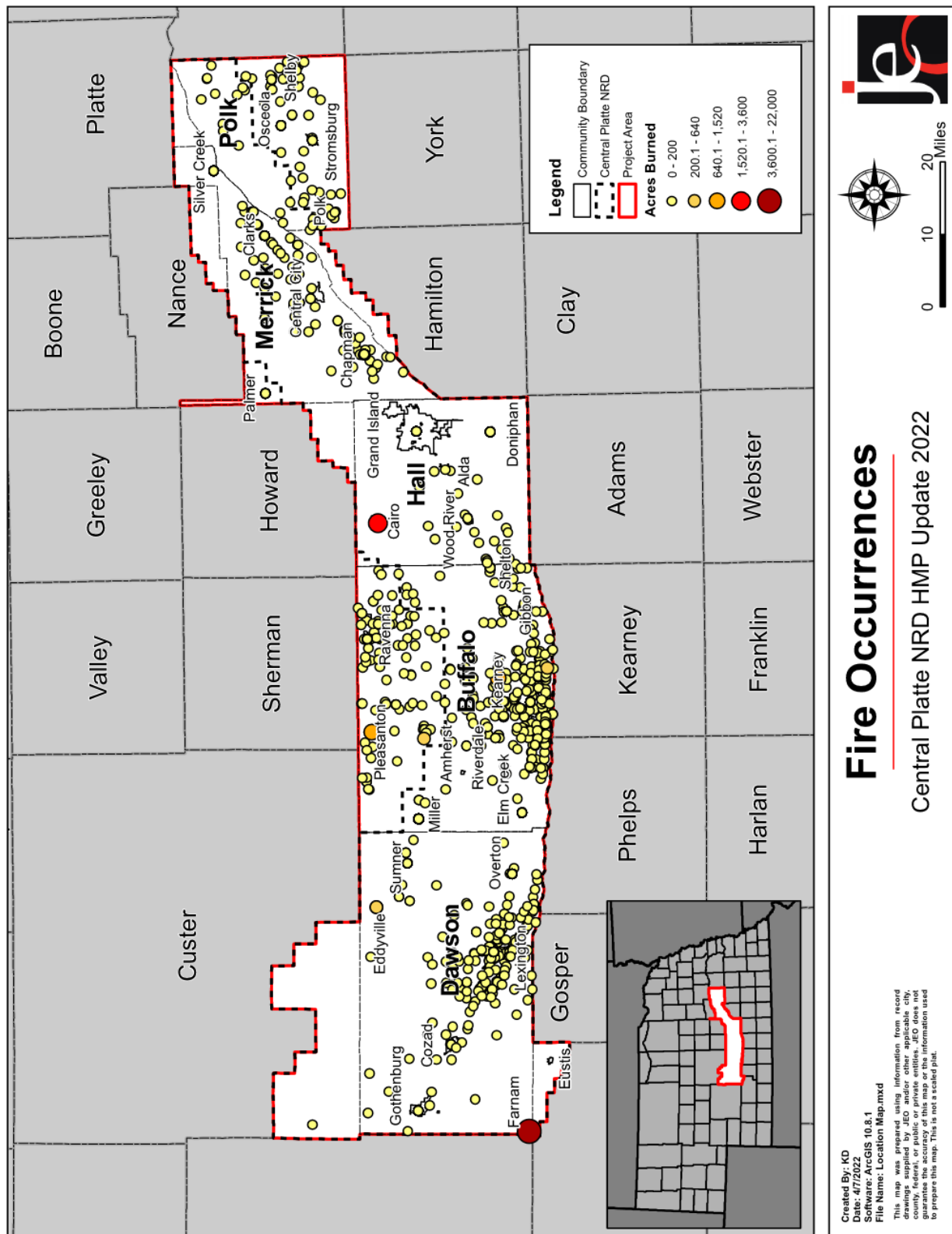
**Table 66: Reported Wildfires by County**

County	Reported Wildfires	Acres Burned	Other Impacts
<b>Buffalo</b>	628	6,806	6 Injuries; 3 Fatalities; 47 structures threatened; 11 structures destroyed
<b>Dawson</b>	455	27,565	1 Injury; 44 structures threatened; 3 structures destroyed
<b>Hall</b>	68	5,349	1 structure threatened
<b>Merrick</b>	195	1,043	14 structures threatened; 9 structures destroyed
<b>Polk</b>	114	672	12 structures threatened; 1 structure destroyed

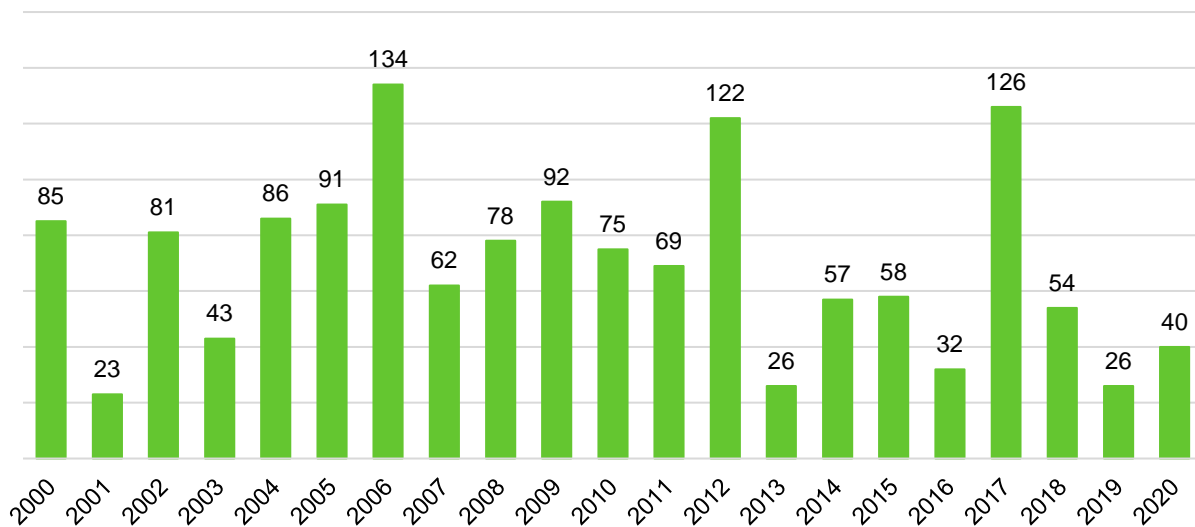
Source: NFS, 2000-2020<sup>92</sup>

92 Nebraska Forest Service. 2020. "Fire Incident Type Summary." Data Files 2000-2018 provided by NFS.

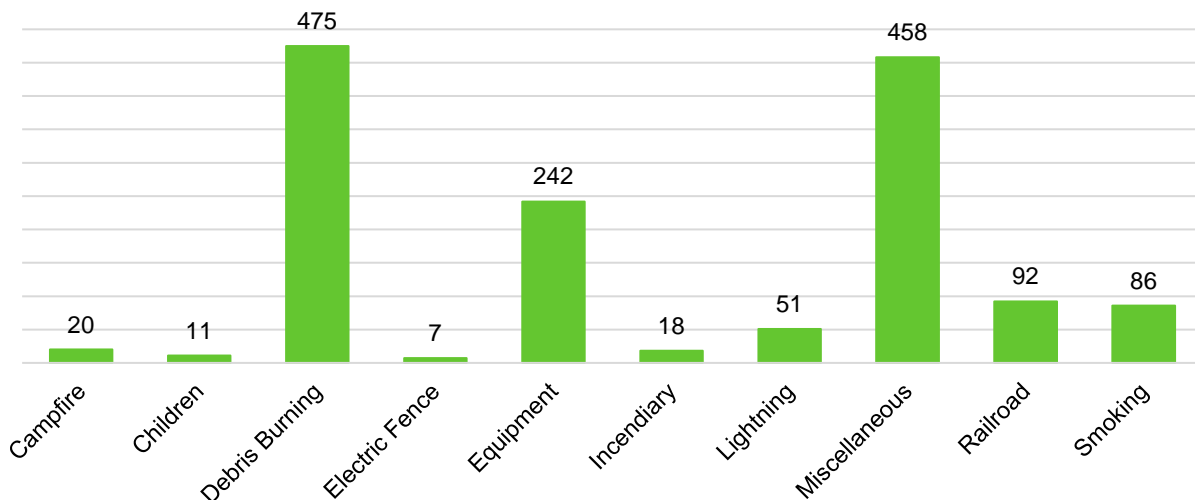
Figure 42: Wildfire Occurrences in the Planning Area





**Figure 43: Wildfire Events by Year**

Source: NFS, 2000-2020

**Figure 44: Wildfires by Cause in Planning Area**

Source: NFS, 2000-2020

**Average Annual Losses**

The average damage per event estimate was determined based upon records from the Nebraska Forest Service Wildfires Database from January 2000 to July 2020 and the number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. During this 20-year period, 1,460 wildfires burned 41,435 acres and caused \$248,598 in crop and \$1,226,183 in property damages.

Damages caused by wildfires extend past the loss of building stock, recreation areas, timber, forage, wildlife habitat, and scenic views. Secondary effects of wildfires, including erosion, landslides, introduction of invasive species, and changes in water quality, all increase due to the exposure of bare ground and loss of vegetative cover following a wildfire, and can often be more disastrous than the fire itself in long-term recovery efforts.

**Table 67: Wildfire Loss Estimation**

Hazard Type	Number of Events	Events Per Year	Average Acres Per Fire	Total Property Loss	Average Property Loss	Total Crop Loss	Average Annual Crop Loss
Grass/Wildfire	1,460	73	32.3	\$1,226,183	\$61,309	\$248,598	\$12,430

Source: NFS, 2000-2020

**Table 68: Wildfire Event Impacts and Threats**

Hazard Type	Injuries	Fatalities	Homes Threatened or Destroyed	Other Structures Threatened or Destroyed
Grass/Wildfire	7	3	77	65

Source: NFS, 2000-2020

### Probability

Probability of wildfire occurrence is based on the historic record provided by the Nebraska Forest Service and reported potential by participating jurisdictions. With a grass/wildfire occurring each reported year (Figure 43) there is a 100 percent annual probability of wildfires occurring in the planning area each year.

### Community Top Hazard Status

The following table lists jurisdictions which identified grass/wildfire as a top hazard of concern.

Jurisdiction	
Central City Fire District	Eustis-Farnam Public Schools
Central Platte NRD	Gibbon Fire District
Centura Public Schools	Lexington Fire District
Cozad	Pleasanton Fire District
Doniphan Fire District	Pleasanton Public Schools
Elm Creek Fire District	

### Regional Vulnerabilities

Periods of drought can occur throughout the year while extreme heat conditions during summer months greatly increase the potential for and magnitude of wildland fires. Drought has a high probability of occurring in the planning area and the planning area sees, on average, five days above 100°F. During a severe drought, dry conditions, and/or windy conditions, large wildfires can more easily spread.

Wildfire poses a threat to a range of demographic groups. Wildfire, wildfire within the WUI, and urban fire could result in major evacuations of residents in impacted and threatened areas. Groups and individuals lacking reliable transportation could be trapped in dangerous locations. Lack of transportation is common among the elderly, low-income individuals, and racial minorities; including on tribal reservation lands. Wildfires can cause extensive damage to both urban and rural building stock and properties including critical facilities and infrastructure, as well as agricultural producers which support the local industry and economy. Damaged homes can reduce available housing stock for residents, causing residents to leave the area. Additionally, fire events threaten the health and safety of residents and emergency response personnel. Recreation areas, timber and grazing land, wildlife habitat, and scenic views can also be threatened by wildfires.

Development across the planning area may be located within the WUI, particularly in larger metropolitan areas with a large amount of intermix overlap such as the City of Grand Island or the



City of Kearney. Local officials can adopt codes and ordinances that can guide growth in ways to mitigate potential losses from wildfires. These may include more stringent building code standards, setback requirements, or zoning regulations.

According to the Central Platte and Loess Canyons CWPPs, specific concerns are located throughout the planning area. Table 69 and Table 70 describe other specific risks and vulnerabilities seen across the planning area.

#### Buffalo County

In Buffalo County, locations of special concern include areas surrounding municipalities, especially the area west of Kearney where there are several subdivisions with multiple structures, limited access, and areas with heavy fuels. There are several recreational and residential areas along the Platte River with heavy fuels and limited access. The entire county lies within the mixed grass prairie vegetation zone which includes agriculture crop fields, hay land, and grazing lands.

#### Dawson County

In Dawson County, locations of special concern include land in the northern and western parts of the county, where topography is rough and eastern redcedar has encroached into grasslands and created a high fire hazard for the area. The county lies within the mixed grass prairie vegetation zone. The northern portion is covered with hay and grazing lands and agricultural fields are widespread along the Wood River and the southeastern edge of the region.

#### Hall County

In Hall County, locations of special concern include population centers adjacent to grasslands and areas where eastern redcedar has encroached into grasslands, creating high fire hazard. Other areas at-risk from wildfire are located along the Platte and South Loup Rivers. The county consists of mixed-grass prairie, lowland tallgrass prairie and riparian deciduous forest and woody wetlands along the Platte River. Agriculture crop fields are prevalent across the county.

#### Merrick County

In Merrick County, locations of special concern include population centers adjacent to grasslands, areas with rough terrain and poor access, and wooded areas along the Platte River. The county is made up of mixed-grass prairie, lowland tallgrass prairie, and riparian deciduous forests along the Platte River.

#### Polk County

In Polk County, locations of special concern include Heron Point Lake, a sandpit lake with multiple large single-family dwellings and limited access, which is surrounded by wildland and pasture, population centers adjacent to grasslands, areas with rough terrain and poor access, and wooded areas along the rivers. The county lies within the upland tallgrass prairie vegetation zone with riparian deciduous woodlands along the Platte and Big Blue Rivers.

**Table 69: Wildfire Vulnerabilities by County**

County	Risk to Homes (Compared to NE Counties)	Exposure Type	Wildfire Likelihood (Compared to NE Counties)
<b>Buffalo</b>	Greater risk than 34% of NE Counties	Directly Exposed (18%) Indirectly Exposed (32%) Not Exposed (50%)	Greater risk than 36% of NE Counties
<b>Dawson</b>	Greater risk than 36% of NE Counties	Directly Exposed (14%) Indirectly Exposed (21%) Not Exposed (65%)	Greater risk than 38% of NE Counties
<b>Hall</b>	Greater risk than 7% of NE Counties	Directly Exposed (15%) Indirectly Exposed (14%) Not Exposed (71%)	Greater risk than 9% of NE Counties
<b>Merrick</b>	Greater risk than 12% of NE Counties	Directly Exposed (26%) Indirectly Exposed (23%) Not Exposed (51%)	Greater risk than 15% of NE Counties
<b>Polk</b>	Populated areas in nearly all other NE counties have greater risk than Polk County	Directly Exposed (26%) Indirectly Exposed (9%) Not Exposed (65%)	Populated areas in nearly all other NE counties have greater risk than Polk County

Source: *Wildfire Risk to Communities, 2020*<sup>93</sup>**Table 70: Wildfire Vulnerable Populations by County**

County	Families in Poverty	People with Disabilities	People over 65	Difficulty with English	Households with no Vehicle	Mobile Homes
<b>Buffalo</b>	8.4%	11.1%	13.5%	1.7%	4.7%	7%
<b>Dawson</b>	10.8%	12.7%	15.4%	9.7%	6%	7.8%
<b>Hall</b>	10.7%	12.4%	14.4%	6.2%	4.9%	4.8%
<b>Merrick</b>	5.6%	15.8%	19.8%	0.3%	6.6%	5.9%
<b>Polk</b>	4.6%	12.6%	21.1%	1%	4.6%	3.2%

Source: *Wildfire Risk to Communities, 2020*<sup>94</sup>

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

93 United States Department of Agriculture, United States Forest Service. 2022. "Wildfire Risk to Communities." <https://wildfirerisk.org/>.

94 United States Department of Agriculture, United States Forest Service. 2022. "Wildfire Risk to Communities." <https://wildfirerisk.org/>.

**Table 71: Regional Wildfire Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Risk of injury or death for residents and firefighting personnel</li> <li>-Displacement of people and loss of homes</li> <li>-Lack of transportation poses risk to low-income individuals, families, and elderly</li> <li>-Transportation routes may be blocked by fire, preventing evacuation efforts</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-Damages to buildings and property can cause significant losses to business owners</li> <li>-Loss of businesses</li> </ul>
<b>Built Environment</b>	<ul style="list-style-type: none"> <li>-Property damages</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-Damage to power lines and utility structures</li> <li>-Potential loss of firefighting equipment and resources</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Risk of damages</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>-Changes in seasonal temperature and precipitation normals can increase frequency and severity of wildfire events</li> <li>-Changes in climate can help spread invasive species, changing potential fuel loads in wildland areas</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>-Increase chance of landslides, erosion, and land subsidence</li> <li>-May lead to poor water quality</li> <li>-Post fire, flash flooding events may be exacerbated</li> </ul>

# Hazardous Materials Release

The following description for hazardous materials is provided by the Federal Emergency Management Agency (FEMA):

Chemicals are found everywhere. They purify drinking water, increase crop production and simplify household chores. But chemicals also can be hazardous to humans or the environment if used or released improperly. Hazards can occur during production, storage, transportation, use or disposal. You and your community are at risk if a chemical is used unsafely or released in harmful amounts into the environment where you live, work or play.<sup>95</sup>

Hazardous materials in various forms can cause fatalities, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. Chemicals posing a health hazard include carcinogens, toxic agents, reproductive toxins, irritants, and many other substances that can harm human organs or vital biological processes.

Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites. Varying quantities of hazardous materials are manufactured, used, or stored in an estimated 4.5 million facilities in the United States—from major industrial plants to local dry-cleaning establishments or gardening supply stores.

Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. Hazardous materials incidents are technological (meaning non-natural hazards created or influenced by humans) events that involve large-scale releases of chemical, biological or radiological materials. Hazardous materials incidents generally involve releases at fixed-site facilities that manufacture, store, process or otherwise handle hazardous materials or along transportation routes such as major highways, railways, navigable waterways and pipelines. A large number of spills also occur during the loading and unloading of chemicals.

The Environmental Protection Agency (EPA) requires the submission of the types and locations of hazardous chemicals being stored at any facility within the state over the previous calendar year. This is completed by submitting a Tier II form to the EPA as a requirement of the Emergency Planning and Community Right-to-Know Act of 1986.<sup>96</sup>

The transportation of hazardous materials is defined by the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) as "...a substance that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce..."<sup>97</sup> According to PHMSA, hazardous materials traffic in the U.S. now exceeds 1,000,000 shipments per day.<sup>98</sup> Nationally, the U.S. has had 108 fatalities associated with the

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95 Federal Emergency Management Agency. 2017. "Hazardous Materials Incidents." <https://www.ready.gov/hazardous-materials-incidents>

96 Emergency Planning and Community Right-to-Know Act of 1986, Pub. L. No. 116 § 10904. (1986).

97 Pipeline and Hazardous Materials Safety Administration. 2017. "Hazmat Safety Community FAQ." <https://www.phmsa.dot.gov/about-phmsa/phmsa-faqs>

98 U.S. Department of Transportation. 2015. "2012 Economic Census: Transportation." <https://data.census.gov/cedsci/>.

transport of hazardous materials between 2007 through 2016.<sup>99</sup> While such fatalities are a low probability risk, even one event can harm many people. For example, a train derailment in Crete, Nebraska in 1969 allowed anhydrous ammonia to leak from a rupture tanker. The resulting poisonous fog killed nine people and injured 53.

Table 72 demonstrates the nine classes of hazardous material according to the 2016 Emergency Response Guidebook.

**Table 72: Hazardous Materials Classes**

Class	Type of Material	Divisions
1	Explosives	Division 1.1 – Explosives with a mass explosion hazard Division 1.2 – Explosives with a projection hazard but not a mass explosion hazard Division 1.3 – Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard Division 1.4 – Explosives which present no significant blast hazard Division 1.5 – Very insensitive explosives with a mass explosion hazard Division 1.6 – Extremely insensitive articles which do not have a mass explosion hazard
2	Gases	Division 2.1 – Flammable gases Division 2.2 – Non-flammable, non-toxic gases Division 2.3 – Toxic gases
3	Flammable liquids (and Combustible liquids)	
4	Flammable solids; Spontaneously combustible materials	Division 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives Division 4.2 – Substances liable to spontaneous combustion Division 4.3 – Substances which in contact with water emit flammable gases
5	Oxidizing substances and Organic peroxides	Division 5.1 – Oxidizing substances Division 5.2 – Organic peroxides
6	Toxic substances and infectious substances	Division 6.1 – Toxic substances Division 6.2 – Infectious substances
7	Radioactive materials	
8	Corrosive materials	
9	Miscellaneous hazardous materials/products, substances, or organisms	

Source: Emergency Response Guidebook, 2016<sup>100</sup>

99 Pipeline and Hazardous Materials Safety Administration. 2016. "10 Year Incident Summary Reports."  
<https://www.phmsa.dot.gov/hazmat/library/data-stats/incidents>

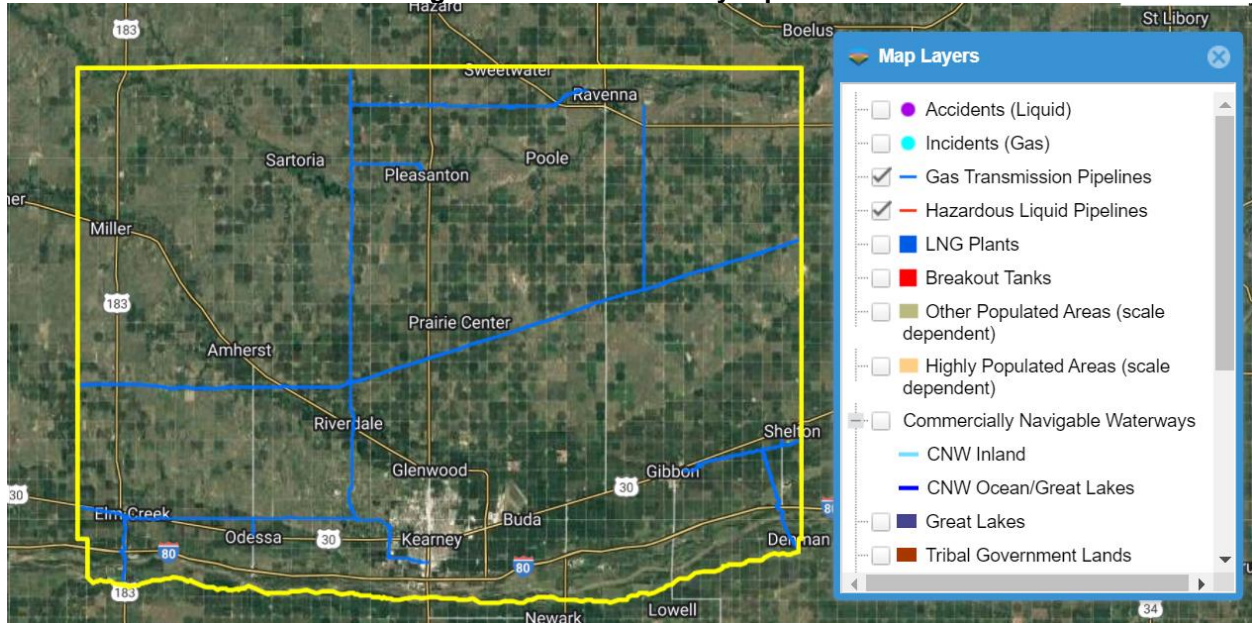
100 U.S. Department of Transportation Pipeline and Hazardous materials Safety Administration. 2016. "2016 Emergency Response Guidebook." <https://www.phmsa.dot.gov/hazmat/outreach-training/erg>



## Location

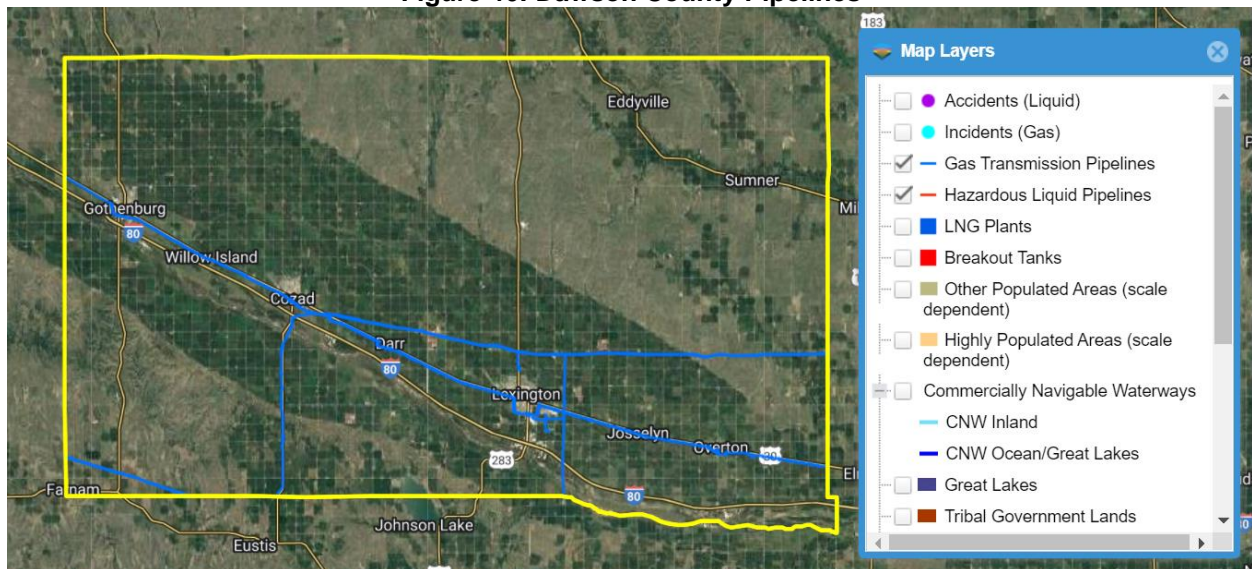
According to PHMSA, there are several gas transmission and hazardous liquid pipelines located in the planning area. A map of the pipelines and incidents from PHMSA for the five-county planning area can be seen in the following figures.

**Figure 45: Buffalo County Pipelines**



Source: Pipelines and Hazardous Safety Administration<sup>101</sup>

**Figure 46: Dawson County Pipelines**

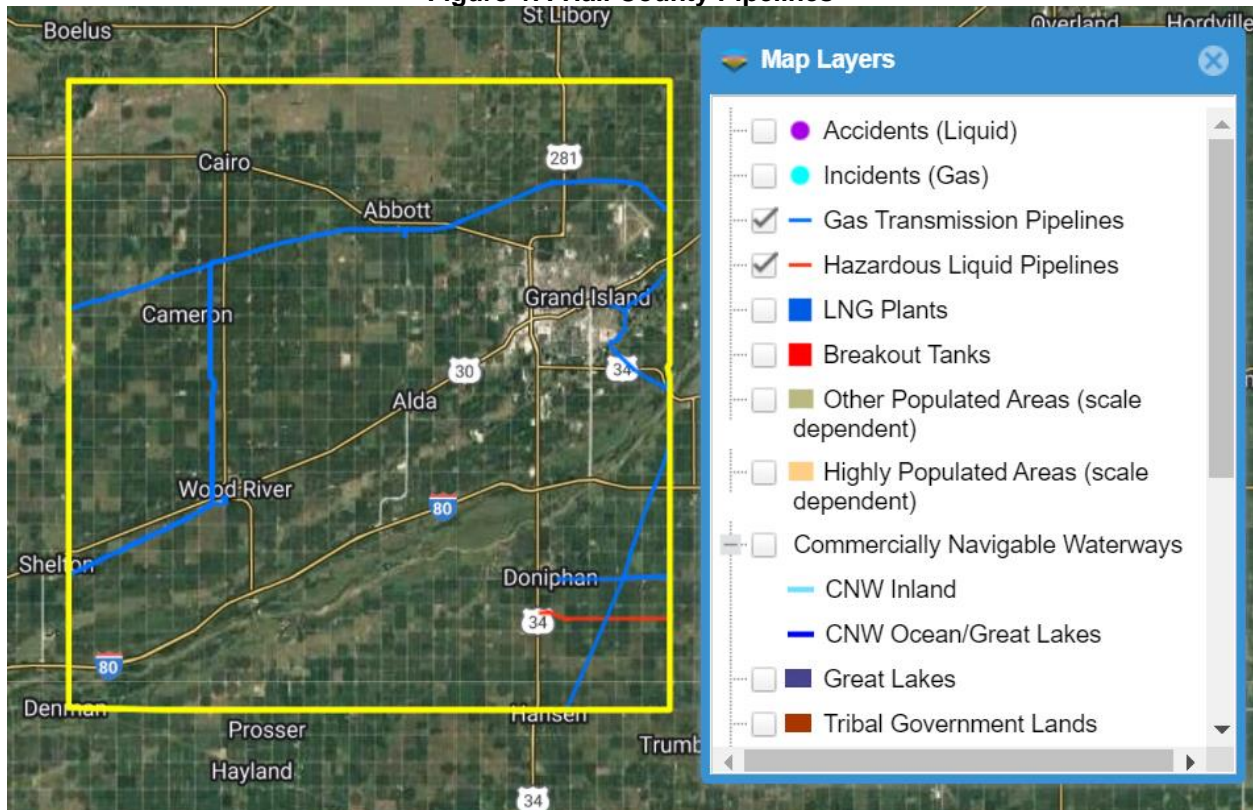


Source: Pipelines and Hazardous Safety Administration

<sup>101</sup> Pipeline and Hazardous Materials Safety Administration. 2021. "National Pipeline Mapping System." <https://www.npms.phmsa.dot.gov/>.

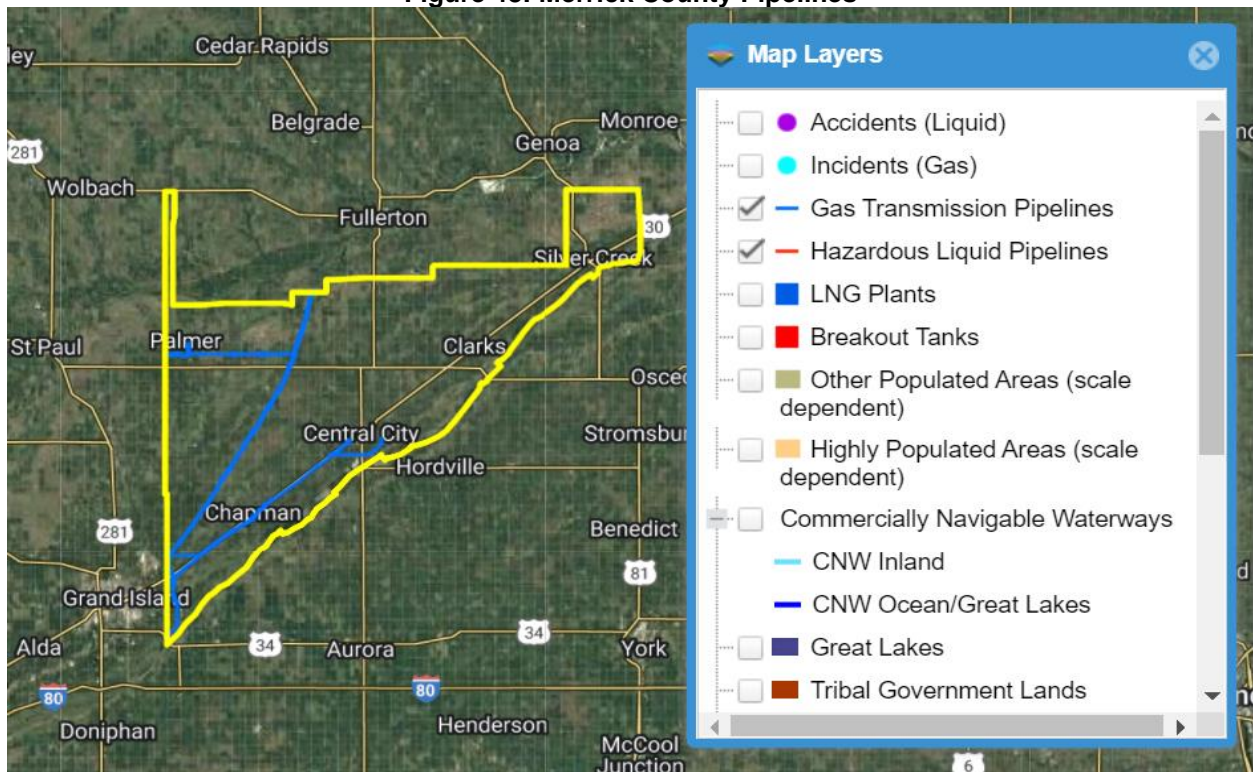


**Figure 47: Hall County Pipelines**



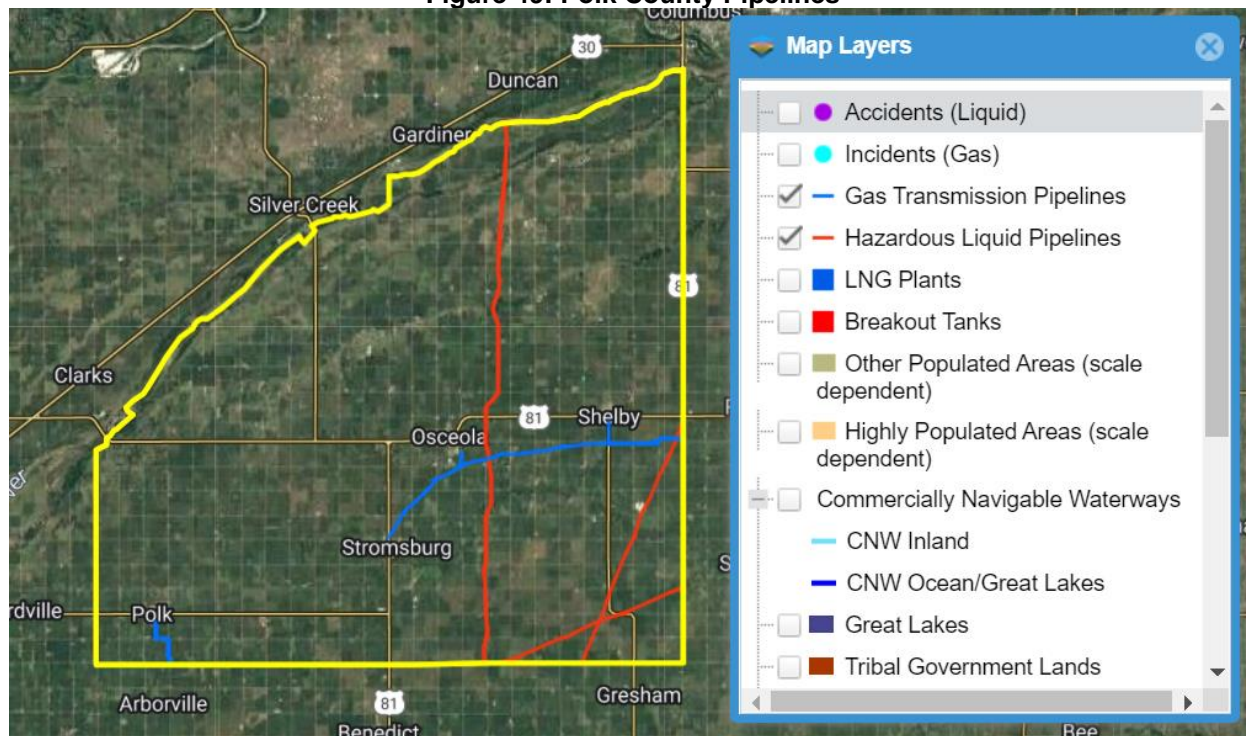
Source: Pipelines and Hazardous Safety Administration

**Figure 48: Merrick County Pipelines**



Source: Pipelines and Hazardous Safety Administration



**Figure 49: Polk County Pipelines**

Source: Pipelines and Hazardous Safety Administration

There are 238 facility locations across the planning area that submitted Tier II reports to the Nebraska Department of Environment and Energy (NDEE) in 2020. These locations are shown in Figure 50. A listing of hazardous material storage sites can be found in *Section Seven: Community Profiles* for each jurisdiction.

A large number of spills typically occur during the loading and unloading of chemicals for highway and pipeline chemical transport. Transportation corridors in the planning area are primarily US Highways, State Highways, and Interstate 80.

Hazardous materials releases during transportation primarily occur on major transportation routes as identified in Figure 51. Participating communities specifically reported transportation along railroads and highways as having the potential to impact their communities. Railroads providing service through the planning area have developed plans to respond to chemical releases along rail routes.

Figure 50: Fixed Chemical Sites

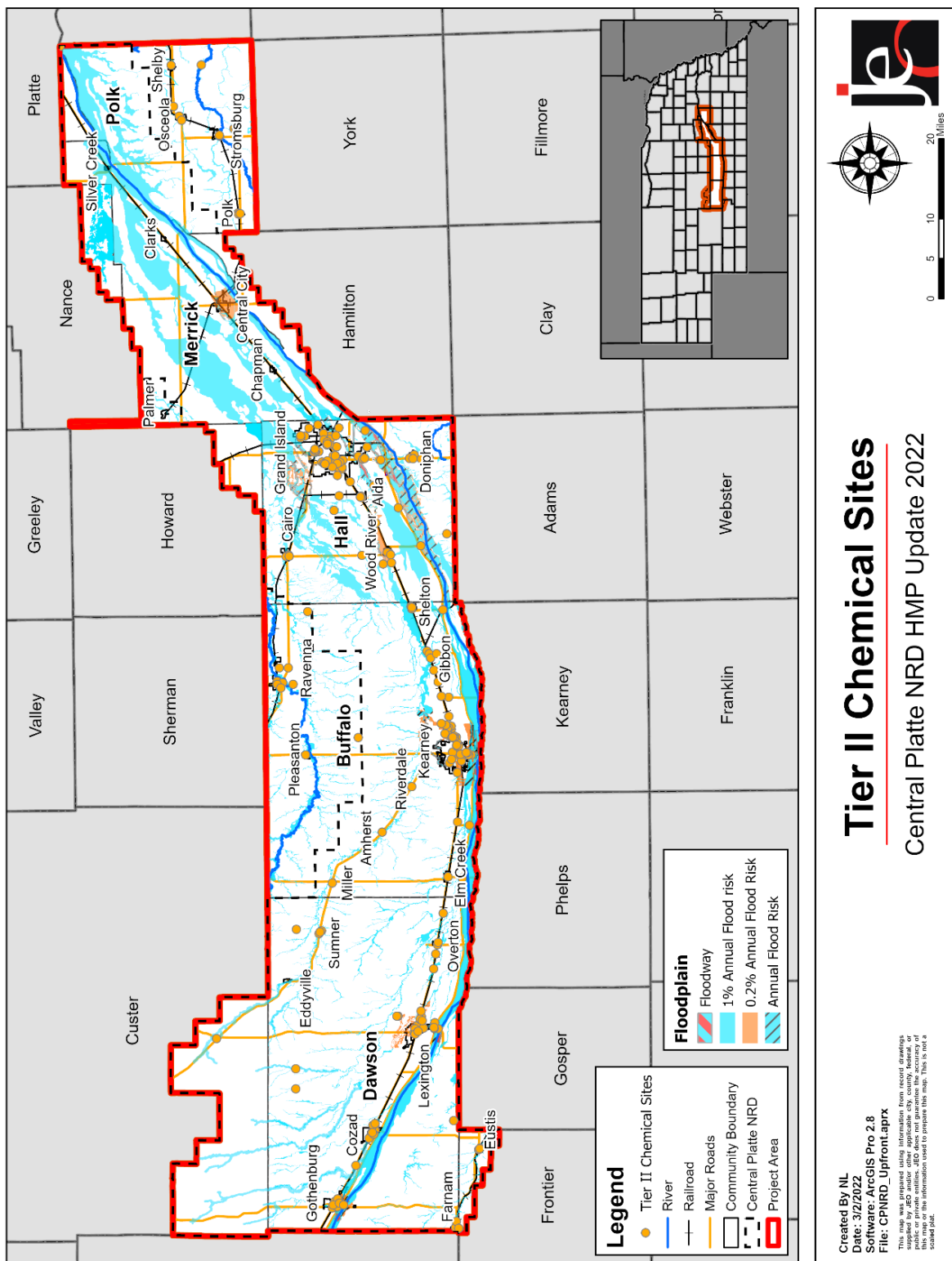
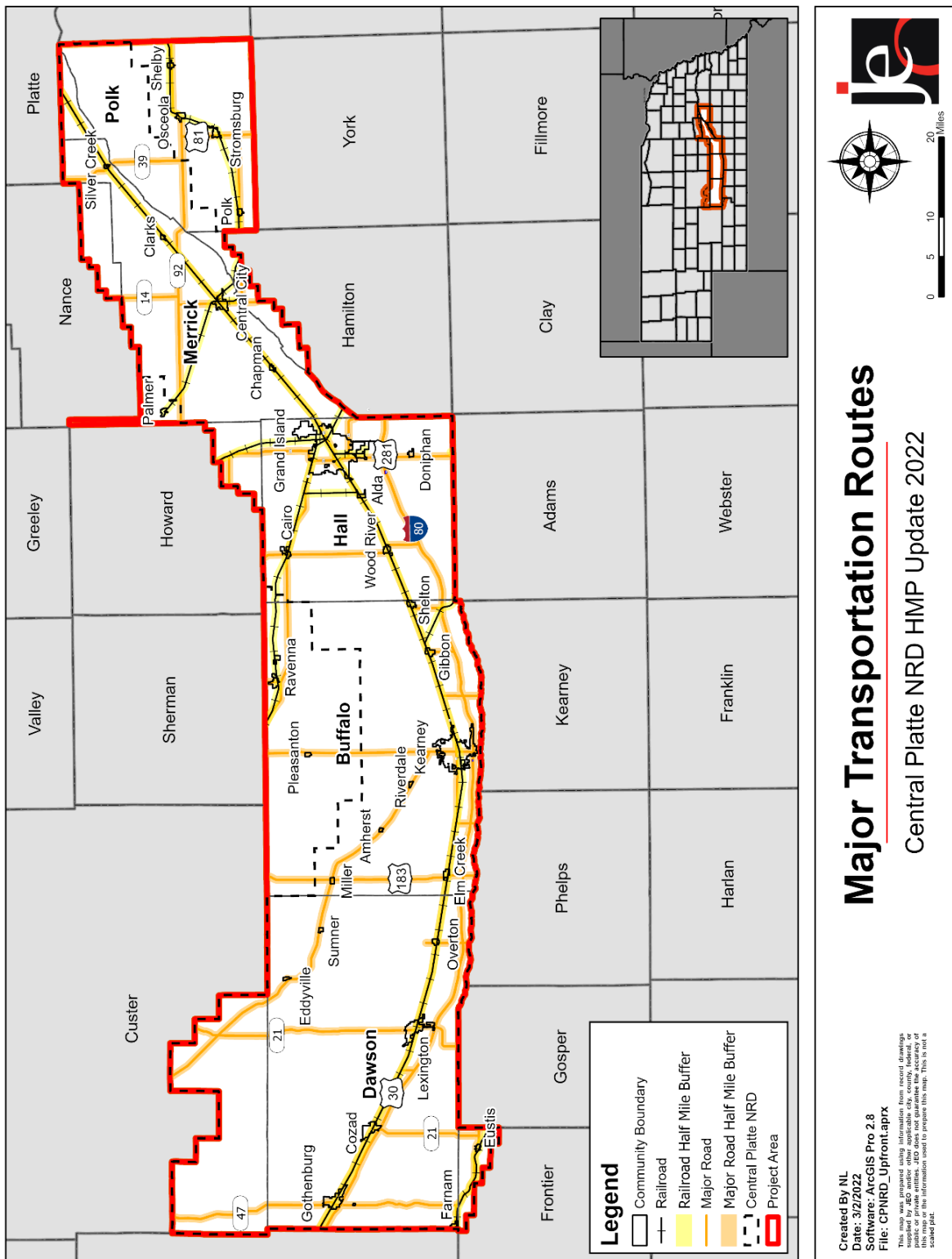


Figure 51: Major Transportation Corridors



## Extent

The extent of chemical spills at fixed sites varies and depends on the type of chemical that is released with a majority of events localized to the facility. The probable extent of chemical spills during transportation is difficult to anticipate and depends on the type and quantity of chemical released. In total 176 fixed site releases have occurred in the planning area, and the total amount spilled ranged from 0 gallons to 24,000 gallons. Of the 176 chemical spills, seven spills led to evacuations, five spills led to injuries, and one spill led to one fatality. In total 183 releases have occurred during transportation in the planning area. Transportation spills ranged from no material released to over 13,789 liquid gallons of material with an average quantity spilled of 281 liquid gallons. Of the 183 chemical spills, six spills led to evacuations, and three spills resulted in injuries. Based on historic records, it is likely that any spill involving hazardous materials will not affect an area larger than a quarter mile from the spill location.

## Historical Occurrences

### Hazardous Materials Release – Fixed Sites

According to the U.S. Coast Guard's National Response Center database (NRC), there have been 176 hazardous materials releases at fixed sites from 1990 through February 2020 in the planning area. There were no property damages reported for these releases. The following table displays the larger spills that have occurred throughout the planning area (>500 gallons).

**Table 73: Hazardous Material Releases (Fixed Site)**

Year of Event	Location of Release	Quantity Spilled	Material Involved	Number of Injuries	Property Damage
1991	Grand Island	600 Gallons	Sulfuric Acid	0	\$0
1993	Cozad	1,000 Gallons	Other Oil (Shock Absorber Oil)	0	\$0
1995	Grand Island	2,850 Gallons	Oil, Misc: Mineral	0	\$0
2004	Grand Island	7,000 Gallons	Processed Wastewater	0	\$0
2006	Grand Island	24,000 Gallons	Beef Plant Wastewater	0	\$0
2009	Wood River	6,000 Gallons	Sulfuric Acid	0	\$0
2009	Wood River	20,000 Gallons	Ethanol	0	\$0
2017	Central City	3,500 Gallons	Gasoline: Automotive (Unleaded)	0	\$0

Source: National Response Center, 1990-2020<sup>102</sup>

102 U.S. Coast Guard National Response Center. 2020. "Chemical Pollution and Railroad Incidents, 2000-2020." [datafile]. <https://nrc.uscg.mil/>.

**Hazardous Materials Release – Transportation**

According to the Pipeline and Hazardous Materials Safety Administration (PHMSA), 183 hazardous materials releases occurred during transportation in the planning area between 1971 and June 2021. During these events, there were three injuries, no fatalities, and \$1,325,150 in damages.

The following table provides a list of the most damaging hazardous materials releases during transportation in the planning area.

**Table 74: Hazardous Materials Release (Transportation)**

Date of Event	Location of Release	Failure Description	Material Involved	Method of Transportation	Amount	Total Damage	Evacuation (Yes/No)
5/18/1992	Willow Island	Derailment	Hazardous Substance	Rail	13,770 LGA	\$212,000	Yes
1/15/2003	Wood River	Vehicular Crash	Helium, Refrigerated Liquid (Cryogenic Liquid)	Highway	0 LGA	\$130,000	No
2/21/2003	Grand Island	Equipment Failure	Ferric Chloride Solution	Rail	6,500 LGA	\$15,000	No
12/6/2006	Grand Island	Broken Component or Device	Liquid Ammonium Nitrate	Rail	40 LGA	\$33,872	No
4/13/2013	Grand Island	Unknown	Hypochlorite Solutions	Highway	70 LGA	\$94,000	Yes
5/27/2012	Kearney	Fire, Temperature, or Heat	Corrosive Liquid	Highway	852.5 LGA	\$82,854	No
8/2/2012	Overton	Vehicular Crash	Sodium Hydroxide Solution	Highway	84 LGA	\$81,270	No
7/13/2013	Elm Creek	Broken Component or Device	Polychlorinated Biphenyls	Highway	70 LGA	\$53,000	No

Source: PHMSA, 1971– June 2021<sup>103</sup>

103 Pipeline and Hazardous Materials Safety Administration. May 2019. "Incident Statistics: Nebraska." <https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics>.

### Average Annual Damages

Using data from Table 75, average annual damages from hazardous materials releases can be estimated. There have been 176 fixed site spills in the planning area reported from the NRC and 183 transportation spills as reported by PHMSA. Neither the NRC nor PHMSA track crop losses from chemical spills. These events reported \$1,325,150 in property damages. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life.

**Table 75: Hazardous Materials Release Loss Estimate**

Hazard Type	Number of Events	Events Per Year	Injuries	Fatalities	Total Damages	Average Annual Chemical Spill Loss
Hazardous Materials Release (Fixed Site)	176	5.7	0	1	\$0	\$0
Hazardous Materials Release (Transportation)	183	3.6	9	0	\$1,325,150	\$25,983

Source: National Response Center, 1990-2020; PHMSA, 1971-June 2021

### Probability

Hazardous materials releases at fixed site storage areas are likely in the future. Given the historic record of occurrence (31 fixed site releases reported in 31 years), the annual probability of occurrence for hazardous materials releases at fixed sites is 100 percent.

Hazardous materials releases during transportation are likely in the future. Given the historic record of occurrence (33 transportation releases reported in 51 years), the annual probability of occurrence for hazardous materials releases during transportation is 65 percent.

### Community Top Hazard Status

The following table lists jurisdictions which identified hazardous materials release as a top hazard of concern.

Jurisdiction	
Alda	Kearney
Buffalo County	Lexington Fire District
Central City Public Schools	Lexington Public Schools
Clarks	Merrick County
Doniphan Fire District	Pleasanton Fire District
Doniphan	Pleasanton Public Schools
Elm Creek Fire District	Ravenna Public Schools
Elm Creek	Ravenna
Eustis-Farnam Public Schools	Riverdale
Four Corners Health Department	Shelton
Gibbon Fire District	Silver Creek
Gibbon	Two Rivers Public Health Department
Gothenburg	Wood River Public Schools
Grand Island	Wood River



## Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 76: Regional Hazardous Materials Release Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Those in close proximity to chemical fixed sites or transportation corridors could have minor to moderate health impacts</li> <li>-Possible evacuation</li> <li>-Hospitals, nursing homes, and the elderly at greater risk due to low mobility</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-A chemical plant shutdown in smaller communities would have significant impacts to the local economy</li> <li>-Evacuations and closed transportation routes could impact businesses near spill</li> </ul>
<b>Built Environment</b>	<ul style="list-style-type: none"> <li>-Risk of fire or explosion</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-Transportation routes can be closed during evacuations</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Critical facilities are at risk of evacuation</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>-None</li> </ul>

# Levee Failure

According to FEMA:

“The United States has thousands of miles of levee systems. These manmade structures are most commonly earthen embankments designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide some level of protection from flooding. Some levee systems date back as far as 150 years. Some levee systems were built for agricultural purposes. Those levee systems designed to protect urban areas have typically been built to higher standards. Levee systems are designed to provide a specific level of flood protection. No levee system provides full protection from all flooding events to the people and structures located behind it. Thus, some level of flood risk exists in these levee-impacted areas.”

Levee failure can occur several ways. A breach of a levee is when part of the levee breaks away, leaving a large opening for floodwaters to flow through. A levee breach can be gradual by surface or subsurface erosion, or it can be sudden. A sudden breach of a levee often occurs when there are soil pores in the levee that allow water to flow through causing an upward pressure greater than the downward pressure from the weight of the soil of the levee. This under seepage can then resurface on the backside of the levee and can quickly erode a hole to cause a breach. Sometimes the levee actually sinks into a liquefied subsurface below.

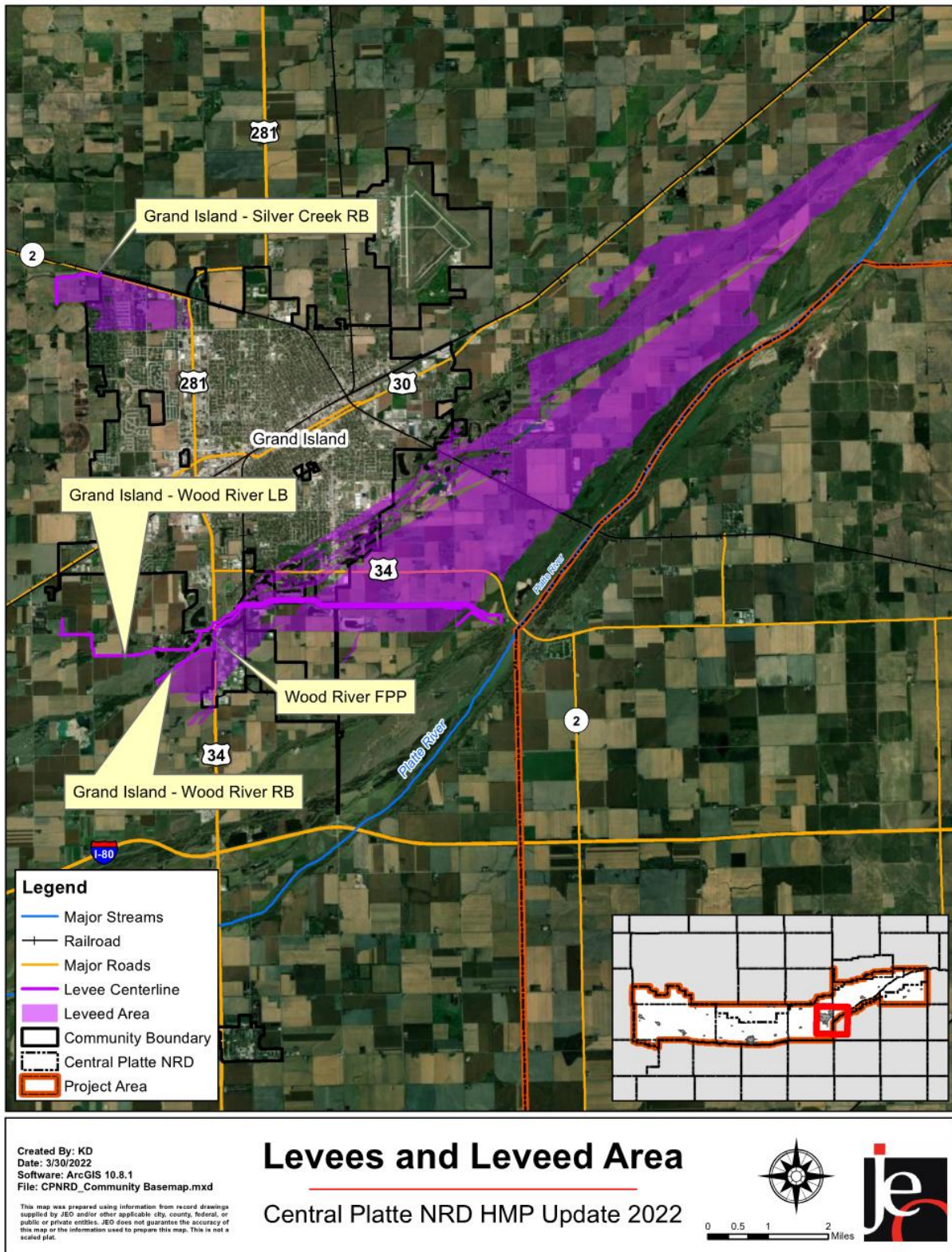
Another way a levee failure can occur is when the water overtops the crest of the levee. This happens when the flood waters simply exceed the lowest crest elevation of the levee. An overtopping can lead to significant erosion of the backside of the levee and can result to a breach and thus a levee failure.

## Location

There is one non-federal levee and three federal (USACE) levees located near the City of Grand Island. The four levees are located in Hall County, south of Grand Island. The Grand Island – Wood River RB levee spans 7.19 miles and protects 101 residents and 118 structures. The Grand Island – Wood River LB levee spans 8.8 miles and protects 9,327 residents and 3,715 structures. The Wood River FPP levee spans 0.31 miles and does not protect any residents or structures.

The Wood River Right Bank Levee system starts southwest of Grand Island and continues east approximately 4.7 miles where it ends at the confluence of the Platte River. The Wood River Left Bank Levee system starts southwest of Grand Island and continues east approximately 7.9 miles where it ends at the confluence of the Platte River. The Wood River FPP Levee system is 0.31 miles in length and located south of Grand Island along Tom Osbourne Expressway and southeast of Wood River. The Silver Creek Levee, a non-federal levee which was completed in the spring of 2019, is an earthen embankment approximately 6,150 feet (1.16 miles) in length located on the northwest side of Grand Island. The four levee systems are shown in the following figure.

Figure 52: Levees in the Planning Area



The following two tables provide a list of federal and non-federal levees in the planning area.

**Table 77: USACE Levees in Planning Area**

Name	Sponsor	Location	Length (Miles)	Risk Level
<b>Grand Island - Wood River LB</b>	USACE	Grand Island	8.8	Low
<b>Grand Island - Wood River RB</b>	USACE	Grand Island	7.19	Low
<b>Wood River FPP</b>	USACE	Grand Island	0.31	Not Screened

Source: USACE Levee Database

**Table 78: Other Levees in Planning Area**

Name	Sponsor	Location	Length (Miles)	Risk Level
<b>Silver Creek Levee</b>	Central Platte Natural Resources District	Grand Island	1.16	Not Screened

Beyond the USACE's National Levee Database, there is no known comprehensive list of levees that exists in the planning area especially for private agricultural levees. Thus, it is not possible at this time to document the location of non-federal levees, the areas they provide flood risk reduction, nor the potential impact of these levees.

### Extent

Given the location of the three federal levees and one non-federal levee in the planning area, the extent of levee failure is limited to the area surrounding Grand Island.

USACE, who is responsible for federal levee oversight and inspection of levees, has three ratings for levee inspections. Any levee failure events in the planning area will fall within USACE's rating system; however, it is not currently possible to determine what level of damage each levee system will experience. Non-federal levees are not inspected and thus do not have ratings.

**Table 79: USACE Levee Rating Categories**

Ratings	Description
<b>Acceptable</b>	All inspection items are rated as Acceptable
<b>Minimally Acceptable</b>	One or more inspection items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable inspection items would not prevent the segment/system from performing as intended during the next flood event
<b>Unacceptable</b>	One or more items are rated as Unacceptable and would prevent the segment/system from performing as intended, or a serious deficiency noted in past inspections has not been corrected within the established timeframe, not to exceed two years

Source: USACE

### Historical Occurrences

There have been no recorded instances of levee failure in the planning area.



### Potential Losses

To determine potential losses for levee failure, a parcel inventory from leveed areas was utilized. Based on the nature of the assessor's parcel data, it is not possible to do a true structural inventory with structure-specific impacts. Instead, inundated parcels were used as a proxy for structural data. The number of improvements and value of improvements were determined based on assessor data from Hall and Merrick Counties. The population in leveed areas was determined based on information from the USACE Levee Database. The following table shows the number of improvements included in the leveed areas for the four levees located near Grand Island. A population of 9,428 people resides in the leveed area. A total of 1,663 improvements are within the leveed area and are valued at \$395,380,510.

**Table 80: Potential Losses in Levee Breach Area**

Levee	Number of Improvements in Leveed Area <sup>1</sup>	Value of Improvements within Leveed Area <sup>1</sup>	Population in Leveed Area <sup>2</sup>
Grand Island - Wood River LB	908	\$197,996,628	9,327
Grand Island - Wood River RB	85	\$50,571,365	101
Wood River FPP	0	\$0	0
Silver Creek Levee	670	\$146,812,517	N/A
<b>Total</b>	<b>1,663</b>	<b>\$395,380,510</b>	<b>9,428</b>

Source: 1 Hall County and Merrick County Assessor; 2 Indicates data is from USACE Levee Database

### Probability

Given no historical occurrences of federal levee failure in the planning area, the annual probability of this event occurring is considered to be less than one percent. While it is possible for levee failure to occur in the future, this is considered a low probability.

### Community Top Hazard Status

The following table lists jurisdictions which identified levee failure as a top hazard of concern.

Jurisdiction	
Dawson County Drainage District No. 2 & 3 Hall County	Grand Island Central Platte NRD

### Regional Vulnerabilities

The following table summarizes regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 81: Regional Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Those living in federal and non-federal levee protected areas</li> <li>-Residents with low mobility or with no access to a vehicle are more vulnerable during levee failure events</li> <li>-Those without adequate notification (text alerts, sirens, internet or cable access) may be at greater risk</li> </ul>
<b>Economic</b>	-Businesses and industries protected by levees are at risk during failures
<b>Built Environment</b>	-All buildings within leveed protected areas are at risk to damages
<b>Infrastructure</b>	-Major transportation corridors and bridges at risk during levee failures
<b>Critical Facilities</b>	-Critical facilities in levee protected areas are at risk
<b>Climate</b>	-Changes in seasonal precipitation and temperature normals can increase strain on levee infrastructure



# Public Health Emergency

According to the World Health Organization (WHO), a public health emergency is:

“an occurrence or imminent threat of an illness or health condition, caused by bio terrorism, epidemic or pandemic disease, or (a) novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human fatalities or incidents or permanent or long-term disability” (WHO/DCD, 2001). The declaration of a state of public health emergency permits the governor to suspend state regulations and change the functions of state agencies.<sup>104</sup>

The number of cases that qualifies as a public health emergency depends on several factors including the illness, its symptoms, ease in transmission, incubation period, and available treatments or vaccinations. With the advent of sanitation sewer systems and other improvements in hygiene since the 19<sup>th</sup> century, the spread of infectious disease has greatly diminished. Additionally, the discovery of antibiotics and the implementation of universal childhood vaccination programs have played a major role in reducing human disease impacts. Today, human disease incidences are carefully tracked by the Centers for Disease Control and Prevention (CDC) and state organizations for possible epidemics and to implement control systems. Novel illnesses or diseases have the potential to develop annually and significantly impact residents and public health systems.

Some of the best actions or treatments for public health emergencies are nonpharmaceutical interventions (NPI). These are readily available behaviors or actions, and response measures people and communities can take to help slow the spread of respiratory viruses such as influenza. Understanding NPIs and increasing the capacity to implement them in a timely way, can improve overall community resilience during a pandemic. Using multiple NPIs simultaneously can reduce influenza transmission in communities even before vaccination is available.<sup>105</sup>

Pandemics are global or national disease outbreaks. These types of illnesses, such as influenza, can easily spread person-to-person, cause severe illness, and are difficult to contain. An especially severe pandemic can lead to high levels of illness, death, social disruption, and economic turmoil. Past pandemic events include:

- 1918 Spanish Flu: the H1N1 influenza virus spread world-wide during 1918 and 1919. It is estimated that at least 50 million people worldwide died during this pandemic with about 675,000 deaths alone in the United States. No vaccine was ever developed, and control efforts included self-isolation, quarantine, increased personal hygiene, disinfectant use, and social distancing.
- 1957 H2N2 Virus: a new influenza A virus emerged in Eastern Asia and eventually crossed into coastal U.S. cities in summer of 1957. In total 1.1 million people worldwide died of the flu with 116,000 of those in the United States.

104 World Health Organization. 2008. Accessed April 2020. “Glossary of humanitarian Terms.” <https://www.who.int/hac/about/definitions/en/>.

105 U.S. Department of Health and Human Services. 2017. “Pandemic Influenza Plan: 2017 Update.” <https://www.cdc.gov/flu/pandemic-resources/pdf/pan-flu-report-2017v2.pdf>.

- 1968 H3N2 Virus: an influenza A virus discovered in the United States in September 1968 which killed over 100,000 citizens. The majority of deaths occurred in people 65 years and older.
- 2009 H1N1 Swine Flu: a novel influenza A virus discovered in the United States and spread quickly across the globe. This flu was particularly prevalent in young people while those over 65 had some antibody resistance. The CDC estimated the U.S. had over 60.8 million cases and 12,469 deaths.
- 2019 COVID-19: the novel influenza A virus which originated in Wuhan China and spread globally. As of February 2, 2021, the CDC reported over 26,277,125 cases and 445,264 deaths attributed to COVID-19. Efforts to control and limit the virus included self-isolation, quarantine, increased cleaning measures, social distancing and vaccinations. Significant impacts to the national and global economy have been caused by COVID-19.

The State of Nebraska Department of Health and Human Services requires doctors, hospitals, and laboratories to report on many communicable diseases and conditions to monitor disease rates for epidemic events. Additionally, regional or county health departments monitor local disease outbreaks and collect data relevant to public health. In the planning area, the Central District Health Department covers Hall and Merrick Counties, the Four Corners Health Department covers Polk County, and the Two Rivers Public Health Department covers Buffalo and Dawson Counties.

### Location

Human disease outbreaks can occur anywhere in the planning area. Public health emergencies or pandemic threshold levels are dependent on the outbreak type, transmission vectors, location, and season. Normal infectious disease patterns are changing due to increasing human mobility and climate change. Rural populations are particularly at risk for animal-related diseases while urban areas are at greater risk from community spread type illnesses. All residents throughout the planning area are at risk during public health emergencies. All areas within the planning area experienced impacts from COVID-19 specifically during 2020 and 2021.

### Extent

Those most affected by public health emergencies are typically the very young, the very old, the immune-compromised, the economically vulnerable, and the unvaccinated. Roughly 25% of the planning area's population is 18 years or younger, and 17% of the planning area is 65 years or older. These factors increase vulnerability to the impacts of pandemics. Refer to *Section Three: Planning Area Profile* for further discussion of age and economic vulnerability in the planning area. It is not possible to determine the extent of individual public health emergency events, as the type and severity of a novel outbreak cannot be predicted. However, depending on the disease type, a significant portion of residents may be at risk to illness or death.

The extent of a public health emergency is closely tied to the proximity or availability of health centers and services. The following table identifies hospitals in the planning area.

**Table 82: Hospitals in the Planning Area**

County	Facility Name	Nearest Community	Total Licensed Beds
Buffalo	Bryan Hospital – Kearney	Kearney	93
Buffalo	CHI Health Good Samaritan	Kearney	175
Buffalo	CHI Health Richard Young Behavioral Health	Kearney	61

County	Facility Name	Nearest Community	Total Licensed Beds
<b>Buffalo</b>	Kearney Ambulatory Surgical Center	Kearney	15
<b>Dawson</b>	Cozad Community Hospital	Cozad	20
<b>Dawson</b>	Gothenburg Memorial Hospital	Gothenburg	14
<b>Dawson</b>	Lexington Regional Health Center	Lexington	25
<b>Hall</b>	Grand Island Regional Medical Center	Grand Island	67
<b>Hall</b>	Saint Francis Medical Center	Grand Island	155
<b>Merrick</b>	Merrick Medical Center	Central City	20
<b>Polk</b>	Annie Jeffrey Memorial County Health Center	Osceola	16

Source: Nebraska Department of Health and Human Services<sup>106</sup>

Certain geographic areas, populations, and facilities may experience a shortage of health care professionals which results in a lack of access to health care in an area. The Health Resources and Services Administration (HRSA) assigns specific designations to shortage areas to focus limited resources on communities with the most need. Shortage designations include Health Professional Shortage Areas (HPSAs), Medically Underserved Areas (MUAs) and Medically Underserved Populations (MUPs). Health Professional Shortage Areas are designated based on shortages in primary care, dental, or mental health providers in a geographic area, facility, or population. HPSAs are determined based on the number of health professionals relative to a high need population. The following table identifies HPSA designations in the planning area.

**Table 83: Health Care Professional Shortage Areas in the Planning Area**

County	Designation Type	Designation ID	Designation Date	Type of Care
<b>Buffalo, Hall, Merrick</b>	Geographic HPSA	7315324561	7/20/1978	Mental Health
<b>Hall</b>	Federally Qualified Health Center	6319993106	10/31/2013	Dental Health
<b>Hall</b>	Federally Qualified Health Center	7319993101	10/31/2013	Mental Health
<b>Hall</b>	Federally Qualified Health Center	131999310A	10/31/2013	Primary Care
<b>Dawson</b>	Rural Health Clinic	631999311A	05/31/2017	Dental Health
<b>Dawson</b>	Geographic HPSA	7312770380	02/22/2022	Mental Health
<b>Dawson</b>	Rural Health Clinic	131999311A	05/31/2017	Primary Care
<b>Merrick</b>	Rural Health Clinic	6318715447	09/29/2021	Dental Health
<b>Merrick</b>	Rural Health Clinic	7313872577	09/29/2021	Mental Health
<b>Merrick</b>	Rural Health Clinic	1315965517	09/29/2021	Primary Care
<b>Polk</b>	Geographic HPSA	7319643086	10/21/2021	Mental Health

Source: Health Resources and Services Administration<sup>107</sup>

106 Department of Health and Human Services. December 2021. "Hospitals." <http://dhhs.ne.gov/licensure/Documents/Hospital%20Roster.pdf>.

107 Health Resources and Services Administration. 2022. "HPSA Find." <https://data.hrsa.gov/tools/shortage-area/hpsa-find>

Medically Underserved Areas and Populations are designated by the HRSA as areas or populations having high poverty rates, high infant mortality rates, high elderly populations, or an insufficient number of primary care providers. The following tables identifies MUA designations in the planning area. Dawson County is the only county in the planning area without an MUA designation.

**Table 84: Medically Underserved Areas/Populations in the Planning Area**

County	Service Area	Designation Type	Designation ID	Designation Date	Type of Care
<b>Buffalo</b>	Ravenna City - County	MUA	02056	05/31/1994	Primary Care
<b>Hall</b>	Low Income Population	MUA	05207	06/08/1999	Primary Care
<b>Merrick</b>	Clarksville Service Area	MUA	02051	5/12/1994	Primary Care
<b>Merrick</b>	Loup Service Area	MUA	02072	5/12/1994	Primary Care
<b>Polk</b>	Polk Service Area	MUA	02031	11/01/1978	Primary Care

Source: Health Resources and Services Administration<sup>108</sup>

Immunodeficiency disorders (such as diabetes), obesity, or other pre-existing health complications reduce the ability of the body to fight infection. Diabetes prevalence per county and for the state are listed in the table below. Dawson, Hall, and Merrick Counties had a higher diabetes rate than the state.

**Table 85: Diabetes Prevalence in the Planning Area**

County	Diagnosed Diabetes Rate (Total Adults Age 20+)
<b>Buffalo</b>	8.1
<b>Dawson</b>	9.3
<b>Hall</b>	9
<b>Merrick</b>	10
<b>Polk</b>	6.5
<b>State of Nebraska*</b>	8.8%

Source: Centers of Disease Control and Prevention, 2019<sup>109</sup>

\*State data is from 2018.

Nebraska state law (Title 173) requires all students have the following vaccinations: poliomyelitis, Diphtheria, pertussis, tetanus, measles, mumps, rubella, Hepatitis B, and varicella (chicken pox). The Vaccines for Children program is a federally funded and state-operated vaccine supply program that provides free vaccines to children under 18 who are of American Indian or Alaska Native descent, enrolled in Medicaid, uninsured, or underinsured. Additionally, the HPV vaccination series is recommended for teenagers and influenza vaccinations are recommended yearly for those over six months old. Individuals without vaccinations are at greater risk of contracting diseases or carrying diseases to others.

108 Health Resources and Services Administration. 2022. "MUA Find." <https://data.hrsa.gov/tools/shortage-area/mua-find>

109 Centers for Disease Control and Prevention. 2017. "Diagnosed diabetes prevalence – Nebraska." <https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html>

## Historical Occurrences

Cases and fatalities associated with Public Health Emergencies vary between illness types and severity of outbreak. Past major outbreaks in Nebraska have specifically included the H1N1 Swine Flu in 2009 and COVID-19 in 2020/21.

- H1N1 Swine Flu (2009) – outbreaks were first reported in mid-April 2009 and spread rapidly. The new flu strand for which immunity was nonexistent in persons under 60 years old was similar in many ways to typical seasonal influenza. Symptoms of H1N1 included fever greater than 100°F, cough, and sore throat. County specific counts of H1N1 are not available, however a total of 71 confirmed cases were reported by June 12, 2009.<sup>110</sup> Outbreaks in Nebraska were typically seen sporadically with occasional cluster outbreaks at summer camps for youth. The U.S. Public Health Emergency for the H1N1 Influenza outbreak expired on June 23, 2010. The CDC developed and encouraged all US residents to receive a yearly flu vaccination to protect against potential exposures. The H1N1 continues to appear annually and persons in the planning area are at risk of infection in the future.
- COVID-19 (2020) – In January 2020, the CDC confirmed the first case of COVID-19 in the United States, and it quickly spread across the country. By March 2020, the World Health Organization declared COVID-19 a pandemic and travel bans were instituted around the globe. Primary symptoms of the infection included cough, fever or chills, shortness of breath or difficulty breathing, fatigue, muscle and body aches, headache, loss of taste or smell, sore throat, and others. The first confirmed case of COVID-19 in the State of Nebraska was a 36-year-old Omaha resident in early March. Counties and cities throughout the planning area have instituted directed health measures to protect residents from the spread of COVID-19.

The table below displays COVID-19 confirmed cases and vaccination rate of individuals age 12 or older. This data will likely increase as time goes on until the entire population can be vaccinated.

**Table 86: COVID-19 Cases in the Planning Area**

County	Population	Total Confirmed Cases	Vaccination Rate
Buffalo	50,084	6,781	55%
Dawson	24,111	3,362	55%
Hall	62,895	9,254	56%
Merrick	7,668	908	48%
Polk	5,214	691	50%
<b>Total</b>	<b>149,972</b>	<b>20,088</b>	<b>55%</b>

Source: Nebraska Department of Health and Human Services<sup>111</sup>

## Average Annual Losses

The national economic burden of influenza medical costs, medical costs plus lost earnings, and total economic burden was \$10.4 billion, \$26.8 billion, and \$87.1 billion respectively in 2007.<sup>112</sup> However, associated costs with pandemic response are much greater. Current estimated costs

110 Centers for Disease Control and Prevention. June 2009. "Novel H1N1 Flu Situation Update."

<https://www.cdc.gov/h1n1flu/updates/061209.htm>.

111 Nebraska Department of Health and Human Services. September 24, 2021. "COVID-19 Case Rate Last 14 Days".

[https://datanexus-dhhs.ne.gov/views/Covid/1\\_CountyStatisticsMap?%3AisGuestRedirectFromVizportal=y&%3Aembed=y](https://datanexus-dhhs.ne.gov/views/Covid/1_CountyStatisticsMap?%3AisGuestRedirectFromVizportal=y&%3Aembed=y).

112 Molinari, N.M., Ortega-Sanchez, I.R., Messonnier, M., Thompson, W.W., Wortley, P.M., Weintraub, E., & Bridges, C.B. April 2007. "The annual impact of seasonal influenza in the US: measuring disease burden and costs." DOI: 10.1016/j.vaccine.2007.03.046.

for COVID-19 in the United States exceed \$16 trillion. Specific costs do not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of significant health impacts are difficult to quantify.

### Probability

There is no pattern as to when public health emergencies will occur. Based on historical records, it is likely that small-scale disease outbreaks will occur annually within the planning area. However, large scale emergency events (such as seen with COVID-19) cannot be predicted.

### Community Top Hazard Status

The following table lists jurisdictions which identified public health emergency as a top hazard of concern.

Jurisdiction	
Buffalo County	Lexington Fire District
Central City Fire District	Lexington Public Schools
Cross Country Community Schools	Pleasanton Public Schools
Eustis-Farnam Public Schools	Ravenna Public Schools
Four Corners Health Department	Shelton Public Schools
Gibbon Public Schools	Two Rivers Public Health Department
Gibbon	University of Nebraska - Kearney
Hall County	Wood River Public Schools
Kearney	Lexington Fire District

### Regional Vulnerabilities

The following table summarizes regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 87: Regional Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Vulnerable populations include the very young, the very old, the unvaccinated, the economically vulnerable, and those with immunodeficiency disorders.</li> <li>-Institutional settings such as prisons, dormitories, long-term care facilities, day cares, and schools are at higher risk to contagious diseases</li> <li>-Poverty, rurality, underlying health conditions, and drug or alcohol use increase chronic and infectious disease rates</li> </ul>
<b>Economic</b>	-Large scale or prolonged events may cause businesses to close, which could lead to significant revenue loss and loss of income for workers
<b>Built Environment</b>	-Increased number of unoccupied business structures
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-Transportation routes may be closed if a quarantine is put in place</li> <li>-Healthcare facilities in the planning area may be overwhelmed quickly by widespread events</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Healthcare facilities in the planning area may be overwhelmed quickly by widespread events</li> <li>-Critical facilities could see suspended action or reduced resources due to sick staff</li> </ul>
<b>Climate</b>	-Climate change impacts on extreme weather, air quality, transmission of disease via insects and pests, food security, and water quality increase threats of disease



# Severe Thunderstorms

Severe thunderstorms are common and unpredictable seasonal events throughout Nebraska. A thunderstorm is defined as a storm that contains lightning and thunder, which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or “thunderheads” develop, resulting in thunderstorms. This can occur singularly, in clusters, or in lines.

Thunderstorms can develop in fewer than 30 minutes and can grow to an elevation of eight miles into the atmosphere. Lightning, by definition, is present in all thunderstorms and can cause harm to humans and animals, fires to buildings and agricultural lands, and electrical outages in municipal electrical systems. Lightning can strike up to 10 miles from the portion of the storm depositing precipitation. There are three primary types of lightning: intra-cloud, inter-cloud, and cloud to ground. While intra and inter-cloud lightning are more common, communities are potentially impacted when lightning comes in contact with the ground. Lightning generally occurs when warm air mixes with colder air masses resulting in atmospheric disturbances necessary for polarizing the atmosphere. Additionally, hail is a common component of thunderstorms and often occurs in series, with one area having the potential to be hit multiple times in one day. Severe thunderstorms usually occur in the evening during the spring and summer months. Hail can destroy property and crops with sheer force, as some hail stones can fall at speeds up to 100 mph.

Economically, thunderstorms are generally beneficial in that they provide moisture necessary to support Nebraska’s largest industry, agriculture. The majority of thunderstorms do not cause damage, but when they escalate to severe storms and/or produce hail, the potential for damages increases. Damages can include: crop losses from wind and hail; property losses due to building and automobile damages from hail; high wind; flash flooding; death or injury to humans and animals from lightning, drowning, or getting struck by falling or flying debris; and personal injury from people without shelter during these events or standing near windows. The potential for damages increases as the size of the hail increases. Figure 53 displays the average number of days with thunderstorms across the country each year. The planning area experiences an average of 50 to 60 thunderstorms over the course of one year.

## Location

The entire planning area is at risk to thunderstorms due to the regional nature of this type of event.

## Extent

The geographic extent of a severe thunderstorm event may be large enough to impact the entire planning area (such as in the case of a squall line, derecho, or long-lived supercell) or just a few square miles, in the case of a single cell that marginally meets severe criteria. The NWS defines a thunderstorm as severe if it contains hail that is one inch in diameter or capable of winds gusts of 58 mph or higher. The Tornado and Storm Research Organization (TORRO) scale is used to classify hailstones and provides some detail related to the potential impacts from hail. Table 88 outlines the TORRO Hail Scale.

Figure 53: Average Number of Thunderstorms

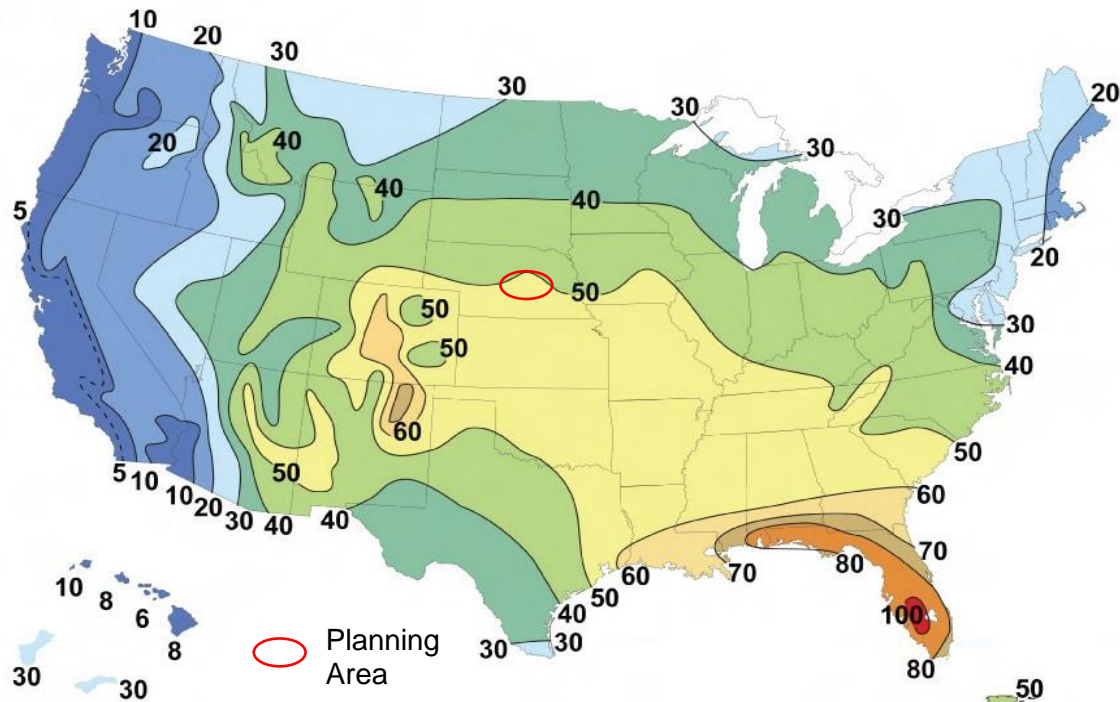
Source: NWS, 2018<sup>113</sup>

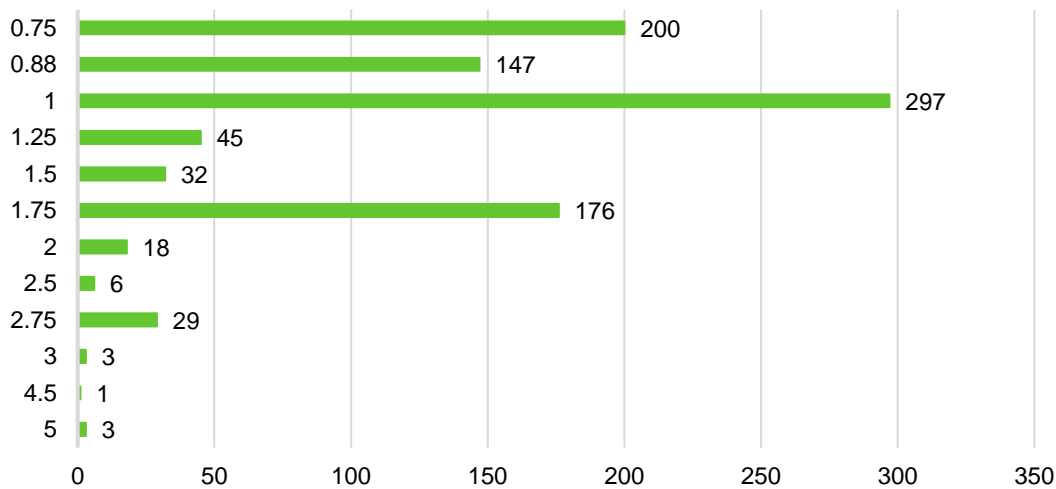
Table 88: TORRO Hail Scale

Class	Type of Material	Divisions
H0: Hard Hail	5 mm; (Pea size); 0.2 in	No damage
H1: Potentially Damaging	5 -15 mm (Marble); 0.2 – 0.6 in	Slight general damage to plants and crops
H2: Significant	10 -20 mm (Grape); 0.4 – 0.8 in.	Significant damage to fruit, crops, and vegetation
H3: Severe	20 -30 mm (Walnut); 0.8 – 1.2 in	Severe damage to fruit and crops, damage to glass and plastic structures
H4: Severe	30 -40 mm (Squash Ball); 1.2 – 1.6 in	Widespread damage to glass, vehicle bodywork damaged
H5: Destructive	40 – 50 mm (Golf ball); 1.6 – 2.0 in.	Wholesale destruction of glass, damage to tiled roofs; significant risk or injury
H6: Destructive	50 – 60 mm (chicken egg); 2.0 – 2.4 in	Grounded aircrafts damaged, brick walls pitted; significant risk of injury
H7: Destructive	60 – 75 mm (Tennis ball); 2.4 – 3.0 in	Severe roof damage; risk of serious injuries
H8: Destructive	75 – 90 mm (Large orange); 3.0 – 3.5 in.	Severe damage to structures, vehicles, airplanes; risk of serious injuries
H9: Super Hail	90 – 100 mm (Grapefruit); 3.5 – 4.0 in	Extensive structural damage; risk of severe or even fatal injuries to persons outdoors
H10: Super Hail	>100 mm (Melon); > 4.0 in	Extensive structural damage; risk or severe or even fatal injuries to persons outdoors

Source: TORRO, 2022<sup>114</sup><sup>113</sup> National Weather Service. 2018. "Introduction to Thunderstorms." [https://www.weather.gov/jetstream/tstorms\\_intro](https://www.weather.gov/jetstream/tstorms_intro).<sup>114</sup> Tornado and Storm Research Organization. 2022. "Hail Scale." <https://www.torro.org.uk/research/hail/hscale>.

The NCEI reported 957 individual hail events across the planning area since 1996. As the NCEI reports events per county, this value overestimates the total amount of thunderstorm events. The average hailstone size was 1.20 inches. Events of this magnitude correlate to an H4 Severe classification. It is reasonable to expect H4 classified events to occur several times in a year throughout the planning area. In addition, it is reasonable, based on the number of occurrences, to expect larger hailstones to occur in the planning area annually. The planning area has endured four H10 hail events (>4.0 inches) during the period of record. Figure 54 shows hail events based on the size of the hail.

**Figure 54: Hail Events by Magnitude**

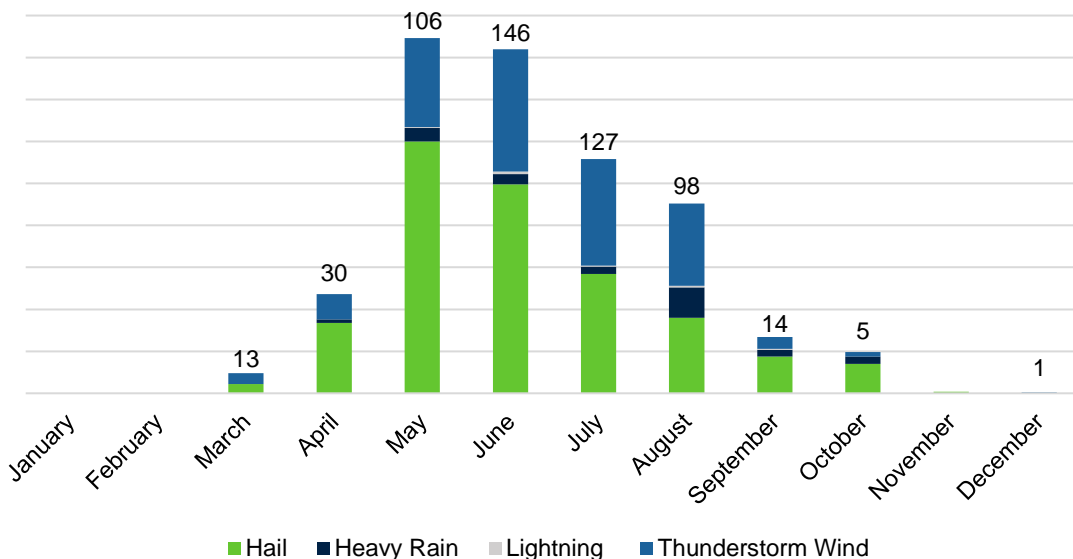


Source: NCEI, 1996-June 2021

### Historical Occurrences

Severe thunderstorms in the planning area usually occur in the afternoon and evening during the summer months (Figure 55).

**Figure 55: Severe Thunderstorm Events by Month**



Source: NCEI, 1996-June 2021

The NCEI reports events as they occur in each community. A single severe thunderstorm event can affect multiple communities and counties at a time; the NCEI reports these large scale, multi-county events as separate events. The result is a single thunderstorm event covering the entire region could be reported by the NCEI as several events.

The NCEI reports a total of 540 thunderstorm wind, 94 heavy rain, eight lightning, and 957 hail events in the planning area from January 1996 to June 2021. In total these events were responsible for \$153,813,000 in property damages. The USDA RMA data shows that severe thunderstorms caused \$190,074,924 in crop damages. No injuries and 25 fatalities were reported in association with these storms.

### Average Annual Damages

The average damage per event estimate was determined based upon recorded damages from NCEI Storm Events Database since 1996 and number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Severe thunderstorms cause an average of \$5,915,884 per year in property damages and \$9,503,746 in crop damages.

**Table 89: Severe Thunderstorms Loss Estimate**

Hazard Type	Number of Events <sup>1</sup>	Average Events Per Year	Total Property Loss <sup>1</sup>	Average Annual Property Loss	Total Loss <sup>2</sup>	Crop	Average Annual Crop Loss
Hail	957	37	\$117,794,000	\$4,530,538	\$190,074,924		\$9,503,746
Heavy Rain	94	3.6	\$587,000	\$22,577			
Lightning	8	0.3	\$492,000	\$18,923			
Thunderstorm Wind	540	20.8	\$34,940,000	\$1,343,846			
<b>Total</b>	<b>15,999</b>	<b>61.7</b>	<b>\$153,813,000</b>	<b>\$5,915,884</b>	<b>\$190,074,924</b>		<b>\$9,503,746</b>

Source: 1 Indicates data is from NCEI (January 1996 to June 2021); 2 Indicates data is from USDA RMA (2000 to 2020)

### Probability

Based on historical records and reported events, severe thunderstorms events and storms with hail are likely to occur on an annual basis. The NCEI reported a total of 15,999 severe thunderstorm events between 1996 and June 2021, resulting in 100% chance annually for thunderstorms.

### Community Top Hazard Status

The following table lists jurisdictions which identified severe thunderstorms as a top hazard of concern.

Jurisdiction	
Alda	Gibbon
Buffalo County	Gothenburg
Cairo	Grand Island
Central City Fire District	Hall County
Central City Public Schools	Kearney
Central City	Lexington
Centura Public Schools	Merrick County
Clarks	Pleasanton Public Schools
Cozad	Pleasanton
Cross Country Community Schools	Polk County
Dawson County	Polk
Dawson County Drainage District No.2	Ravenna Public Schools
Dawson County Drainage District No.3	Ravenna
Doniphan Fire District	Riverdale
Doniphan	Shelby
Elm Creek Fire District	Shelton Public Schools
Elm Creek	Stromsburg
Eustis-Farnam Public Schools	Two Rivers Public Health Department
Gibbon Fire District	University of Nebraska - Kearney
Gibbon Public Schools	Wood River

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 90: Regional Thunderstorm Vulnerabilities**

Sector	Vulnerability
<b>People</b>	<ul style="list-style-type: none"> <li>-Elderly citizens with decreased mobility may have trouble evacuating or seeking shelter</li> <li>-Mobile home residents are risk of injury and damage to their property if the mobile home is not anchored properly</li> <li>-Injuries can occur from not seeking shelter, standing near windows, and shattered windshields in vehicles</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>-Damages to buildings and property can cause significant losses to business owners and employees</li> </ul>
<b>Built Environment</b>	<ul style="list-style-type: none"> <li>-Buildings are at risk to hail damage</li> <li>-Downed trees and tree limbs</li> <li>-Roofs, siding, windows, gutters, HVAC systems, etc. can incur damage</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>-High winds and lightning can cause power outages and down power lines</li> <li>-Roads may wash out from heavy rains and become blocked from downed tree limbs</li> </ul>
<b>Critical Facilities</b>	<ul style="list-style-type: none"> <li>-Power outages are possible</li> <li>-Critical facilities may sustain damage from hail, lightning, and wind</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>-Changes in seasonal precipitation and temperature normals can increase frequency and magnitude of severe storm events</li> </ul>

# Severe Winter Storms

Severe winter storms are an annual occurrence in Nebraska. Winter storms can bring extreme cold, freezing rain, heavy or drifting snow, and blizzards. Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions which greatly inhibit vehicular traffic. Generally, winter storms occur between the months of November and March but may occur as early as October and as late as April. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction by hindering transportation, knocking down tree limbs and utility lines, and structurally damaging buildings.

## Extreme Cold

Along with snow and ice storm events, extreme cold is dangerous to the well-being of people and animals. What constitutes extreme cold varies from region to region but is generally accepted as temperatures that are significantly lower than the region's average low temperature. For the planning area, the coldest months of the year are December, January, and February. The average low temperature for these months is below freezing (average low for the three months is 16°F). The average high temperature for the months of January, February, and December is near 38°F.<sup>115</sup>

## Freezing Rain

Along with snow events, winter storms also have the potential to deposit significant amounts of ice. Ice buildup on tree limbs and power lines can cause them to collapse. This is most likely to occur when rain falls that freezes upon contact, especially in the presence of wind. Freezing rain is the name given to rain that falls when surface temperatures are below freezing. Unlike a mixture of rain and snow, ice pellets or hail, freezing rain is made entirely of liquid droplets. Freezing rain can also lead to many problems on the roads, as it makes them slick, causing automobile accidents, and making vehicle travel difficult.

## Blizzards

Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions, which greatly inhibits vehicular traffic. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction for several days by hindering transportation, knocking down tree limbs and utility lines, structurally damaging buildings, and injuring or killing crops and livestock.

## Location

The entire planning area is at risk of severe winter storms.

## Extent

The Sperry-Piltz Ice Accumulation Index (SPIA) was developed by the NWS to predict the accumulation of ice and resulting damages. The SPIA assesses total precipitation, wind, and temperatures to predict the intensity of ice storms. Figure 56 shows the SPIA index.

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<sup>115</sup> High Plains Regional Climate Center. 2021. "Monthly Climate Normals 1981-2010." <http://climod.unl.edu/>.



Figure 56: SPIA Index

ICE DAMAGE INDEX	*AVERAGE ICE AMOUNT (in inches) <i>Revised: Oct. 2011</i>	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
<b>0</b>	<0.25	<15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	0.10 – 0.25	15 – 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	>15	
<b>2</b>	0.10 – 0.25	25 – 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 – 25	
	0.50 – 0.75	>15	
<b>3</b>	0.10 – 0.25	> – 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 – 35	
	0.50 – 0.75	15 – 25	
	0.75 – 1.00	>15	
<b>4</b>	0.25 – 0.50	> – 35	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 – 35	
	0.75 – 1.00	15 – 25	
	1.00 – 1.50	>15	
<b>5</b>	0.50 – 0.75	> – 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> – 25	
	1.00 – 1.50	> – 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

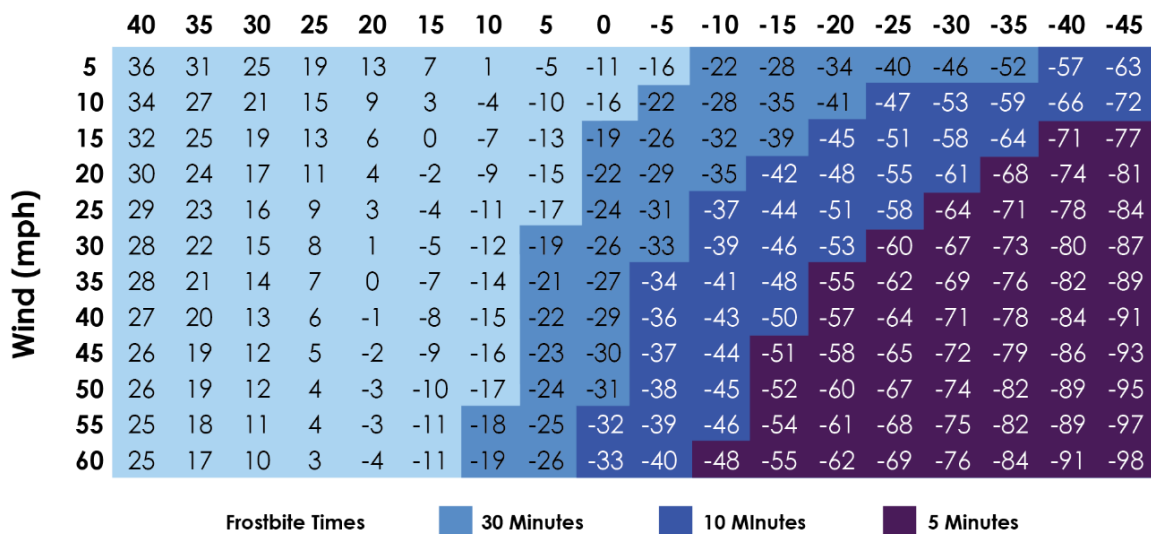
Source: SPIA-Index, 2017<sup>116</sup>

The Wind Chill Index was developed by the NWS to determine the decrease in air temperature felt by the body on exposed skin due to wind. The wind chill is always lower than the air temperature and can quicken the effects of hypothermia or frost bite as it gets lower. Figure 57 shows the Wind Chill Index used by the NWS.

Average monthly snowfall for the planning area is shown in Figure 59, which shows the snowiest months are between December and February. A common snow event (likely to occur annually) will result in accumulation totals between one and five inches. Often these snow events are accompanied by high winds. It is reasonable to expect wind speeds of 25 to 35 mph with gusts reaching 50 mph or higher. Strong winds and low temperatures can combine to produce extreme wind chills of 20°F to 40°F below zero.

116 SPIA-Index. 2009. "Sperry-Piltz Ice Accumulation Index." Accessed June 2017. <http://www.spia-index.com/index.php>

**Figure 57: Wind Chill Index Chart**  
Temperature (°F)



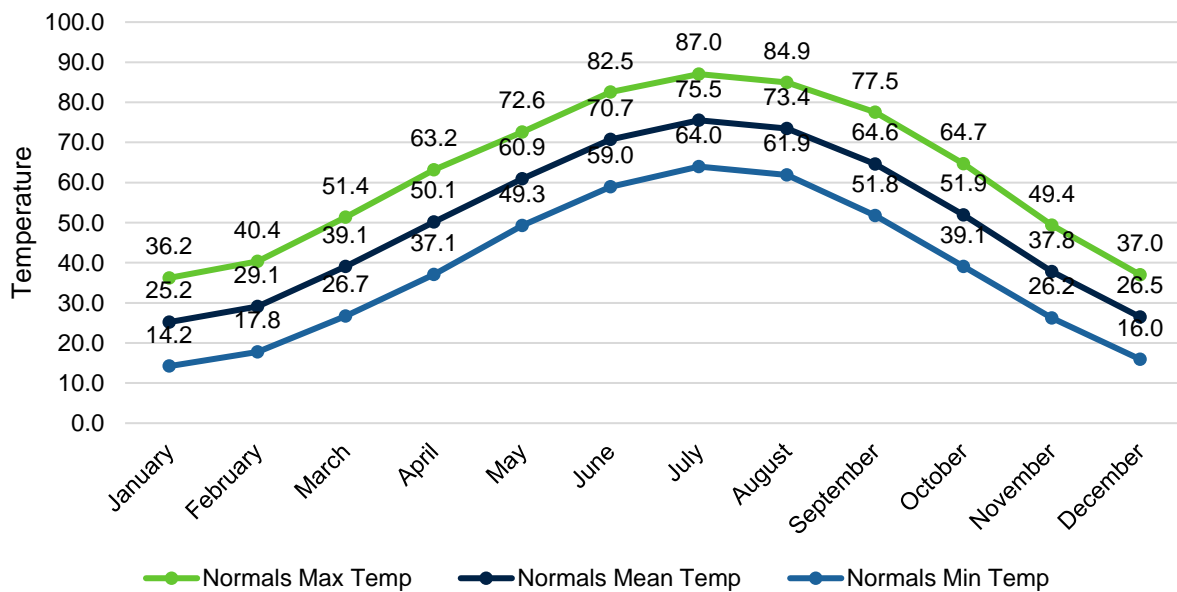
$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

T = Air Temperature (°F) V = Wind Speed (mph)

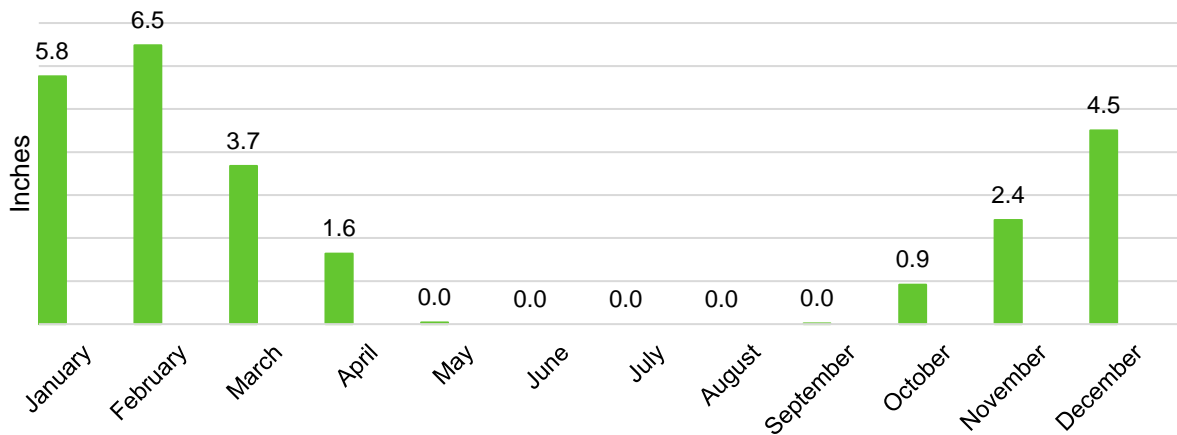


Source: NWS, 2017<sup>117</sup>

**Figure 58: Monthly Climate Normals Temperature (1981-2010)**



117 National Weather Service. 2001. "Wind Chill Chart." [http://www.nws.noaa.gov/om/cold/wind\\_chill.shtml](http://www.nws.noaa.gov/om/cold/wind_chill.shtml).

**Figure 59: Monthly Normal (1981-2010) Snowfall in Inches**

Source: High Plains Regional Climate Center, 2021

### Historical Occurrences

Due to the regional scale of severe winter storms, the NCEI reports events as they occur in each county. According to the NCEI, there were a combined 513 severe winter storm events for the planning area from January 1996 to June 2021. February had the most recorded events for the planning area. These recorded events caused a total of \$25,655,000 in reported property damages and \$3,613,366 in crop damages.

According to the NCEI, there were 12 injuries and four deaths associated with winter storms in the planning area. Additional information from these events from NCEI and reported by each community are listed in *Section Seven: Community Profiles*.

### Average Annual Damages

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and includes aggregated calculations for each of the six types of winter weather as provided in the database. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Severe winter storms have caused an average of \$986,731 per year in property damage and \$138,976 per year in crop damages for the planning area.

**Table 91: Severe Winter Storm Loss Estimate**

Hazard Type	Number of Events <sup>1</sup>	Average Events Per Year <sup>1</sup>	Total Property Loss <sup>1</sup>	Average Annual Property Loss <sup>1</sup>	Total Crop Loss <sup>2</sup>	Average Annual Crop Loss <sup>2</sup>
Blizzard	50	1.9	\$905,000	\$34,808	\$3,613,366	\$138,976
Extreme Cold/Wind Chill	17	0.65	\$0	\$0		
Heavy Snow	16	0.61	\$0	\$0		
Ice Storm	35	1.4	\$23,325,000	\$897,115		
Winter Storm	216	8.3	\$1,265,000	\$48,654		
Winter Weather	179	6.8	\$160,000	\$6,154		
<b>Total</b>	<b>513</b>	<b>19.7</b>	<b>\$25,655,000</b>	<b>\$986,731</b>	<b>\$3,613,366</b>	<b>\$138,976</b>

Source: 1 Indicates data is from NCEI (Jan 1996 to June 2021); 2 Indicates data is from USDA RMA (2000 to 2020)

### Probability

Based on historical records and reported events, severe winter storm events are likely to occur on an annual basis. The NCEI reported a severe winter storm event in every year, resulting in 100 percent chance annually for thunderstorms.

### Community Top Hazard Status

The following table lists jurisdictions which identified severe winter storms as a top hazard of concern.

Jurisdiction	
Alda	Gibbon Public Schools
Amherst	Gothenburg
Buffalo County	Hall County
Cairo	Kearney
Central City Fire District	Lexington Fire District
Central City Public Schools	Lexington Public Schools
Central City	Lexington
Clarks	Osceola
Cozad	Pleasanton Public Schools
Cross Country Community Schools	Pleasanton
Dawson County	Polk County
Dawson County Drainage District No.2	Polk
Dawson County Drainage District No.3	Ravenna Public Schools
Doniphan Fire District	Ravenna
Doniphan	Riverdale
Elm Creek Fire District	Shelby
Elm Creek	Shelton Public Schools
Eustis	Shelton
Eustis-Farnam Public Schools	Stromsburg
Four Corners Health Department	Two Rivers Public Health Department
Gibbon Fire District	Wood River Public Schools

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 92: Regional Severe Winter Storm Vulnerabilities**

Sector	Vulnerability
<b>People</b>	-Elderly citizens are at higher risk to injury or death, especially during extreme cold and heavy snow accumulations -Citizens without adequate heat and shelter at higher risk of injury or death
<b>Economic</b>	-Closed roads and power outages can cripple a region for days, leading to significant revenue loss and loss of income for workers
<b>Built Environment</b>	-Heavy snow loads can cause roofs to collapse -Significant tree damage possible, downing power lines and blocking roads
<b>Infrastructure</b>	-Heavy snow and ice accumulation can lead to downed power lines and prolonged power outages -Transportation may be difficult or impossible during blizzards, heavy snow, and ice events
<b>Critical Facilities</b>	-Emergency response and recovery operations, communications, water treatment plants, and others are at risk to power outages, impassable roads, and other damages
<b>Climate</b>	-Changes in seasonal precipitation and temperature normals can increase frequency and magnitude of severe winter storm events

# Terrorism

According to the Federal Bureau of Investigation (FBI), 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 a political or social objectives” (28 C.F.R. Section 0.85).

The FBI further describes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. For the purpose of this report, the following definitions from the FBI will be used:

- Domestic terrorism is the unlawful use, or threatened use, of force or violence by a group or individual based and operating entirely within the United States or Puerto Rico without foreign direction committed against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof in furtherance of political or social objectives.
- International terrorism involves violent acts or acts dangerous to human life that are a violation of the criminal laws of the United States or any state, or that would be a criminal violation if committed within the jurisdiction of the United States or any state. These acts appear to be intended to intimidate or coerce a civilian population, influence the policy of a government by intimidation or coercion, or affect the conduct of a government by assassination or kidnapping. International terrorist acts occur outside the United States or transcend national boundaries in terms of the means by which they are accomplished, the persons they appear intended to coerce or intimidate, or the locale in which their perpetrators operate or seek asylum.

There are different types of terrorism depending on the target of attack, which are:

- Political Terrorism
- Bio-Terrorism
- Cyber-Terrorism
- Eco-Terrorism
- Nuclear-Terrorism
- Narco-Terrorism
- Agro-Terrorism

Terrorist activities are also classified based on motivation behind the event such as ideology (i.e. religious fundamentalism, national separatist movements, and social revolutionary movements). Terrorism can also be random with no ties to ideological reasoning.



The FBI also provides clear definitions of a terrorist incident and prevention:

- 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.
- 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.

Primarily, threat assessment, mitigation and response to terrorism are federal and state directives and work primarily with local law enforcement. The Office of Infrastructure Protection within the Federal Department of Homeland Security is a component within the National Programs and Protection Directorate.

### Cyber-Terrorism

Cyber-terrorism is an incident involving the theft or modification of information on computer systems that can compromise the system or potentially disrupt essential services. A cyber-terrorism incident can impact city agencies, private utilities, or critical infrastructure/key resources like a power grid, public transportation system, and wireless networks. Cyber infrastructure includes electronic information and communications systems, and the information contained in those systems. Computer systems, control systems such as Supervisory Control and Data Acquisition systems, and networks such as the Internet are all part of cyber infrastructure.

Nation-states, criminal organizations, terrorists, and other malicious actors conduct attacks against critical cyber infrastructure on an ongoing basis. The impact of a serious cyber incident or successful cyber-attack would be devastating to state, local, tribal, and territorial governments' assets, systems, and/or networks; the information contained in those networks; and the confidence of those who trust governments to secure those systems.

A cyber incident can affect a system's:

- Confidentiality: protecting a user's private information
- Integrity: ensuring that data is protected and cannot be altered by unauthorized parties
- Availability: keeping services running and giving administration access to key networks and controls.

"Many of the Nation's essential and emergency services, as well as our critical infrastructure, rely on the uninterrupted use of the Internet and the communications systems, data, monitoring, and control systems that comprise our cyber infrastructure. A cyber-attack could be debilitating to our highly interdependent critical infrastructure and key resources and ultimately to our economy and national security."

- National Strategy for Homeland Security

### Location

Terrorism can occur throughout the entire planning area. Urban areas, schools, and government buildings are more likely to see terroristic activity. However, water systems of any size could be vulnerable as well as computer systems from cyber-terrorism.

### Extent

Terrorist attacks can vary greatly in scale and magnitude, depending on the location, method, and target of the attack. Previous terrorist attacks in the planning area have been limited to primarily individual private property.

### Historical Occurrences

Previous accounts of terrorism in the planning area were gathered from the Global Terrorism Database, maintained by the University of Maryland and the National Consortium for the Study of Terrorism and Responses to Terrorism. This database contains information for over 140,000 terrorist attacks. According to this database, there has been one terrorist incident since 1970 within the planning area. Between May 3-7, 2002, a college student placed eighteen pipe bombs in rural mailboxes throughout five Midwestern states, causing seven injuries and widespread panic in the region. The bombs placed in mailboxes in the planning area did not detonate, and no injuries were suffered. The attacks were meant to bring attention to the perpetrator's antigovernment sentiment.

**Table 93: Terrorist Incidents in the Planning Area**

Date	Location	Perpetrator Group	Fatalities	Injuries	Target	Property Damage
5/4/2002	Cairo	Individual	0	0	US Mailboxes	None

Source: University of Maryland and the National Consortium for the Study of Terrorism and Response to Terrorism<sup>118</sup>

Threat assessment, mitigation, and response to terrorism are federal and state directives that work in conjunction with local law enforcement. Terroristic events are addressed at the federal level by the U.S. Department of Homeland Security and at the state level by the Nebraska Emergency Management Agency.

### Average Annual Damages

The average damage per event estimate was determined based upon the START Global Terrorism Database information since 1970. This does not include losses from displacement, functional downtime, or economic loss. It should also be noted that none of the pipe bombs detonated, therefore there were no reported damages. If a terrorist event were to occur in the planning area, damages can range from minimal (in rural areas, <\$1 million) to significant (in metropolitan areas, >\$10 million).

**Table 94: Terrorism Incidents Loss Estimate**

Hazard Type	Number of Events	Average Number of Events Per Year	Total Property Loss	Annual Property Loss	Total Crop Loss	Annual Crop Loss
Terrorism	1	<0.1	\$0	\$0	\$0	\$0

Source: University of Maryland and the National Consortium for the Study of Terrorism and Response to Terrorism 1970-2017

118 University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism. 2017. "Global Terrorism Database." [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ne/soils/surveys/?cid=nrcs142p2\\_029746](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ne/soils/surveys/?cid=nrcs142p2_029746).

### Probability

Given one year with a reported terrorism incident over the course of 48 years, the annual probability for terrorism in the planning area is reported as less than one percent annually. This does not indicate that a terrorist event will occur with that frequency within the planning area as terrorist events are typically clustered in timeframe due to extenuating circumstances.

### Community Top Hazard Status

The following table lists jurisdictions which identified terrorism as a top hazard of concern.

Jurisdiction	
Central City Stromsburg	Wood River Public Schools

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 95: Regional Terrorism Vulnerabilities**

Sector	Vulnerability
<b>People</b>	-Police officers and first responders at risk of injury or death -Civilians at risk of injury or death -Students and staff at school facilities at risk of injury or death from school shootings
<b>Economic</b>	-Damaged businesses can cause loss of revenue and loss of income for workers -Agricultural attacks could cause significant economic losses for the region -Risk of violence in an area can reduce income flowing into and out of that area
<b>Built Environment</b>	-Targeted buildings may sustain heavy damage
<b>Infrastructure</b>	-Water supply, power plants, utilities may be damaged
<b>Critical Facilities</b>	-Police stations and government offices are at a higher risk
<b>Climate</b>	-None

# Tornadoes and High Winds

High winds typically accompany severe thunderstorms, severe winter storms, tornadoes, and other large low-pressure systems, which can cause significant crop damage, downed power lines, loss of electricity, traffic flow obstructions, and significant property damage including to trees and center-pivot irrigation systems.

The National Weather Service (NWS) defines high winds as sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration.<sup>119</sup> The NWS issues High Wind Advisories when there are sustained winds of 25 to 39 miles per hour and/or gusts to 57 mph. Figure 60 shows the wind zones in the United States. The wind zones are based on the maximum wind speeds that can occur from a tornado or hurricane event. The planning area is located in Zone III which has maximum winds of 200 mph equivalent to an EF4/5 tornado.

A tornado is typically associated with a supercell thunderstorm. In order for a rotation to be classified as a tornado, three characteristics must be met:

- There must be a microscale rotating area of wind, ranging in size from a few feet to a few miles wide;
- The rotating wind, or vortex, must be attached to a convective cloud base and must be in contact with the ground; and,
- The spinning vortex of air must have caused enough damage to be classified by the Fujita Scale as a tornado.

Once tornadoes are formed, they can be extremely violent and destructive. They have been recorded all over the world but are most prevalent in the American Midwest and South, in an area known as “Tornado Alley.” Approximately 1,000 tornadoes are reported annually in the contiguous United States (NOAA 2012). Tornadoes can travel distances over 100 miles and reach over 11 miles above ground. Tornadoes usually stay on the ground no more than 20 minutes. Nationally, the tornado season typically occurs between April and July. On average, 80 percent of tornadoes occur between noon and midnight. In Nebraska, 77 percent of all tornadoes occur in the months of May, June, and July.

Nebraska is ranked fifth in the nation for tornado frequency with an annual average of 57 tornadoes between 1991 and 2020.

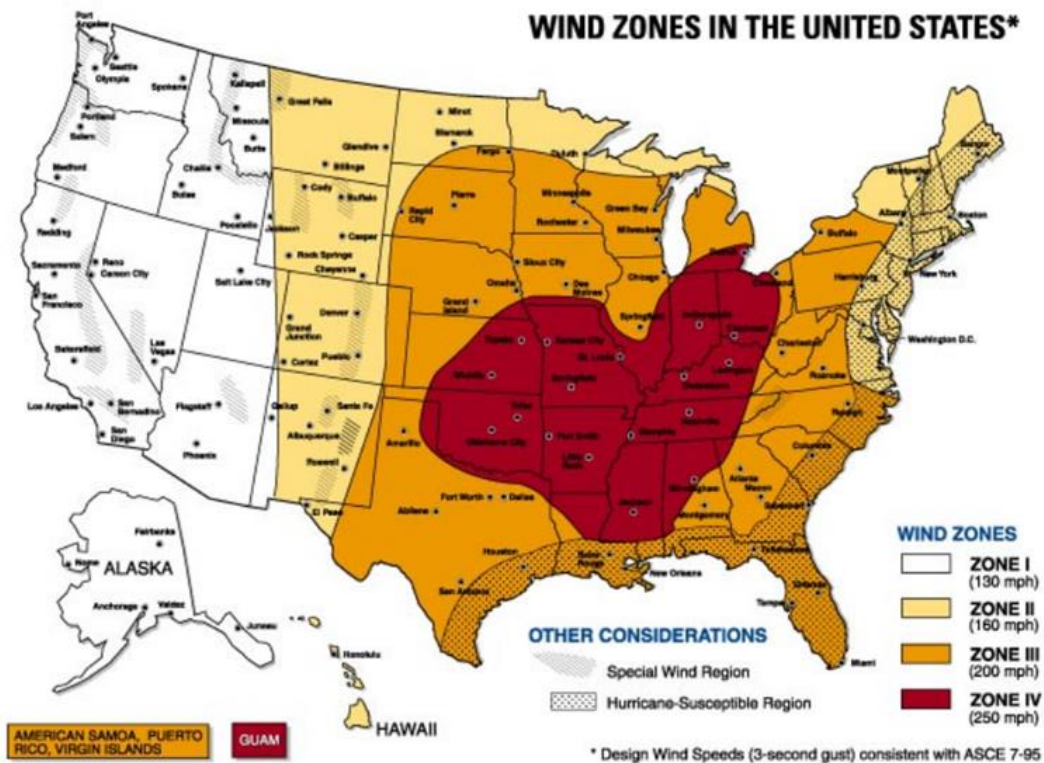
## Location

High winds and tornadoes can occur throughout the planning area. The impacts would be greater in more densely populated areas, such as Grand Island or Kearney. The following map shows the historical track locations across the region according to the Midwestern Regional Climate Center. Touchdowns and tornado events can occur anywhere within the five-county planning area.

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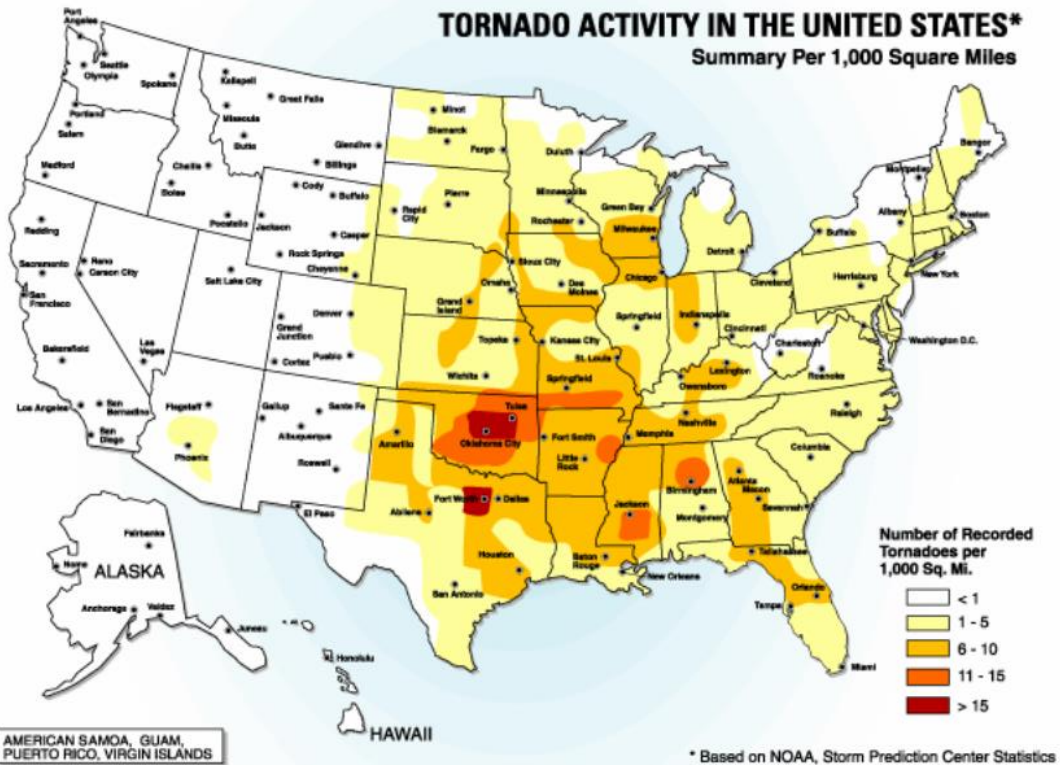
<sup>119</sup> National Weather Service. 2017. “Glossary.” <http://w1.weather.gov/glossary/index.php?letter=h>.

Figure 60: Wind Zones in the U.S.



Source: FEMA

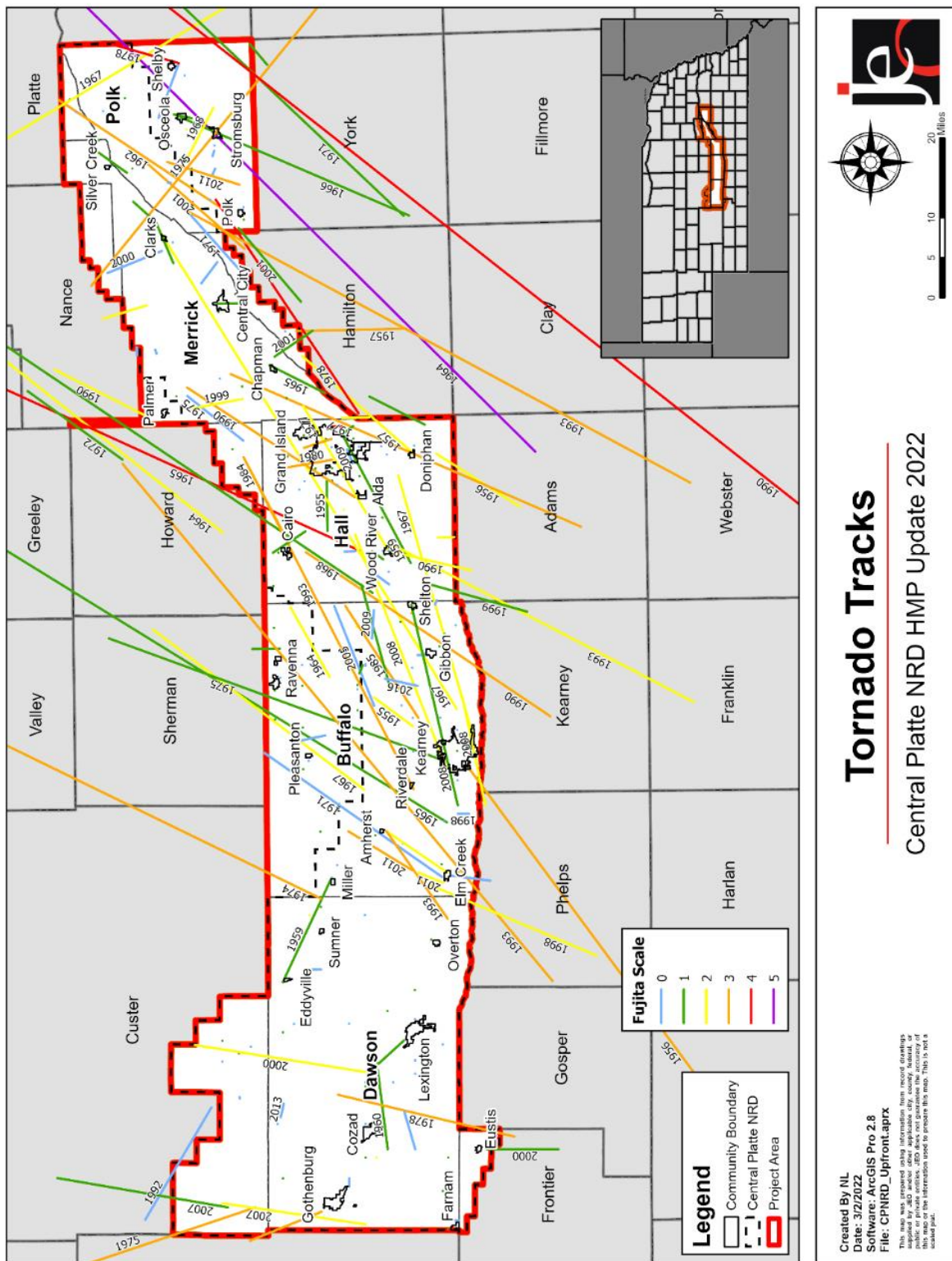
Figure 61: Tornado Activity in the United States



Source: FEMA



Figure 62: Historic Tornado Tracks





## Extent

The Beaufort Wind Scale can be used to classify wind strength while the magnitude of tornadoes is measured by the Enhanced Fujita Scale. The following table outlines the Beaufort scale including wind speed ranking, range of wind speeds per ranking, and a brief description of conditions for each.

**Table 96: Beaufort Wind Ranking**

Beaufort Wind Force Ranking	Range of Wind	Conditions
0	<1 mph	Smoke rises vertically
1	1-3 mph	Direction shown by smoke but not wind vanes
2	4-7 mph	Wind felt on face; leaves rustle; wind vanes move
3	8-12 mph	Leaves and small twigs in constant motion
4	13-18 mph	Raises dust and loose paper; small branches move
5	19-24 mph	Small trees in leaf begin to move
6	25-31 mph	Large branches in motion; umbrellas used with difficulty
7	32-38 mph	Whole trees in motion; inconvenience felt when walking against the wind
8	39-49 mph	Breaks twigs off tree; generally, impedes progress
9	50-54 mph	Slight structural damage; chimneypots and slates removed
10	55-63 mph	Trees uprooted; considerable structural damages; improperly or mobiles homes with no anchors overturned
11	64-72 mph	Widespread damages; very rarely experienced
12 - 17	72 - > 200 mph	Hurricane; devastation

Source: Storm Prediction Center, 2017<sup>120</sup>

After a tornado passes through an area, an official rating category is determined, which provides a common benchmark that allows comparisons to be made between different tornadoes. The Enhanced Fujita Scale replaced the Fujita Scale in 2007. The Enhanced Fujita Scale does not measure tornadoes by their size or width, but rather the amount of damage caused to human-built structures and trees after the event. The official rating category provides a common benchmark that allows comparisons to be made between different tornadoes. The enhanced scale classifies EF0-EF5 damage as determined by engineers and meteorologists across 28 different types of damage indicators, including different types of building and tree damage. To establish a rating, engineers and meteorologists examine the damage, analyze the ground-swirl patterns, review damage imagery, collect media reports, and sometimes utilize photogrammetry and videogrammetry. Based on the most severe damage to any well-built frame house, or any comparable damage as determined by an engineer, an EF-Scale number is assigned to the tornado.

The following tables summarize the Enhanced Fujita Scale and damage indicators. According to the National Institute of Science and Technology on the Joplin Tornado, tornadoes rated EF3 or lower account for around 96 percent of all tornado damages.<sup>121</sup>

120 Storm Prediction Center: National Oceanic and Atmospheric Administration. 1805. "Beaufort Wind Scale." <http://www.spc.noaa.gov/faq/tornado/beaufort.html>.

121 Kuligowski, E.D., Lombardo, F.T., Phan, L.T., Levitan, M.L., & Jorgensen, D.P. March 2014. "Final Report National Institute of Standards and Technology(NIST) Technical Investigation of the May 22, 2011, Tornado in Joplin, Missouri."

**Table 97: Enhanced Fujita Scale**

Storm Category	3 Second Gust (mph)	Damage Level	Damage Description
<b>EF0</b>	65-85 mph	Gale	Some damages to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
<b>EF1</b>	86-110 mph	Weak	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages might be destroyed.
<b>EF2</b>	111-135 mph	Strong	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
<b>EF3</b>	136-165 mph	Severe	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
<b>EF4</b>	166-200 mph	Devastating	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
<b>EF5</b>	200+ mph	Incredible	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
<b>EF No rating</b>	--	Inconceivable	Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Source: NOAA; FEMA

**Table 98: Enhanced Fujita Scale Damage Indicator**

Number	Damage Indicator	Number	Damage Indicator
<b>1</b>	Small barns, farm outbuildings	<b>15</b>	School – 1 story elementary (interior or exterior halls)
<b>2</b>	One- or two-family residences	<b>16</b>	School – Junior or Senior high school
<b>3</b>	Single-wide mobile homes (MHSW)	<b>17</b>	Low-rise (1-4 story) buildings
<b>4</b>	Double-wide mobile homes (MHDW)	<b>18</b>	Mid-rise (5-20 story) buildings
<b>5</b>	Apartment, condo, townhouse (3 stories or less)	<b>19</b>	High-rise (over 20 stories)
<b>6</b>	Motel	<b>20</b>	Institutional buildings (hospital, government, or university)
<b>7</b>	Masonry apartment or motel	<b>21</b>	Metal building systems
<b>8</b>	Small retail buildings (fast food)	<b>22</b>	Service station canopy
<b>9</b>	Small professional (doctor office, branch bank)	<b>23</b>	Warehouse (tilt-up walls or heavy timber)
<b>10</b>	Strip mall	<b>24</b>	Transmission line tower
<b>11</b>	Large shopping mall	<b>25</b>	Free-standing tower
<b>12</b>	Large, isolated ("big box") retail building	<b>26</b>	Free standing pole (light, flag, luminary)
<b>13</b>	Automobile showroom	<b>27</b>	Tree- hardwood
<b>14</b>	Automotive service building	<b>28</b>	Tree -softwood

Source: NOAA; FEMA

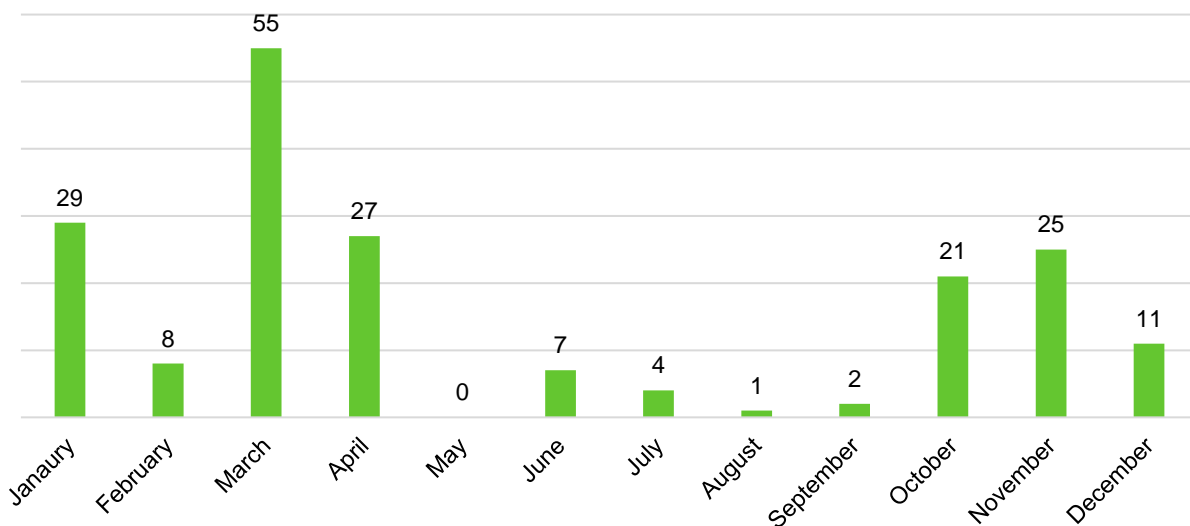
Using the NCEI reported events, the most common high wind event in the planning area is a level 9 on the Beaufort Wind Ranking scale. The reported high wind events ranged from 35 mph to 70 mph, with an average speed of 50 mph. Based on the historical record, it is most likely that tornadoes that occur within the planning area will be of EF0 strength. Of the 68 reported tornado events, 47 were EF/F0, 13 were EF/F1, five were EF/F2, and three were EF/F3.

### Historical Occurrences

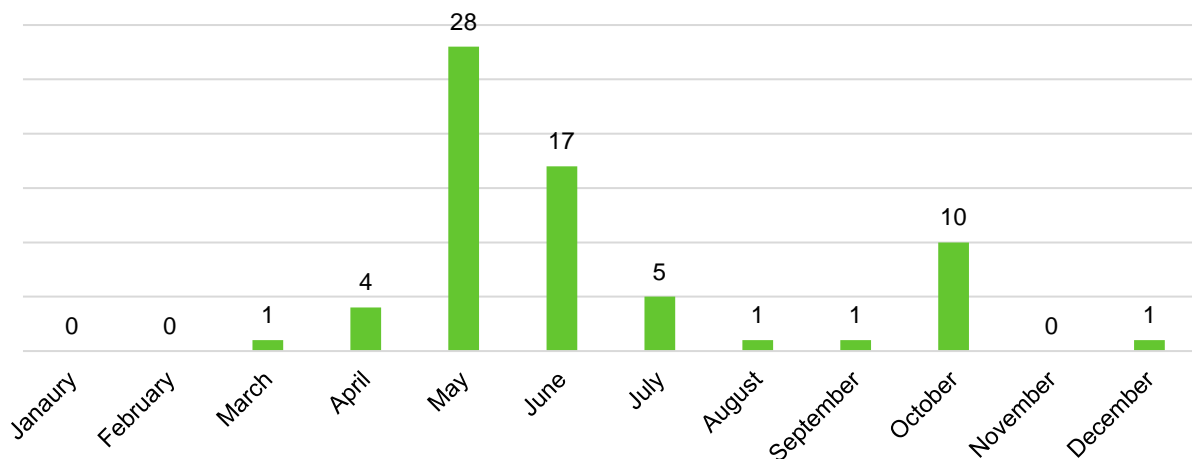
Due to the regional scale of high winds, the NCEI reports events as they occur in each county. While a single event can affect two or more counties at a time, the NCEI reports them as separate events. There were 190 high wind events that occurred between 1996 and June 2021 and 68 tornadic events ranging from a magnitude of EF0 to F3. These events were responsible for \$36,391,400 in property damages and \$30,929,112 in crop damages. No deaths were reported; however, 10 injuries were cited over two events.

The most damaging tornado occurred in Buffalo County in 2008, causing \$11 million in damages. This F2 tornado damaged an apartment complex, destroyed a hangar and cooperative jet at the Kearney Airport, caused a portion of a building to collapse at the Buffalo County fairgrounds, damaged several roofs and cars, destroyed grain bins, and downed multiple power poles and lines. As seen in the following figures, the majority of high wind events occur in the spring and winter months, while most tornado events occur in the summer.

**Figure 63: High Wind Events by Month**



Source: NCEI, 1996-June 2021

**Figure 64: Tornado Events by Month**

Source: NCEI, 1996-June 2021

Event descriptions from NCEI for the most damaging events (those including injuries, fatalities, or greatest property damage estimates) are provided below.

- 6/20/2011 Tornado** - \$6,000,000 in property damages. The tornado knocked down large transmission lines along Highway 40, and overturned irrigation pivots. Four homes destroyed. Significant damage to eight homes. Minor damage to 30 homes. Forty irrigation pivots overturned or damaged. As it continued to the northeast, the tornado destroyed one home directly in its path, and no walls remained standing. Tree trunks were snapped. Maximum wind speed of this tornado was estimated to be 160 miles per hour.
- 5/29/2008 Tornado** – \$11,000,000 in property damages. Damaged one apartment complex. Destroyed a hangar and cooperative jet at the Kearney Airport. Caused a portion of a building to collapse at the Buffalo County fairgrounds. Damaged several roofs and cars. Destroyed grain bins, and downed multiple power poles and lines.
- 4/20/2007 Tornado** - \$2,500,000 in property damages. The tornado started south of Gothenburg and moved north. It crossed Interstate 80 where several vehicles and semis were blown off the road with several injuries reported, although none were serious. At one farmstead, the twister killed nearly a dozen head of cattle. The tornado damaged or destroyed many outbuildings and farmhouses. The storm survey team rated this tornado as an EF2 based on damage to a farmhouse that lost half of its roof and had many windows blown out. This would have had an expected wind speed around 114 mph. Many wood utility poles (ETL) were also broken off at their base or snapped in half (DOD4). This would have an expected wind speed of 120 mph. The tornado had a maximum width around 3/4 mile about 5 miles north of Gothenburg. The storm also produced hail along its path in which the largest was the size of a softball.

### Average Annual Damages

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury or loss of life. It is estimated that high wind events can cause an average of \$229,478 per year in property damages and \$1,221,956

per year in crop damages. Tornadoes have caused an average of over \$1,170,192 per year in property damages and \$324,500 per year in crop damages; however, damages from tornadoes vary greatly depending on the severity or magnitude of each event.

**Table 99: High Winds and Tornado Losses**

Hazard Type	# of Events <sup>1</sup>	Average # events per year	Total Property Loss <sup>1</sup>	Average Annual Property Loss	Total Crop Loss <sup>2</sup>	Average Annual Crop Loss
<b>High Winds</b>	190	7.3	\$5,966,400	\$229,478	\$24,439,112	\$1,221,956
<b>Tornadoes</b>	68	2.6	\$30,425,000	\$1,170,192	\$6,490,000	\$324,500

Source: 1 NCEI (1996-June 2021), 2 USDA RMA (2000-2020)

### Probability

Given the historic record of occurrence for high wind events (23 out of 26 years with reported events), for the purposes of this plan, the annual probability of wind event occurrence is 88 percent. However, high wind events may be more common than presented here but have simply not been reported in past years.

Given the historic record of occurrence for tornado events (24 out of 26 years with reported events), for the purposes of this plan, the annual probability of tornado occurrence is 92 percent. However, it is worth noting that data utilized during this analysis only encompassed through June 2021. Tornado events in 2022 were likely experienced in the planning area but were not reflected here.

### Community Top Hazard Status

The following table lists jurisdictions which identified tornadoes and high winds as a top hazard of concern.

Jurisdiction	
Alda	Hall County
Amherst	Kearney
Buffalo County	Lexington Fire District
Cairo	Lexington Public Schools
Central City Public Schools	Lexington
Central City	Osceola
Central Platte NRD	Pleasanton Fire District
Centura Public Schools	Pleasanton Public Schools
Clarks	Pleasanton
Cozad	Polk County
Cross Country Community Schools	Polk
Dawson County	Ravenna Public Schools
Doniphan Fire District	Ravenna
Doniphan	Riverdale
Elm Creek Fire District	Shelby
Elm Creek	Shelton Public Schools
Eustis	Shelton
Eustis-Farnam Public Schools	Silver Creek
Four Corners Health Department	Stromsburg
Gibbon Public Schools	Two Rivers Public Health Department
Gibbon	University of Nebraska - Kearney
Gothenburg	Wood River Public Schools

Jurisdiction	
Grand Island	Wood River

### Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdictional specific vulnerabilities, refer to *Section Seven: Community Profiles*.

**Table 100: Regional Tornado and High Wind Vulnerabilities**

Sector	Vulnerability
People	<ul style="list-style-type: none"> <li>-Vulnerable populations include those living in mobile homes (especially if improperly anchored), nursing homes, schools, or in substandard housing</li> <li>-People outside during events</li> <li>-Citizens without access to shelter below ground or in reinforced rooms</li> <li>-Elderly with decreased mobility or poor hearing may be at higher risk</li> <li>-Lack of multiple ways to receive weather warnings, especially at night</li> </ul>
Economic	<ul style="list-style-type: none"> <li>-Agricultural losses to both crops and livestock</li> <li>-Damages to businesses and prolonged power outages can cause significant impacts to the local economy, especially with EF3 tornadoes or greater</li> </ul>
Built Environment	<ul style="list-style-type: none"> <li>-All building stock is at risk of significant damages</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>-Downed power lines and power outages</li> <li>-All above ground infrastructure at risk to damages</li> <li>-Impassable roads due to debris blocking roadways</li> </ul>
Critical Facilities	<ul style="list-style-type: none"> <li>-All critical facilities are at risk to damages and power outages</li> </ul>
Climate	<ul style="list-style-type: none"> <li>-Changes in seasonal precipitation and temperature normals can increase frequency and magnitude of events</li> </ul>



# Section Five:

## Mitigation Strategy

### Introduction

The primary focus of the mitigation strategy is to identify action items to reduce the effects of hazards on existing infrastructure and property based on the established goals and objectives. These actions should consider the most cost effective and technically feasible manner to address risk.

The establishment of goals and objectives took place during the kick-off meeting with the Regional Planning Team. Meeting participants reviewed the goals from the 2017 HMP and discussed recommended additions and modifications. The intent of each goal and set of objectives is to develop strategies to account for risks associated with hazards and identify ways to reduce or eliminate those risks.

The Regional Planning Team made some revisions to the 2017 HMP goals and objectives. These updated goals and objectives were then shared with all planning team members at the Round 1 public meetings.

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

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

**Requirement: §201.6(c)(3)(ii):** [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with NFIP requirements, as appropriate.

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

**Requirement §201.6(c)(3)(iv):** For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

### Summary of Changes

The development of the mitigation strategy for this plan update includes the addition of new mitigation actions, updated status or removal of past mitigation actions, and revisions to the mitigation action selection process or descriptions of mitigation actions for consistency across the planning area.

## Goals

Below is the final list of goals as determined for this plan update. These goals provide direction to guide participants in reducing future hazard related losses.

**Goal 1: Protect the Health and Safety of Residents from All Hazard Events**

**Goal 2: Protect Existing and New Properties from All Hazard Events**

**Goal 3: Increase Public Awareness and Educate About All Hazard Events**

**Goal 4: Enhance Overall Resilience and Promote Sustainability**

## Selected Mitigation Actions

After establishing the goals, local planning teams evaluated and prioritized mitigation actions. These actions included: the mitigation actions identified per jurisdiction in the previous plan and additional mitigation actions discussed during the planning process. The Regional Planning Team provided each participant a link to the FEMA Handbook as a list of mitigation actions to be used as a starting point. Participants were also encouraged to think of actions that may need FEMA grant assistance and to review their hazard prioritization for potential mitigation actions. These suggestions helped participants determine which actions would best assist their respective jurisdiction in alleviating damages in the event of a disaster. The listed priority rating does not indicate which actions will be implemented first but serves as a guide in determining the order in which each action should be implemented. Participants were informed of the STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, Environmental) feasibility review process and were encouraged to use it when determining priorities.

These projects are the core of a hazard mitigation plan. The local planning teams were instructed that each action must directly relate to the goals of the plan and the hazards of top concern for their jurisdiction. Actions must be specific activities that are concise and can be implemented individually. Mitigation actions were evaluated based on referencing the community's risk assessment and capability assessment. Jurisdictions were encouraged to choose mitigation actions that were realistic and relevant to the concerns identified.

A final list of alternatives was established including the following information: description of action; which hazard(s) the action mitigates; responsible party; priority; cost estimate; potential local funding sources; and estimated timeline. This information was established through input from participants and determination by the Regional Planning Team.

It is important to note that not all the mitigation actions identified by a jurisdiction may ultimately be implemented due to limited capabilities, prohibitive costs, low benefit-cost ratio, or other concerns. These factors may not be identified during this planning process. The cost estimates, priority rating, potential funding, and identified agencies are used to give communities an idea of what actions may be most feasible over the next five years. This information will serve as a guide for the participants to assist in hazard mitigation for the future. Additionally, some jurisdictions may identify and pursue additional mitigation actions not identified in this HMP.

## Participant Mitigation Actions

Mitigation actions identified by participants of the CPNRD HMP are found in the Mitigation Actions Project Matrix below. Additional information about selected actions can be found in respective *Section Seven: Community Profiles*. Each action includes the following information in the respective community profile.

- Mitigation Action: General title of the action item.
- Description: Brief summary of what the action item(s) will accomplish.
- Hazard(s) Addressed: Which hazard the mitigation action aims to address.
- Estimated Cost: General cost estimate for implementing the mitigation action for the appropriate jurisdiction.
- Funding: A list of any potential local funding mechanisms to fund the action.
- Timeline: General timeline as established by planning participants.
- Priority: General description of the importance and workability in which an action may be implemented (high/medium/low); priority may vary between each community, mostly dependent on funding capabilities and the size of the local tax base.
- Lead agency: Listing of agencies or departments which may lead or oversee the implementation of the action item.
- Status: A description of what has been done, if anything, to implement the action item.

Implementation of the actions will vary between individual plan participants based upon the availability of existing information; funding opportunities and limitations; and administrative capabilities of communities. Establishing a cost-benefit analysis is beyond the scope of this plan and could potentially be completed prior to submittal of a project grant application or as part of a five-year update. Completed, removed, and ongoing or new mitigation actions for each participating jurisdiction can be found in *Section Seven: Community Profiles*.

## Mitigation Actions Project Matrix

During public meetings, each participant was asked to review mitigation projects listed in the 2017 HMP and identify new potential mitigation actions, if needed, to reduce the effects of hazards. Selected projects varied per jurisdiction depending upon the significance of each hazard present. The information listed in the following tables is a compilation of new and ongoing mitigation actions identified by jurisdiction. Completed and removed mitigation actions can be found in respective community profiles.

**Mitigation Actions Project Matrix will be added after public review.**

# Section Six:

## Plan Implementation and Maintenance

### Monitoring, Evaluating, and Updating the Plan

Each participating jurisdiction in the CPNRD HMP will be responsible for monitoring, evaluating, and updating the plan during its five-year lifespan. Hazard mitigation projects will be prioritized by each participant's governing body with support and suggestions from the public and business owners. Each participant identified the positions that will be responsible for plan maintenance, the frequency of review, and how the public will be involved. The information can be found in each community profile under the Plan Maintenance section. During the review, the lead agency (or appropriate department/staff) identified on each mitigation action, will report on the status of projects and include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies could be revised.

To assist with monitoring the plan, as each mitigation action is completed, a detailed timeline of how that project was completed will be written and attached to the plan in a format selected by the governing body. Information that will be included will address project timeline, agencies involved, area(s) benefited, total funding, etc.

In addition, each local review team will be responsible for ensuring that the HMP's goals are incorporated into applicable revisions of each participant's comprehensive plan and any new planning projects undertaken by the participant. The HMP will also consider any changes in comprehensive plans and incorporate the information accordingly in its next update.

The FEMA required update of this plan will occur at least every five years, to reduce the risk of the HMP expiring. Updates may be incorporated more frequently, especially in the event of a major hazard. Las Animas County will start meeting to discuss mitigation updates at least nine months prior to the deadline for completing the plan review. The persons overseeing the evaluation process will review the goals and objectives of the previous plan and evaluate them to determine whether they are still pertinent and current. Among other questions, they may want to consider the following. Worksheets in *Appendix C* may also be used to assist with plan updates.

- Do the goals and objectives address current and expected conditions?
- If any of the recommended projects have been completed, did they have the desired impact on the goal for which they were identified? If not, what was the reason it was not

**Requirement §201.6(c)(4)(i):**  
[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

**Requirement §201.6(c)(4)(ii):**  
[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

**Requirement §201.6(c)(4)(iii):**  
[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

successful (lack of funds/resources, lack of political/popular support, underestimation of the amount of time needed, etc.)?

- Have either the nature, magnitude, and/or type of risks changed?
- Are there implementation problems?
- Are current resources appropriate to implement the plan?
- Were the outcomes as expected?
- Did the plan partners participate as originally planned?
- Are there other agencies which should be included in the revision process?

## Continued Public Involvement

To ensure continued plan support and input from the public and business owners, public involvement should remain a top priority for each participating jurisdiction. Every participant identified ways the public will be involved in the update process. Various identified ways include:

- Social Media,
- Websites,
- Board/City Council Meetings,
- Newsletters,
- Letters.

## Integrating Other Capabilities

There are a number of state and federal agencies with capabilities that can be leveraged during HMP updates or mitigation action implementation. A description of some regional resources is provided below.

### Nebraska Emergency Management Agency

NEMA is an agency that is a part of the Military Department in the State of Nebraska. NEMA is responsible for emergency management, which is usually divided into four phases: preparedness, response, recovery, and mitigation.

NEMA is responsible for developing the state hazard mitigation plan, which serves as a comprehensive set of guidelines for hazard mitigation across the state. The state hazard mitigation officer and other mitigation staff members play an active role in assisting in the development local hazard mitigation plans. Representatives from the state hazard mitigation program serve as technical guides to local planning teams and regularly participate in local mitigation planning meetings. The state hazard mitigation staff also oversees the hazard mitigation assistance programs: HMGP and BRIC; and works with the Governor's taskforce to prioritize projects requesting funding assistance through the HMGP and BRIC.

The main objective in NEMA's preparedness process is to develop plans and procedures to help facilitate any response that may need to occur during a hazard event. NEMA assists communities in the development of county or city/village planning documents; assists with the development of exercises for existing plans and procedures; conducts trainings for community officials, assist emergency management related groups (Citizen Emergency Response Teams, Citizen Corps, Medical Reserve Corps, Fire Corps, and other interest groups); and provide technical resources and expertise throughout the state.

NEMA's role during a response is to assist communities in responding to hazard events *when the need for assistance exceeds the local capabilities and resources*. This includes facilitating and tracking grants, coordinating local needs, providing state and federal level assistance through activation of Emergency Operation Centers, Mass Critical Shelters, Emergency Alert Systems and providing technical, logistical, and administrative resources and expertise before, during, and after incidents. The main purpose of the recovery phase is to perform actions that allow the return of normal living, or better conditions. The secondary role of the recovery phase is grant administration and tracking, project monitoring, damage assessment, collaborating with communities on effective recovery options and opportunities, serving as liaison between federal level entities and local representatives, and serving as a technical resource throughout the recovery process. For more information regarding the plans and NEMA's responsibilities as well as their ongoing projects, please go to <http://www.nema.nebraska.gov/>.

### **Nebraska Department of Natural Resources**

The NeDNR is committed to providing Nebraska's citizens and leaders with the data and analyses they need to make appropriate natural resource decisions for the benefit of all Nebraskans both now and in the future. This state agency is responsible in the area of surface water, groundwater, floodplain management, dam safety, natural resource planning, integrated water management, storage of natural resources and related data, and administration of state funds.

NeDNR plays a significant role in protecting and conserving water resources through the oversight of surface and groundwater status and integrated water management. The NeDNR is also responsible for a non-structural program of floodplain management, coordination and assistance with the National Flood Insurance Program as well as the FMA grant program, reviewing and approving engineering plans for new dams, rehabilitating old dams, and high hazard dam emergency preparedness plans. NeDNR was active throughout the hazard planning process and provided extensive resources and technical support for hazard risk and vulnerability analysis such as flood and dam failure. NeDNR also works with communities in many capacities including assisting in flood mapping needs and the completion of Benefit Cost Analysis. For more information regarding NeDNR's responsibilities as well as their ongoing projects, please go to <http://dnr.nebraska.gov/>.

### **Silver Jackets Program**

The Silver Jackets program is also worth mentioning for their extensive role in providing a formal and consistent strategy for an interagency approach to planning and implementing measures to reduce the risks associated with flooding and other natural hazards. It brings together multiple state, federal, and sometimes tribal and local agencies to learn from one another and apply their knowledge to reduce risk. Both NEMA and NeDNR play an active role on the Nebraska Silver Jackets team. The Silver Jackets completed the Wood River Watershed Study in 2020. The purpose of the study was to develop a 1% Annual Exceedance Probability frequency flow data for the communities of Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island.

### **Nebraska Forest Service**

The agency's mission statement is "To enrich the lives of all Nebraskans by protecting, restoring, and utilizing Nebraska's tree and forest resources. The state agency provides resources, information, and facilitates research to promote healthy forests.

The NFS achieves these goals through a variety of programs. The Rural Forestry Assistance program aids landowners in need of forest management help. Some of these services include assistance and advice on forest and woodlot management, windbreak establishment and



management, reforestation, and other forestry related issues. The forest health program is responsible for maintaining a list of the most prominent pest problems in Nebraska along with the trees affected, control recommendations, and timing. The wildland fire protection program is responsible for protecting wildlands from fire. The state does not have a fire suppression force within the forest service like other states. They rely on local firefighters to handle the suppression of these fires. The agency does provide air support and equipment to the local firefighters if the assistance is needed. The agency also assists Nebraska's communities to be ready for wildfire by helping them prepare Community Wildfire Protection Plans. CWPPs gather local resources to enhance wildfire mitigation and preparedness. The plans identify steps for communities to take to help reduce the risk of damage from wildfires. In the planning area, the Central Platte Community Wildfire Protection Plan encompasses Buffalo, Dawson, Hall, Merrick, and Polk Counties. For more information regarding the NFS's responsibilities as well as their ongoing projects, please go to <http://nfs.unl.edu/>.

### Unforeseen Opportunities

If new, innovative mitigation strategies arise that could impact the planning area or elements of this plan, which are determined to be of importance, a plan amendment may be proposed and considered separate from the annual review and other proposed plan amendments. Central Platte NRD, as the plan sponsor, provides an opportunity for jurisdictions to compile proposed amendments annually and send them to NEMA, and subsequently to FEMA, for a plan amendment. Such amendments should include all applicable information for each proposal including description of changes, identified funding, responsible agencies, etc.

### Incorporation into Existing Planning Mechanisms

The Regional Planning Team utilized a variety of plan integration tools to help communities determine how their existing planning mechanisms were related to the Hazard Mitigation Plan. Utilizing FEMA's *Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan*<sup>122</sup> guidance, as well as FEMA's *2015 Plan Integration*<sup>123</sup> guide, each jurisdiction engaged in a plan integration discussion. This discussion was facilitated by a Plan Integration Worksheet, created by the Regional Planning Team. This document offered an easy way for participants to notify the Regional Planning Team of existing planning mechanisms, and if they interface with the HMP.

Each jurisdiction referenced all relevant existing planning mechanisms and provided information on how these did or did not address hazards and vulnerability. Summaries of plan integration are found in each participant's *Community Profile*. For jurisdictions that lack existing planning mechanisms, especially smaller villages, the HMP may be used as a guide for future activity and development in the jurisdiction.

122 Federal Emergency Management Agency. November 2013. "FEMA Region X Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan." <https://www.fema.gov/media-library-data/1388432170894-6f744a8afa8929171dc62d96da067b9a/FEMA-X-IntegratingLocalMitigation.pdf>.

123 Federal Emergency Management Agency. July 2015. "Plan Integration: Linking Local Planning Efforts." [https://www.fema.gov/media-library-data/1440522008134-ddb097cc285bf741986b48fdcef31c6e/R3\\_Plan\\_Integration\\_0812\\_508.pdf](https://www.fema.gov/media-library-data/1440522008134-ddb097cc285bf741986b48fdcef31c6e/R3_Plan_Integration_0812_508.pdf).

# Section Seven: Community Profiles

## Purpose of Community Profiles

Community Profiles contain information specific to jurisdictions participating in the Central Platte NRD planning effort. Community Profiles were developed with the intention of highlighting each jurisdiction's unique characteristics that affect its risk to hazards. Community Profiles may serve as a short reference of identified vulnerabilities and mitigation actions for a jurisdiction as they implement the mitigation plan. Information from individual jurisdictions was collected at public and one-on-one meetings and used to establish the plan. Community Profiles may include the following elements:

- Local Planning Team
- Location and Geography
- Demographics
- Employment and Economics
- Housing
- Governance
- Capability Assessment
- Plan Integration
- Future Development Trends
- Community Lifelines
- Parcel Improvements and Valuation
- Historical Occurrences
- Hazard Prioritization
- Mitigation Strategy
- Plan Maintenance

In addition, maps specific to each jurisdiction are included, such as jurisdiction identified critical facilities, flood-prone areas, and a future land use map (when available). The hazard prioritization information, as provided by individual participants, varies due in large part to the extent of the geographical area, the jurisdiction's designated representatives (who were responsible for completing meeting worksheets), identification of hazards, and occurrence and risk of each hazard type.

The overall risk assessment for the identified hazard types represents the presence and vulnerability to each hazard type throughout the entire planning area. A discussion of certain hazards selected for each Community Profile was prioritized by the local planning team based on the identification of hazards of greatest concern, hazard history, and the jurisdiction's capabilities. The hazards not examined in depth can be found in *Section Four: Risk Assessment*.

## County Profile

# Hall County

## Central Platte NRD Hazard Mitigation Plan Update

2022

## Local Planning Team

Hall County's local planning team for the hazard mitigation plan are listed in the table below along with the meetings attended. All participant worksheets were filled out and returned by the county.

**Table HAL.1: Hall County Local Planning Team**

Name	Title	Jurisdiction	R1 Meeting	R2 Meeting
<b>Jon Rosenlund</b>	Emergency Manager	Hall County	Grand Island	Grand Island
<b>Pamela Lancaster</b>	Board Supervisor	Hall County	Central City – Virtually	-
<b>Bryan Simonson</b>	Deputy Sheriff	Hall County	Grand Island	Grand Island
<b>Steven Riehle</b>	County Engineer	Hall County	Grand Island	-
<b>Chad Nabity</b>	Floodplain Administrator / Planning / Zoning	Hall County	Lexington – Virtually	Grand Island
<b>Rashad Moxey</b>	Commission Member	Hall County Regional Planning Commission	Grand Island	-
<b>Tyler Doane</b>	Commission Member	Hall County Regional Planning Commission	Grand Island	-

## Location and Climate

Hall County is located in south-central Nebraska and is bordered by Buffalo, Howard, Merrick, Hamilton, and Adams Counties. The total area of Hall County is 552 square miles. The major waterways within the county are the Platte River, Wood River, Prairie Creek, Silver Creek, Moores Creek, and Beaver Creek. Most of Hall County lies in the valleys and plains topographic region, with the vast majority of the county's land characterized by agricultural fields.

### Climate

The average high temperature in Hall County for the month of July is 87.7 degrees and the average low temperature for the month of January is 14.4 degrees. On average, Hall County receives over 26.7 inches of rain and 27.7 inches of snowfall per year. The table below compares climate indicators with those of the entire state. Climate data is helpful in determining if certain events are higher or lower than normal. For example, if the high temperatures in the month of July are running well into the 90s, high heat events may be more likely which could impact vulnerable populations.

**Table HAL.2: Hall County Climate**

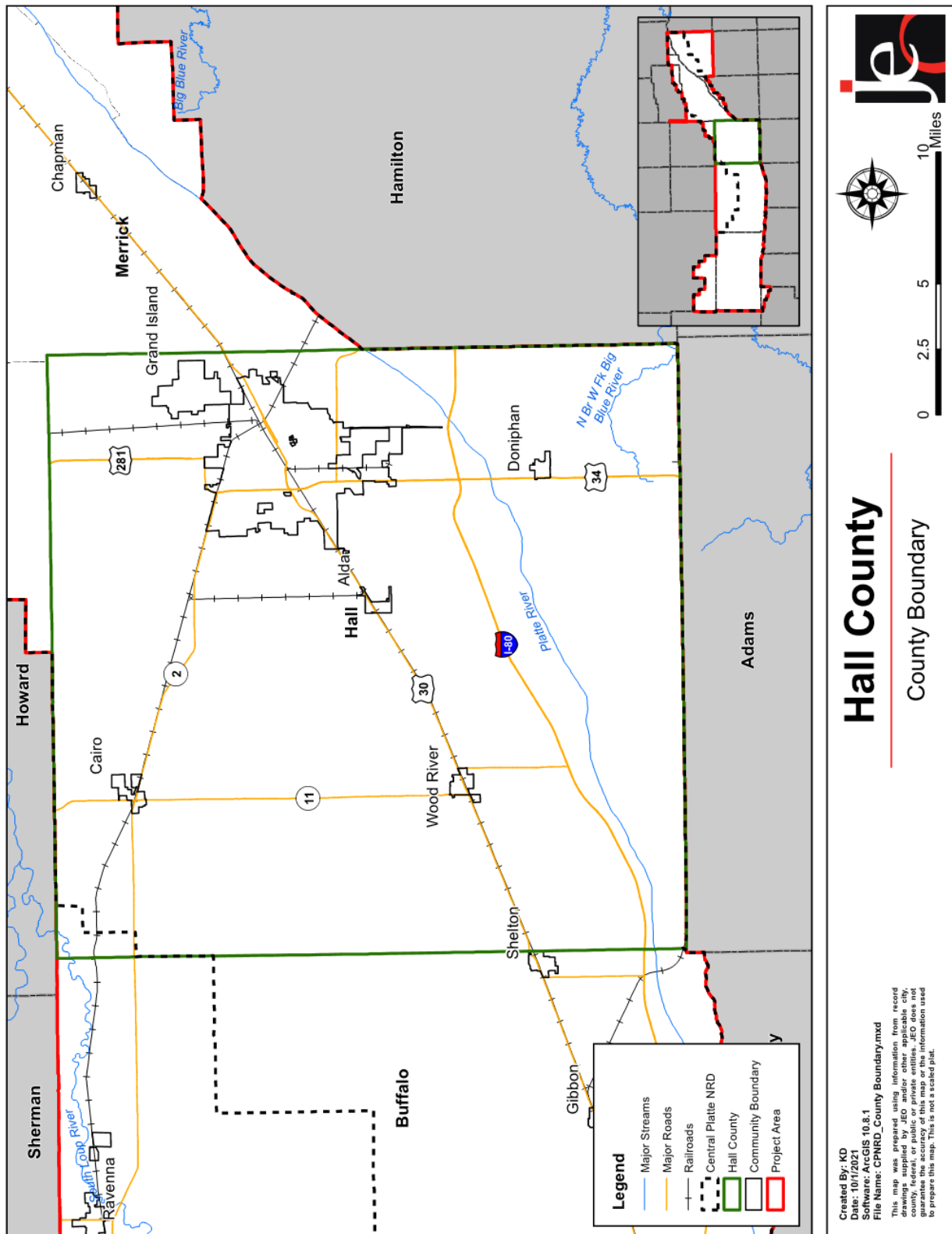
	Hall County	State of Nebraska
<b>July Normal High Temp<sup>1</sup></b>	87.7°F	87.4°F
<b>January Normal Low Temp<sup>1</sup></b>	14.4°F	13.8°F
<b>Annual Normal Precipitation<sup>2</sup></b>	26.7"	23.8"
<b>Annual Normal Snowfall<sup>2</sup></b>	27.7"	25.9"

Source: NCEI 1981-2010 Climate Normals<sup>1</sup>, High Plains Regional Climate Center, 1981-2010<sup>2</sup>  
Precipitation includes all rain and melted snow and ice.

<sup>1</sup> National Centers for Environmental Information. "1981-2010 U.S. Climate Normals." Accessed June 2021.  
<https://www.ncdc.noaa.gov/cdo-web/datatools>.

<sup>2</sup> High Plains Regional Climate Center. "Monthly Climate Normals 1981-2010 – Grand Island Central NE Regional AP, NE." Accessed June 2021. <http://climod.unl.edu/>.

Figure HAL.1: Hall County

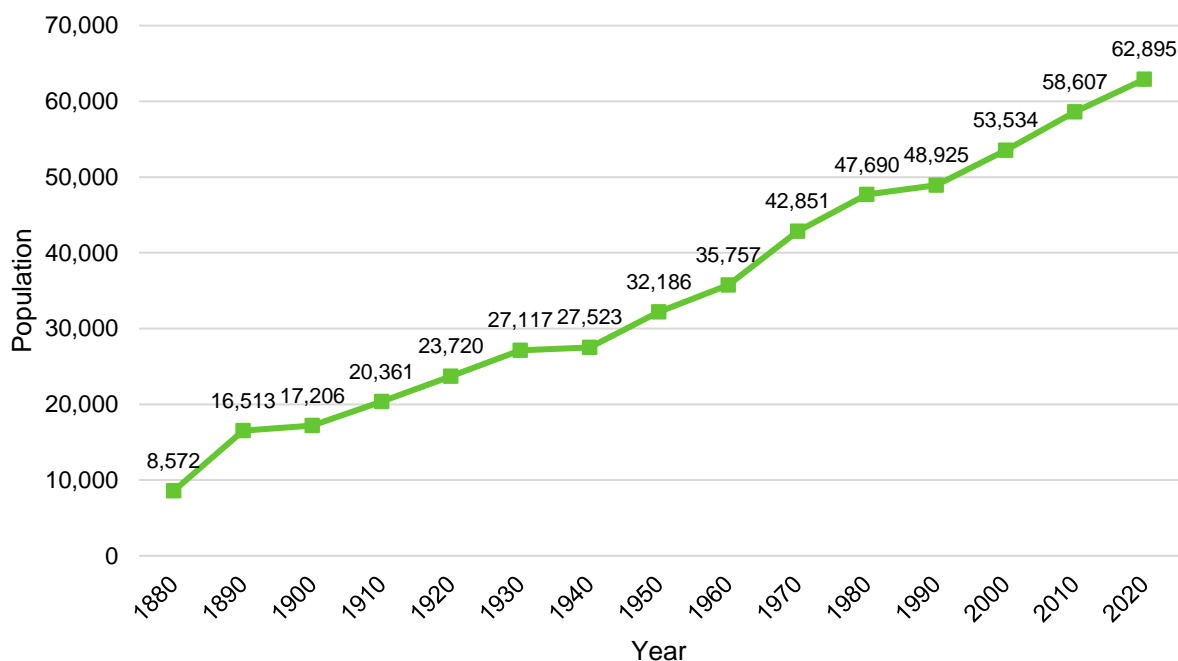


## Demographics, Economics, Housing, and Employment

### Demographics

The following figure displays the historical population trend from 1860 to 2020. This figure indicates that the population of Hall County has been increasing since 1880 to 62,895 people in 2020.<sup>3</sup> Increasing populations are associated with increased hazard mitigation and emergency planning requirements for development. Increasing populations can also contribute to increasing tax revenues, allowing communities to pursue additional mitigation projects. Hall County's population accounted for 3.2% of Nebraska's population in 2020.

**Figure HAL.2: Population 1880 – 2020**



Source: U.S. Census Bureau

The following table indicates Hall County has a higher percentage of people between the ages of five and 64. This is relevant to hazard mitigation because the very young and elderly populations may be at greater risk from certain hazards than others. For a more elaborate discussion of this vulnerability, please see *Section Four | Risk Assessment*.

**Table HAL.3: Population by Age**

Age	Hall County	State of Nebraska
<5	7.7%	6.9%
5-64	77.6%	77.7%
>64	14.6%	15.4%
Median	35.9	36.5

Source: U.S. Census Bureau<sup>4</sup>

<sup>3</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.

<sup>4</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: S0101: Age and Sex." <https://data.census.gov/cedsci/>.



## Economics and Housing

The following table indicates that median household income and per capita income for the county is lower than the State of Nebraska. Median home value and rent are also both lower than the rest of the state. These economic indicators are relevant to hazard mitigation because they indicate the relative economic strength compared to the state as a whole. Areas with economic indicators which are relatively low may influence a county's level of resilience during hazardous events.

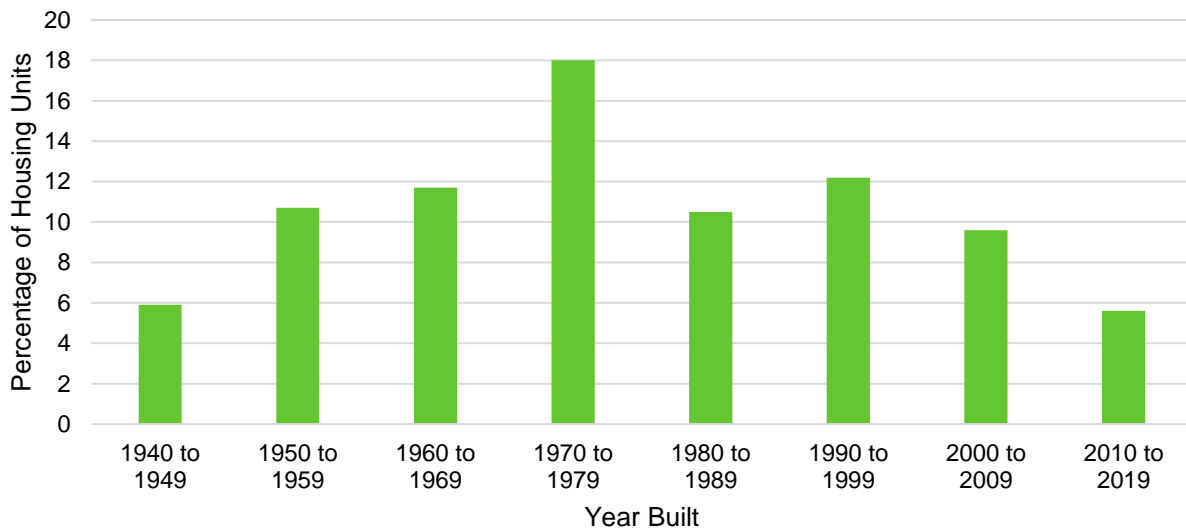
**Table HAL.4: Housing and Income**

	Hall County	State of Nebraska
<b>Median Household Income</b>	\$57,104	\$61,439
<b>Per Capita Income</b>	\$28,359	\$32,302
<b>Median Home Value</b>	\$146,000	\$155,800
<b>Median Rent</b>	\$768	\$833

Source: U.S. Census Bureau<sup>5,6</sup>

The following figure indicates that most of the housing in Hall County was built between 1970 and 1979 (18%). Housing age can serve as an indicator of risk, as structures built prior to the development of state building codes may be at greater risk. The State of Nebraska first adopted building codes in 1987, with the International Building Code adopted in 2010. The current edition of the IBC was updated in 2018. According to the 2019 American Community Survey, the county has 24,832 housing units with 93 percent of those units occupied. There are approximately 1,319 mobile homes in the county. Counties with a substantial number of mobile homes may be more vulnerable to the impacts of high winds, tornadoes, and severe thunderstorms if those homes are not anchored correctly.

**Figure HAL.3: Housing Units by Year Built**



Source: U.S. Census Bureau<sup>5</sup>

5 United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

6 United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." <https://data.census.gov/cedsci/>.

**Table HAL.5: Housing Units**

Jurisdiction	Total Housing Units				Occupied Housing Units			
	Occupied		Vacant		Owner		Renter	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>Hall County</b>	23,096	93%	1,736	7%	14,398	62.3%	8,698	37.7%
<b>Nebraska</b>	759,176	90.7%	78,300	9.3%	501,679	66.1%	257,497	33.9%

Source: U.S. Census Bureau<sup>5</sup>

## Employment

According to 2018 Business Patterns Census Data, Hall County had 1,889 business establishments. The following table presents the number of establishments, number of paid employees, and the annual payroll in thousands of dollars.

**Table HAL.6: Business in Hall County**

	Total Businesses	Number of Paid Employees	Annual Payroll (In Thousands)
<b>Total for All Sectors</b>	1,889	31,273	\$1,241,696

Source: U.S. Census Bureau<sup>7</sup>

Agriculture is important to the economic fabric of the State of Nebraska. Hall County's 582 farms cover 328,229 acres of land, about 93% of the county's total area. Crop and livestock production are the visible parts of the agricultural economy, but many related businesses contribute to agriculture by producing, processing and marketing farm products. These businesses generate income, employment and economic activity throughout the region.

**Table HAL.7: Agricultural Inventory**

Agricultural Inventory	
<b>Number of Farms with Harvested Cropland</b>	582
<b>Acres of Harvested Cropland</b>	328,229

Source: USDA Census of Agriculture, 2017<sup>8</sup>

## Governance

The county's governmental structure impacts its capability to implement mitigation actions. Hall County is governed by a seven-member board of commissioners. The county also has the following offices and departments:

- County Attorney
- County Public Defender
- County Clerk
- County Treasurer
- County Assessor/Register of Deeds
- Building and Grounds Department
- Emergency Management
- Highway Superintendent
- IT Department
- Emergency Management
- Highway Superintendent & County Engineer
- IT Department
- Public Works Department
- Parks and Recreation
- Planning and Zoning
- Hall County Regional Planning Commission
- Floodplain Administrator/Building Inspector
- Sheriff's Department
- Surveyor/GIS Department
- Central District Health Department
- Corrections Department

<sup>7</sup> United States Census Bureau. 2018. "County Business Patterns and 2018 Nonemployer Statistics" [database file]. <https://factfinder.census.gov>.

<sup>8</sup> U.S. Department of Agriculture. "2017 Census of Agriculture." <https://www.nass.usda.gov/Publications/AgCensus/2017/>.

- Veterans Services

- Weed Control

## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the county's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects.

County funds are limited to maintaining current facilities and systems with a large portion of funds already dedicated to a Prairie Silver Moore's Project. The county struggles to keep up with maintaining existing infrastructure. Funds have stayed the same over recent years.

**Table HAL.8: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning &amp; Regulatory Capability</b>	Comprehensive Plan	Yes
	Capital Improvements Plan	Yes (For Roads Only)
	Economic Development Plan	No
	Local Emergency Operations Plan	Yes
	Floodplain Management Plan	No
	Storm Water Management Plan	No
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	No
	Other (if any)	Central Platte Community Wildfire Protection Plan, Wood River Watershed Flood Risk Reduction Plan, Wood River Watershed Study
<b>Administrative &amp; Technical Capability</b>	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	Yes
	Chief Building Official	Yes
	Civil Engineering	Yes
	Local Staff Who Can Assess County's Vulnerability to Hazards	Yes
	Grant Manager	No
	Mutual Aid Agreement	Yes
	Other (if any)	-
<b>Fiscal Capability</b>	Capital Improvement Plan/ 1- & 6-Year plan	Yes (For Roads Only)
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to levy taxes for specific purposes such as mitigation projects	Yes

Survey Components/Subcomponents		Yes/No
	Gas/Electric Service Fees	No
	Storm Water Service Fees	No
	Water/Sewer Service Fees	No
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	No
	Other (if any)	-
<b>Education &amp; Outreach Capability</b>	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes
	Natural Disaster or Safety related school programs	Yes
	StormReady Certification	Yes
	Other (if any)	-

Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Limited
Staff/expertise to implement projects	Moderate
Public support to implement projects	Moderate
Time to devote to hazard mitigation	Moderate

## Plan Integration

Hall County has several planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The county will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

### 1-&6-Year Roads Plan

The county also has a 1 & 6-Year Road Plan that is updated annually. The plan includes many hazard mitigation projects such as stormwater projects, upsizing culverts and drainage structures, bridge improvements, and regular maintenance of drainage structures.

### Building Codes (2021)

The building code sets standards for constructed buildings and structures. The county has adopted the 2018 International Building Codes with no amendments made.

### **Central Platte Community Wildfire Protection Plan (2019)**

The purpose of the Central Platte Community Wildfire Protection Plan (CWPP) is to help effectively manage wildfires and increase collaboration and communication among organizations who manage fire. The CWPP discusses county-specific historical wildfire occurrences and impacts, identifies areas most at risk from wildfires, discusses protection capabilities, and identifies wildfire mitigation strategies. This document is updated every five years.

### **Comprehensive Plan (2004)**

The comprehensive plan is designed to guide the future actions and growth of the county. It directs development away from the flood and chemical storage facilities. It also limits density in areas adjacent to known hazardous areas, encourages infill development, encourages clustering of development in sensitive areas, and encourages elevation of structures located in the floodplain. Furthermore, it encourages the preservation of open space in hazard-prone areas and allows for emergency access to all areas of the county. An update of the comprehensive plan is scheduled to start in 2022.

### **Hall County Local Emergency Operations Plan (2020)**

The Hall County Local Emergency Operations Plan establishes standardized policies, plans, guidelines, and procedures for emergency resources and governmental entities to respond and recover when a disaster event occurs. It contains information regarding direction and control, communications and warning, damage assessment, emergency public information, evacuation, fire services, health and human services, law enforcement, mass care, protective shelters, and resource management. This plan is updated every five years.

### **Wood River Watershed Flood Risk Reduction Plan (Under Development)**

The primary purpose of the Wood River Watershed Flood Risk Reduction Plan is flood risk reduction within and near the communities of Riverdale, Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. It will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. This plan is being funded by the Central Platte NRD and NRCS through the Watershed and Flood Prevention Operations (WFPO) Program. Projects identified in the plan with a positive benefit-cost ratio will be reviewed for inclusion in the HMP.

### **Wood River Watershed Study (2020)**

This study was conducted by the Nebraska Silver Jackets to develop the 1% Annual Exceedance Probability (AEP) frequency flow data for the communities of Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. Results reflect that the flow frequency is larger than the effective Flood Insurance Study for the Kearney to Alda reach of the Wood River. The results also estimate an 1% AEP peak discharge that is 15% less than the current design for the Grand Island diversion channel. This study will help support ongoing Watershed Flood Protection Operations studies and future NFIP mapping efforts in the region.

### **Zoning Ordinance, Floodplain Ordinance, and Subdivision Regulations (2004)**

The county's floodplain ordinance, zoning ordinance, and subdivision regulations outline where and how development should occur in the future. These documents reference floodplain maps, discourage development in the floodplain, include well setback requirements, discourages housing and vulnerable population along major transportation routes and near chemical sites, and encourages maintaining open space within the floodplain. The update of the comprehensive plan in 2022 will include a review of and possible updates to these ordinances and regulations.

## Future Development Trends

Over the past five years, there has been very little development in the unincorporated areas of Hall County. Any new structures were built outside the floodplain or other known hazardous areas. In the next five years, new housing is planned in western Grand Island and businesses are planned in the Grand Island Industrial Park. Most anticipated growth will occur within municipalities or their extraterritorial jurisdictions.

## Community Lifelines

### Transportation

Hall County's major transportation corridors include Interstate 80, US Highways 30, 34, 281 and Nebraska State Highways 2 and 11. The most traveled route is Interstate 80 with an average of 24,080 vehicles daily, 8,210 of which are trucks.<sup>9</sup> Chlorine, ethanol, petroleum, and anhydrous ammonia are regularly transported along all of those routes. Chemical spills have rarely occurred, and most have been small. A Burlington Northern Santa Fe Railway rail line runs east to west through the county and a Union Pacific rail line runs northeast to southwest. The county also has the Central Nebraska Regional Airport. The local planning team identified Locust Streets as a concern due to flooding. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors, as well as areas more at risk of transportation incidents.

### Hazardous Materials

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are a total of 82 chemical storage sites throughout Hall County which house hazardous materials. Additionally, the local planning team identified the Hall County Public Works Building (2900 W 2<sup>nd</sup> St, Grand Island, NE) as a site that houses hazardous materials. In the event of a chemical spill, the local fire departments and emergency response may be the first to respond to the incident.

**Table HAL.9: Chemical Storage Sites**

Name	Address	Located in Floodplain?
Agricultural Services Inc	2777 N Broadwell Ave, Grand Island, NE	N
Agricultural Services Inc	101 E Pine St, Doniphan, NE	N
Agricultural Services Inc	150 Railroad St, Alda, NE	N
Agricultural Services Inc	6068 N Highway 11, Cairo, NE	Y (1%)
Agricultural Services Inc	106 W Railroad St, Wood River, NE	N
Alter Nebraska Corporation	1119 E 4th St, Grand Island, NE	N
American Eagle Airlines	3743 Sky Park Rd, Grand Island, NE	N
AmeriCold Logistics LLC	204 E Roberts St, Grand Island, NE	N
Army Aviation Support Facility	3010 E Airport Rd, Grand Island, NE	N
ARS Nebraska LLC	1209 S Alda Rd, Grand Island, NE	N
AT&T NE0900	144 W Roberts St, Grand Island, NE	N
Aurora Co-op Elevator Company	10501 W One-R Rd, Cairo, NE	Y (1%)
Aurora Co-op Elevator Company	2062 W Binfield Rd, Doniphan, NE	N
Aurora Co-op Elevator Company	6236 S Schauppsville Rd, Grand Island, NE	Y (0.2%)
Aurora Co-op Elevator Company	4155 E US Highway 30, Grand Island, NE	Y (1%)
BKEP Materials LLC	4112 N Academy Rd, Grand Island, NE	N

<sup>9</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map." [map].  
<https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.



Name	Address	Located in Floodplain?
Bosselman Energy Inc	W Nebraska Highway 2, Cairo, NE	N
Bosselman Energy Inc	4705 Juergen Rd, Grand Island, NE	N
Bosselman Oil Inc	4380 S Nebraska Hwy 11, Wood River, NE	N
Bosselman Truck Plaza	3431 W Wood River Rd, Grand Island, NE	Y (1%)
Bullet Weights Inc	122 S Apollo St, Alda, NE	N
C W Burdick Generating Station	800 Bischeld St, Grand Island, NE	N
Central Sand & Gravel Co 97	1672 S Shady Bend Rd, Grand Island, NE	N
CenturyLink	103 E Nile St, Cairo, NE	N
CenturyLink Central Office	105 N Wheeler Ave, Grand Island, NE	N
CenturyLink Central Office	1005 Main St, Wood River, NE	Y (0.2%)
Charter Communications NE23129	2533 W Old Lincoln Hwy, Grand Island, NE	N
Chesterman Coca-Cola	1617 Holland Dr, Grand Island, NE	N
Chief Industries Buildings Div	2391 S North Rd, Grand Island, NE	N
Chief Industries Inc	1119 S Adams St, Grand Island, NE	N
Christensen Concrete Products	3990 W US Highway 30, Grand Island, NE	N
CNH America LLC - Miller Bldg	1011 Claude Rd, Grand Island, NE	N
CNH Industrial America LLC	3445 W Stolley Park Rd, Grand Island, NE	N
Consolidated Concrete Co	3440 W Old Highway 30, Grand Island, NE	N
Cooperative Producers Inc	15123 W Wood River Rd, Wood River, NE	N
Darling Ingredients Inc	5251 W Guenther Rd, Grand Island, Ne	Y (1%)
Gerhold Concrete Co	1431 S Webb Rd, Grand Island, NE	N
GI Truck Service	432 S Stuhr Rd, Grand Island, NE	N
GIUD Rogers Reservoir	3990 W Old Potash Hwy, Grand Island, NE	N
Grand Island Olsen Water Tower	997 S Engleman Rd, Grand Island, NE	N
Grand Island Potable Water	2700 Wellfield Rd, Grand Island, NE	N
Grand Island Water Department	364 N Pine St, Grand Island, NE	N
Green Plains Wood River LLC	7874 S 140th Rd, Wood River, NE	N
Hefty Seed	8099 S 150th Rd, Wood River, NE	N
Hornady Manufacturing Company	3625 W Old Potash Hwy, Grand Island, NE	N
Hornady Manufacturing Company	8350 W Old Potash Hwy, Alda, NE	N
Hornady/Alda LLC	108 S Apollo St, Alda, NE	N
Island Supply Welding Co	4920 W US Highway 30, Alda	N
Jiffy Lube 0029	3423 W State St, Grand Island, NE	N
Lineage Logistics LLC	205 E Roberts St, Grand Island, NE	N
Magellan Pipeline Company LP	12275 S US Highway 281, Doniphan, NE	N
Matheson Tri-Gas Inc	2320 S Webb Rd, Grand Island, NE	N
McCain Foods USA Inc	2629 N Broadwell Ave, Grand Island, NE	N
NDOT Grand Island Yard	3305 W Old Potash Hwy, Grand Island, NE	N
Nebraska Machinery Co	10501 S US Highway 281, Doniphan, NE	N
NPPD Doniphan Sys Control Ctr	2060 W Platte River Dr, Doniphan, NE	Y (1%)
Oil Dealers Association	4032 W Old Highway 30, Grand Island, NE	N
Overhead Door Co	2514 E US Highway 30, Grand Island, NE	N
Pepsi Bottling Group LLC	2422 E US Highway 30, Grand Island, NE	N
Pilot Flying J 912	11775 S Nebraska Hwy 11, Wood River, NE	Y (1%)
Pioneer Hi-Bred Intl Inc	12937 S US Highway 281, Doniphan, NE	N
Platte Generating Station	1035 W Wildwood Dr, Grand Island, NE	N
Platte Valley Energetics LLC	8318 W Old Potash Hwy, Alda, NE	N
RoadBuilders Machinery & Sup	4949 Juergen Rd, Grand Island, NE	N

Name	Address	Located in Floodplain?
<b>Ryder Truck Rental Inc 0987</b>	4039 Stauss Rd, Grand Island, NE	N
<b>Safety-Kleen Systems Inc</b>	2700 W 2nd St, Grand Island, NE	N
<b>Sam's Club 6461</b>	1510 N Diers Ave, Grand Island, NE	N
<b>Sapp Bros Petroleum Inc</b>	1013 S Adams St, Grand Island, NE	N
<b>Sprint Grand Island POP</b>	333 N Pine St, Grand Island, NE	N
<b>Standard Iron Inc</b>	4160 Gold Core Rd, Grand Island, NE	N
<b>Sunbelt Rentals 416</b>	510 Claude Rd, Grand Island, NE	N
<b>Swift Beef Company</b>	555 S Stuhr Rd, Grand Island, NE	N
<b>TA Grand Island West</b>	8033 W Holling Rd, Wood River, NE	N
<b>The Home Depot Store 3208</b>	911 Allen Dr, Grand Island, NE	N
<b>Trego/Dugan Aviation Inc</b>	3661 Sky Park Rd, Grand Island, NE	N
<b>Union Pacific Railroad</b>	601 E South Front St, Grand Island, NE	N
<b>US Foods</b>	3636 W Stolley Park Rd, Grand Island, NE	N
<b>VA Nebraska - Western Iowa HCS</b>	2201 N Broadwell Ave, Grand Island, NE	N
<b>Verizon Wireless MTSO</b>	3650 W 13th St, Grand Island, NE	N
<b>Verizon Wireless Newfair</b>	1203 S Stuhr Rd, Grand Island, NE	Y (1%)
<b>Wilbur-Ellis Company LLC</b>	11544 W Rosedale Rd, Prosser, NE	N
<b>Windstream Communications</b>	3650 W 13th St, Grand Island, NE	N

Source: Nebraska Department of Environment and Energy<sup>10</sup>

## Health and Medical Facilities

The following medical and health facilities are located within the county.

**Table HAL.10: Health and Medical Facilities**

Name	Type of Facility	Address	Number of Beds
<b>Prairie Winds</b>	Assisted Living Facility	603 West 6th St Doniphan, NE 68832	35
<b>Edgewood Grand Island Senior Living</b>	Assisted Living Facility	214 North Piper Grand Island, NE 68803	14
<b>Crane Meadows Assisted Living</b>	Assisted Living Facility	4071 Timberline St Grand Island, NE 68803	44
<b>Grand Island Bickford Cottage LLC</b>	Assisted Living Facility	3285 Woodridge Blvd Grand Island, NE 68803	44
<b>Grand Island Country House</b>	Assisted Living Facility	833 Alpha St Grand Island, NE 68803	29
<b>Lebensraum Assisted Living</b>	Assisted Living Facility	118 South Ingalls St Grand Island, NE 68803	33
<b>Primrose Retirement Community of Grand Island</b>	Assisted Living Facility	3990 W Capital Ave Grand Island, NE 68803	42
<b>Riverside Lodge</b>	Assisted Living Facility	404 Woodland Dr Grand Island, NE 68801	75
<b>The Heritage at Sagewood</b>	Assisted Living Facility	1920 Sagewood Ave Grand Island, NE 68803	136
<b>Emerald Nursing and Rehab Lakeview</b>	Assisted Living Facility/Long Term Care Facility	1405 West HWY 34 Grand Island, NE 68801	113

<sup>10</sup> Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.  
<https://deq-iis.ne.gov/tier2/tier2Download.html>.

Name	Type of Facility	Address	Number of Beds
CHI Health St. Francis	Hospital	2620 West Faidley Ave Grand Island, NE 68803	155
Grand Island Regional Medical Center	Hospital	3533 Prairieview Street Grand Island, NE 68803	67
Azria Health Broadwell	Long Term Care Facility	800 Stoeger Drive Grand Island, NE 68803	76
CHI Health St. Francis	Long Term Care Facility	2116 West Faidley Ave Grand Island, NE 68803	36
Good Samaritan Society - Grand Island Village	Long Term Care Facility	4061 Timberline St Grand Island, NE 68803	67
Tiffany Square	Long Term Care Facility	3119 West Faidley Ave Grand Island, NE 68803	103

Source: Nebraska Department of Health and Human Services<sup>11,12,13,14</sup>

### Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the jurisdiction.

Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table HAL.11: Critical Facilities**

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	Central District Health Dept.	N	Y	N
2	CHI Health St. Francis	N	Y	N
3	FBI Office	N	N	N
4	Grand Island Regional Medical Center	N	Y	N
5	Hall County Admin	N	N	N
6	Hall County Courthouse	N	Y	N
7	Hall County Jail	N	Y	N
8	Hall County PW	N	Y	N
9	KRGI Station	N	Y	N
10	KRGI Transmitter	N	Y	Y (1%)
11	KRGI Transmitter	N	Y	Y (1%)
12	Law Enforcement Center	N	N	N
13	NDOR District Office	N	Y	N
14	NDOR Maintenance Yard	N	Y	N
15	Nebraska Health & Human Services	N	N	N
16	Nebraska State Patrol	N	Y	N

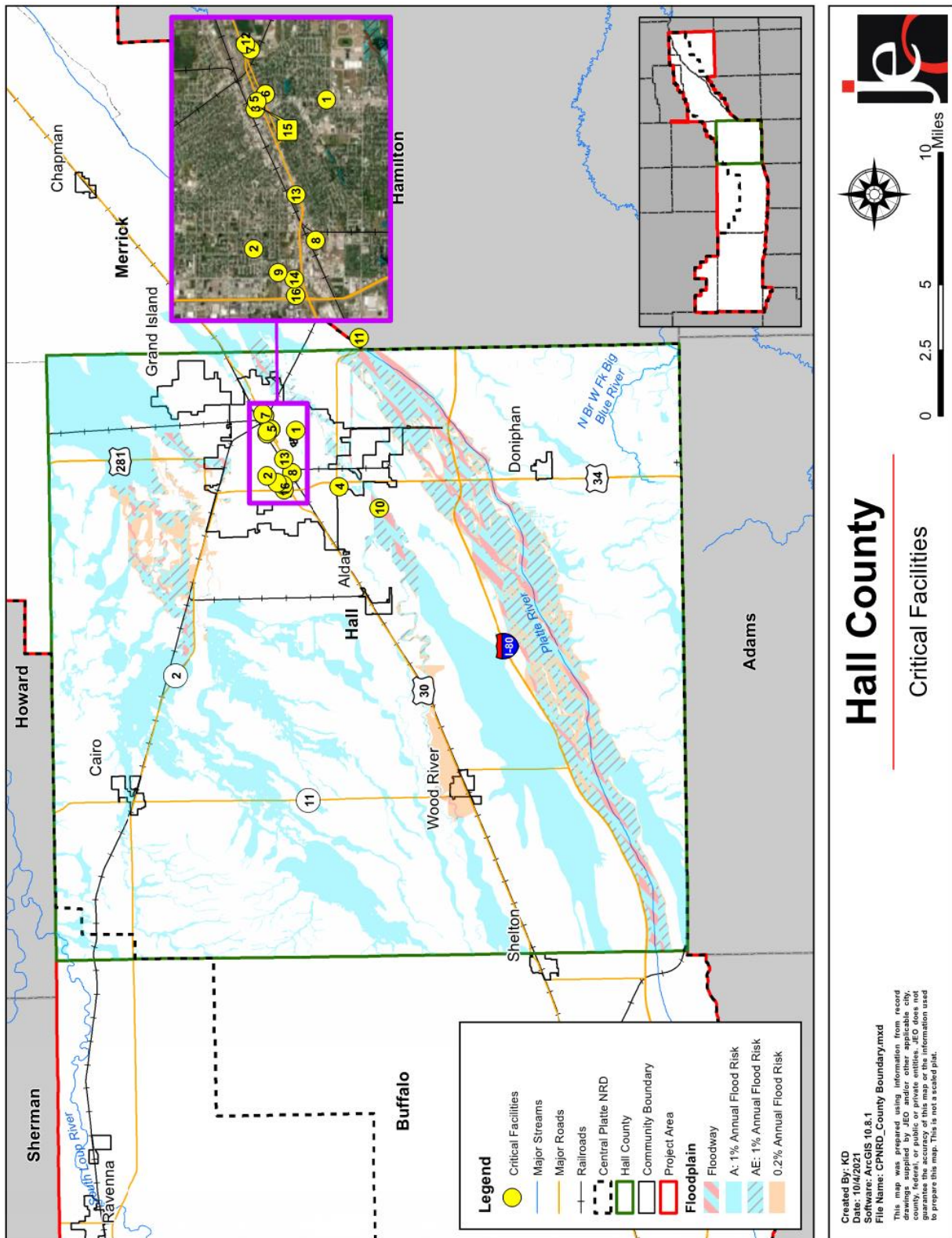
11 Department of Health and Human Services. 2021. "State of Nebraska: Assisted Living Facilities."  
<https://dhhs.ne.gov/licensure/Documents/ALF%20Roster.pdf>.

12 Department of Health and Human Services. 2021. "State of Nebraska Roster: Hospitals."  
<https://dhhs.ne.gov/licensure/Documents/Hospital%20Roster.pdf>.

13 Department of Health and Human Services. 2021. "State of Nebraska Roster: Long Term Care Facilities."  
<https://dhhs.ne.gov/licensure/Documents/LTCRoster.pdf>.

14 Department of Health and Human Services. 2021. "State of Nebraska Roster: Rural Health Clinic."  
[https://dhhs.ne.gov/licensure/Documents/RHC\\_Roster.pdf](https://dhhs.ne.gov/licensure/Documents/RHC_Roster.pdf).

Figure HAL.4: Critical Facilities





## Parcel Improvements and Valuation

The planning team acquired GIS parcel data from the County Assessor to analyze the location, number, and value of property improvements (e.g. buildings, garages, sheds etc.) at the parcel level. The data did not contain the number of structures on each parcel. A summary of the results of this analysis is provided in the following tables.

**Table HAL.12: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
22,119	\$3,796,958,806	1,765	\$423,220,613	8.0%

Source: County Assessor, 2021

**Table HAL.13: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
22,119	\$3,796,958,806	822	\$126,768,583	3.7%

Source: County Assessor, 2021

## Historical Occurrences

The following table provides a statistical summary for hazards that have occurred in the county. The property damages from the NCEI Storm Events Database (January 1996 – June 2021) should be considered only as broad estimates. Crop damages reports come from the USDA Risk Management Agency for Hall County between 2000 and 2020.

**Table HAL.14: County Hazard Loss History**

Hazard Type		Count	Property Damage	Crop Damage <sup>2</sup>
<b>Animal &amp; Plant Disease</b>	Animal Disease <sup>1</sup>	11	19 animals	N/A
	Plant Disease <sup>2</sup>	14	N/A	\$391,221
<b>Dam Failure<sup>5</sup></b>		1	N/A	N/A
<b>Drought<sup>6</sup></b>		444 of 1,513 months	\$0	\$10,032,175
<b>Earthquakes<sup>12</sup></b>		0	\$0	N/A
<b>Extreme Heat<sup>7</sup></b>		Avg. 5 Days a Year	N/A	\$4,807,380
<b>Flooding<sup>8</sup></b>	Flash Flood	0	\$0	\$1,587,053
	Flood	1	\$0	
<b>Grass/Wildfires<sup>9</sup></b>		68	5,349 acres	\$2,490
<b>Hazardous Materials Release</b>	Fixed Site <sup>3</sup>	78	\$0	N/A
	Transportation <sup>4</sup>	136	\$339,410	N/A
<b>Levee Failure<sup>11</sup></b>		0	\$0.00	N/A
<b>Public Health Emergency</b>		2	N/A	N/A
<b>Severe Thunderstorms<sup>8</sup></b>	Thunderstorm Wind Range: 50-80 Average: 57	147	\$4,041,000	\$40,590,394
	Hail Range: 0.75-3.0 in. Average: 1.18 in.	201	\$21,137,000	
	Heavy Rain	19	\$0	
	Lightning	1	\$5,000	

Hazard Type		Count	Property Damage	Crop Damage <sup>2</sup>
<b>Severe Winter Storms<sup>8</sup></b> <i>2 Fatalities, 4 Injuries</i>	Blizzard	10	\$105,000	
	Extreme Cold/Wind Chill	3	\$0	
	Heavy Snow	2	\$0	\$543,094
	Ice Storm	8	\$10,245,000	
	Winter Storm	45	\$435,000	
	Winter Weather	37	\$95,000	
<b>Terrorism<sup>10</sup></b>		1	\$0	N/A
<b>Tornadoes and High Winds<sup>8</sup></b>	Tornadoes Range: EF0-EF1 Average: EF0	11	\$1,035,000	\$430,000
	High Winds Range: 35-70 Average: 52	53	\$1,119,080	\$9,086,958
<b>Total</b>		<b>849</b>	<b>\$38,556,490</b>	<b>\$67,470,766</b>

N/A: Data not available

1 - NDA, 2014 – April 2021

2 - USDA RMA, 2000 – 2020

3 - NRC, 1990 – February 2020

4 - PHMSA, 1971 – June 2021

5 - DNR Communication, July 2021

6 - NOAA, 1895 – January 2021

7 - NOAA Regional Climate Center, 1878 – June 2021

8 - NCEI, 1996 – June 2021

9 - NFS, 2000 - 2020

10 - University of Maryland, 1970-2018

11 - USACE NLN, 1900 – June 2021

12 - USGS, 1900 – June 2021

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the county. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the county's capabilities. For more information regarding regional hazards, please see *Section Four | Risk Assessment*.

### Flooding

Waterways in the county include the Platte River, Wood River, Prairie Creek, Moores Creek, Silver Creek, and Dry Creek. The Platte River is the controlling drainage for most of the county, which means that the waterways listed previously either run parallel or drain into the Platte River. Riverine and ice jam flooding are the primary concerns for Hall County. Areas most prone to flooding include Wood River, Prairie Creek and Silver Creek near northwest Grand Island, and the Platte River near Amick Acres and Shoemaker Island.

According to the County Emergency Manager, there have been several floods along the Platte River. The following list provides a brief description of each of these events:

- Platte River Ice Jam, February 2017: Flooding primarily near Interstate-80 and Highway 281 interchange.
- Platte River Ice Jam, January 2015: Minor ice jam flooding in Hall County near Hwy 34 and Platte River.
- Platte River Flood, May-June 2015: Minor flooding near I-80 Exit 312 and surrounding fields. Hotels and restaurant surrounded but not damaged.
- Platte River Ice Jam, January 2015: Ice Jam flooding from Alda to the end of Hall County. Damaged roads leading to Grand Island Utilities water wellfields east of South Locust north of the Interstate near Exit 314. County Road damage to Shoemaker Island Road on



Shoemaker Island between branches of the Platte. Homes along Shoemaker Island Road surrounded but not damaged.

- Platte River Flood, November 2014: Ice Jam flooding near I-80 Exit 312 and surrounding fields. Homes south of Mormon Island impacted. Nine Bridge Road bridge impacted by debris and ice.
- Platte River Ice Jam, Feb – March 2014: Ice Jam flooding near I-80 Exit 312 and surrounding fields. Hotels & restaurant surrounded, but not damaged.
- Platte River Flood, September 2013: Minor flooding near I-80 Exit 312 and surrounding fields.
- Flash Flooding – May 2005: Heavy rain set rainfall records for a single event across the county. In Wood River, 12 people had to be evacuated and every structure in the city sustained damages. Thirty-six homes in Grand Island had to be evacuated and many businesses were damaged. Hall County was declared a Federal Disaster Area and damages were estimated to be around \$5,000,000.

In addition, county wide flooding occurred in March and August of 2019. Flooding in the City of Wood River caused evacuations of houses and the nursing home. Homes along Prairie Creek and Silver Creek were damaged. Along the Platte River flooding occurred in Amick Acres. Approximately 163 gravel roads were damaged across the county. In addition, crop and pastureland near rivers and creeks had several inches of sand and silt. There was an estimated \$1,000,000 in damages from the two events. For additional information about community concerns and damages from these events, see the individual community participant sections. It has been noted that floods following heavy rains appear to be decreasing in occurrence over the past four to five years along the Silver and Prairie Creeks. This is most likely due to the progress made on the detention cells for the Prairie Silver Moore's flood control project near Grand Island. The project took 600 structures out of the floodplain, and it was estimated that Grand Island avoided \$47 million in damages because of the project.

Several other flood risk reduction projects have been completed in the county. A small berm project to plug holes in the south bank of Wood River west of the City of Wood River has been completed. A diversion project in Amick Acres was completed to allow excess rainwater to be diverted around the subdivisions. The county also raised the height of the banks of Silver Creek between the railroad tracks and Airport Road to reduce the risk of flooding.

A portion of the county falls under the Wood River Watershed Flood Risk Reduction Plan, which is currently under development. The plan will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. Projects deemed feasible in the plan will be added to this HMP once the planning process has concluded.

Hall County is a member of the NFIP, and the county's Floodplain Administrator (Chad Nabity) will oversee the commitments and requirements of the NFIP. The initial FIRM for the county was delineated in 08/01/1980 and the current effective map date is 9/26/2008. As of October 31, 2021, there are 32 policies in-force covering \$4,148,900. Hall County has one single family repetitive loss structure. A mitigation action can be found in the county's Mitigation Strategy to address this structure.

The southeastern portion of Hall County has gone through the Risk Mapping, Assessment, and Planning (MAP) process. Risk MAP is a FEMA program that provides communities with flood information and additional flood risk data (e.g., flood depth grids, percent chance grids, areas of mitigation interest, etc.). As part of that process, a HAZUS analysis was performed for the Risk MAP areas. The figure below shows the HAZUS analysis results for Hall County.

**Figure HAL.5: Estimated Potential Losses for Flood Event Scenarios**

Type	Inventory Estimated Value	% of Total	10% (10-yr) Dollar Losses <sup>1</sup>	10% Loss Ratio <sup>2</sup>	2% (50-yr) Dollar Losses <sup>1</sup>	2% Loss Ratio <sup>2</sup>	1% (100-yr) Dollar Losses <sup>1</sup>	1% Loss Ratio <sup>2</sup>	0.2% (500-yr) Dollar Losses <sup>1</sup>	0.2% Loss Ratio <sup>2</sup>	Annualized Losses <sup>1</sup> (\$/yr)	Ann. Loss Ratio <sup>2</sup>
Residential Building & Contents	\$166,200,000	74%	\$20,000	0%	\$50,000	0%	\$60,000	0%	\$100,000	0%	\$0	0%
Commercial Building & Contents	\$33,300,000	15%	\$0	0%	\$0	0%	\$0	0%	\$0	0%	\$0	0%
Other Building & Contents	\$26,500,000	12%	\$0	0%	\$10,000	0%	\$20,000	0%	\$30,000	0%	\$0	0%
Total Building & Contents <sup>3</sup>	\$226,100,000	100%	\$30,000	0%	\$60,000	0%	\$70,000	0%	\$100,000	0%	\$0	0%
Business Disruption <sup>4</sup>	N/A	N/A	\$0	N/A	\$0	N/A	\$0	N/A	\$0	N/A	\$0	N/A
<b>TOTAL<sup>5</sup></b>	<b>\$226,100,000</b>	<b>N/A</b>	<b>\$30,000</b>	<b>0%</b>	<b>\$60,000</b>	<b>0%</b>	<b>\$70,000</b>	<b>0%</b>	<b>\$100,000</b>	<b>0%</b>	<b>\$0</b>	<b>0%</b>

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.

<sup>1</sup>Losses shown are rounded to nearest \$10,000 for values under \$100,000 and to the nearest \$100,000 for values over \$100,000.

<sup>2</sup>Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent.

<sup>3</sup>Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.

<sup>4</sup>Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.

<sup>5</sup>Total = Total Building and Contents + Business Disruption

The figures in this table only represent information within the West Fork Big Blue

Source: FEMA<sup>15</sup>

## Levee Failure

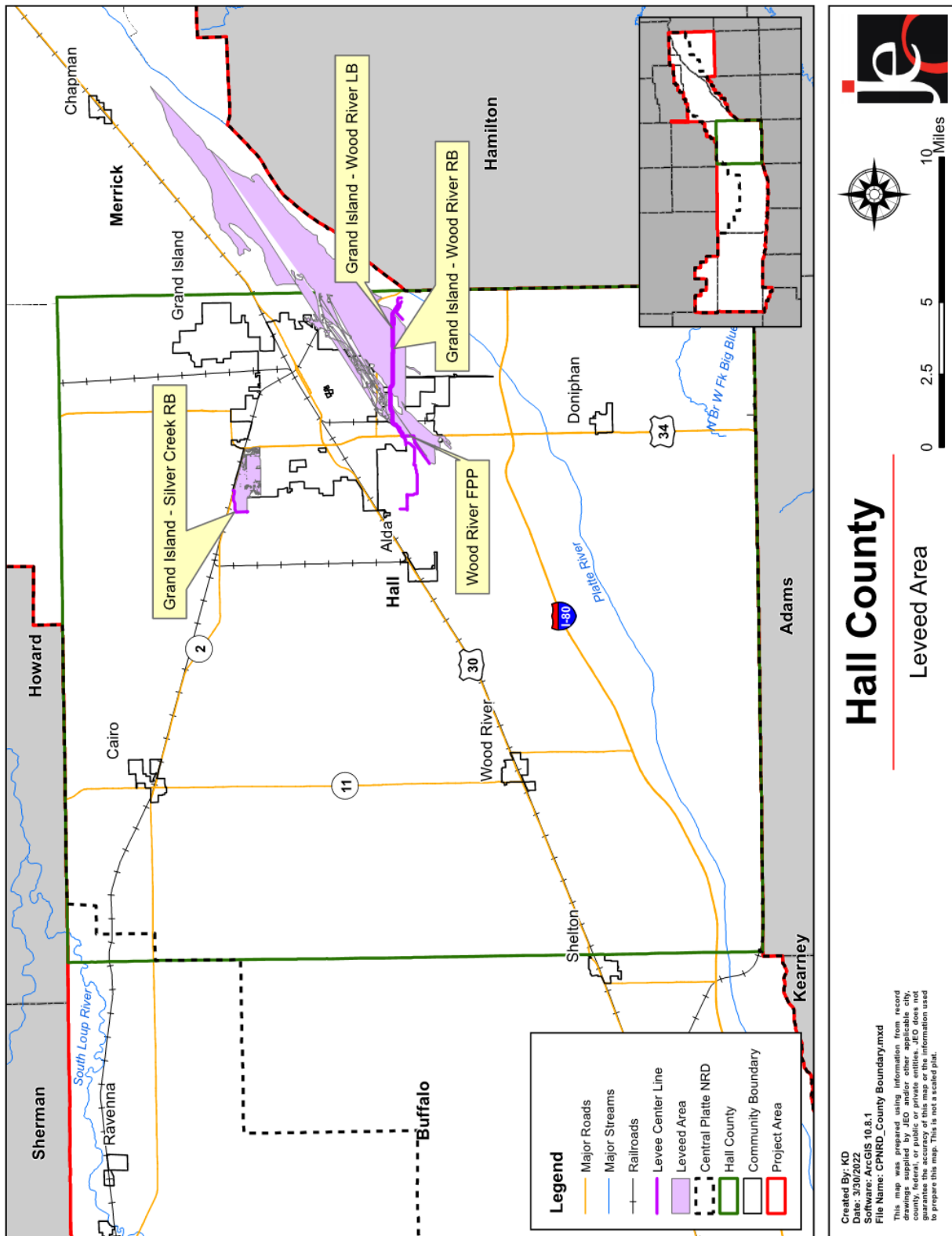
There are four levees in Hall County, Grand Island – Wood River RB, Grand Island – Wood River LB, Grand Island – Silver Creek RB, and Wood River FPP. Both Grand Island – Wood River RB and LB are FEMA accredited levee systems. The Wood River RB Levee is 7.19 miles long and provides protection for 101 people and 118 buildings valued at \$64.1 million. The Wood River LB Levee is 8.8 miles long and provides protection for 9,327 people and 3,715 buildings valued at \$872 million. Figure HAL.5 shows the location of the levees.

## Public Health Emergency

Covid-19 has exposed a number of vulnerabilities in the county's health and medical resources as well as awareness gaps with regards to vaccines, masks, and other health measures. As of September 24, 2021, Hall County has had 9,254 positive cases of Covid-19 and has a 56% vaccination rate. The JBS meat packing plant had a large outbreak and was heavily impacted in the early months of the pandemic. Other county wide impacts include cancelled events, closed businesses, and loss of life. To help reduce the spread of the virus, the county instituted policies for masking, social distancing, and cleaning of workspaces.

<sup>15</sup> FEMA. January 2017. "Flood Risk Report: West Fork Big Blue, 10270203".

Figure HAL.6: Leveed Area



### **Severe Thunderstorms**

Severe thunderstorms are a common occurrence in the region and have caused damage to property and crops. In July 2021, thunderstorm winds damaged powerlines in Alda and west along Highway 30. The local planning team is concerned with possible damage to government property, as well as private and residential property. Heavy rains associated with severe thunderstorms can also cause flash flooding in poor drainage areas. Backup power generators are available at several critical facilities including the 911 Center, Fire Stations, Courthouse, Sheriff's Office, and County Public Works. Hall County completed the StormReady certification in 2016.

Hailstorms can cause serious damage to buildings throughout Hall County, as well as damage crops, which can have a large economic impact across the county. Per the NCEI database, 201 hail events have been reported since 1996 causing over \$21,000,000 in damages. County Emergency Management regularly provides public education on hazards. The county has also identified reducing damage from trees during hail and thunderstorms events as a mitigation action.

### **Severe Winter Storms**

Heavy snow, blowing and drifting snow, and ice accumulation can cause road closures, the need for rescuing stranded motorists, power outages, and property damage. On December 30, 2006, a significant ice storm led to ice accumulation on power lines, trees, and roads. This led to widespread tree damage, along with power outages, and damage to power lines and poles. Many residents were without power for several days. Total property damages across the region were estimated at \$10,000,000. The Christmas Blizzard of 2009 dumped approximately 12 inches of snow across the county. The combination of heavy snow and high winds lead to white-out conditions, which lead to numerous roadway closures. This included the closing of Interstate 80. More recently, on April 1, 2018, blizzard conditions made travel perilous and shut down the airport in Grand Island. Currently, county snow removal resources, which includes motor graders and front-end loaders, are sufficient. City and village resources, though, need to be improved. The local planning team estimates that approximately 10% of powerlines are buried in the county. Southern Public Power District continues to trim trees along county roads to reduce the risk of power loss.

### **Tornadoes and High Winds**

Tornadoes and high winds have a long and devastating history in Hall County. On June 3rd, 1980, several tornadoes hit Grand Island, destroying entire sections of the community, especially the city's northwest and north central residential areas, and the southern business district. The tornadoes killed five people and injured more than 400. When it was over, the tornadoes had caused \$300 million in damages. This event is most famously referred to as Night of the Twisters after a book and television movie were made based on these events. In 1994, a smaller tornado in northwest Grand Island struck a train, overturning several boxcars.

The county offers text alerts through AlertSense, for which residents can register at no cost. Hall County also uses IPAWS and CodeRed for notification. County Emergency Management conducts regular public presentations, storm spotter training, and general information through various communications channels. Outdoor sirens are regularly maintained, and National Weather Service radios are promoted.

## Mitigation Strategy

### Completed Mitigation Actions

Mitigation Action	Develop an Emergency Preparedness Plan
Description	Develop an Emergency Preparedness Plan (EPP) for the Grand Island Levee System in coordination with Hall County Emergency Management and the CPNRD; the plan should include stakeholder roles and responsibilities, a risk communication plan, emergency activation levels, activation process, evacuation plan, and training and exercise plan.
Hazard(s) Addressed	Levee Failure
Status	Completed in 2018 for the Silver Creek Levee.

### New Mitigation Actions

Mitigation Action	Phragmites Reduction
Description	Work with Platte River Resiliency Project to fund projects to reduce phragmites in the Platte River to help keep channels open and flowing.
Hazard(s) Addressed	Flooding, Animal and Plant Disease
Estimated Cost	\$750,000 per year
Local Funding	General Fund
Timeline	Ongoing
Priority	High
Lead Agency	Planning Department, City of Grand Island, Platte River Resiliency Project, Central Platte NRD
Status	This is an ongoing action with phragmites reduction occurring annually.

Mitigation Action	Project Scoping
Description	Evaluate potential flood risk reduction alternatives as identified through the NRCS WFPO including project scoping and implementation.
Hazard(s) Addressed	Flooding
Estimated Cost	Varies by Project
Local Funding	General Fund, WFPO
Timeline	2-5 Years
Priority	Medium
Lead Agency	Floodplain Administrator
Status	Wood River Watershed Flood Risk Reduction Plan is currently under development. No formal alternatives have yet been determined; however, several alternatives are under further review for each program with communities in the district.

Mitigation Action	Repetitive Loss Property Mitigation
Description	Identify and perform flood mitigation options on repetitive loss properties within the county.
Hazard(s) Addressed	Flooding
Estimated Cost	Varies by Project
Local Funding	General Fund, Private Owner Funds
Timeline	5+ Years
Priority	Low
Lead Agency	Floodplain Administrator
Status	Not Started

**Kept Mitigation Actions**

Mitigation Action	Backup and Emergency Generators
<b>Description</b>	Identify and evaluate current backup and emergency generators; obtain additional generators based on identification and evaluation; provide portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations and other critical facilities and shelters.
<b>Hazard(s) Addressed</b>	All Hazards
<b>Estimated Cost</b>	\$20,000 - \$75,000+ per generator
<b>Local Funding</b>	General Fund
<b>Timeline</b>	5+ Years
<b>Priority</b>	Medium
<b>Lead Agency</b>	County Emergency Management, Individual Departments
<b>Status</b>	Several facilities have purchased and installed generators, but a few remaining facilities need generators.

Mitigation Action	Improve Electrical Service
<b>Description</b>	Evaluate hardening, retrofitting, looping and/or burying of power lines and related infrastructure and/or comparable protection measures; provide looped distribution service and other redundancies in the electrical system as a backup power supply in the event the primary system is destroyed or fails; implement measures to improve electrical service; bury power lines for future construction.
<b>Hazard(s) Addressed</b>	All Hazards
<b>Estimated Cost</b>	Varies
<b>Local Funding</b>	Enterprise Funds
<b>Timeline</b>	Ongoing
<b>Priority</b>	Medium
<b>Lead Agency</b>	Public Works, Southern Public Power District
<b>Status</b>	This is on ongoing action. All new electrical services are buried.

Mitigation Action	Reduce Damages from Floods, Stormwater, and Heavy Precipitation Events
<b>Description</b>	Conduct stormwater drainage study; evaluate and implement recommendations or comparable measures to improve drainage; evaluate and improve stormwater system.
<b>Hazard(s) Addressed</b>	Flooding
<b>Estimated Cost</b>	\$10,000 - \$100,000+
<b>Local Funding</b>	General Fund
<b>Timeline</b>	5+ Years
<b>Priority</b>	Medium
<b>Lead Agency</b>	Public Works
<b>Status</b>	In Progress. Improvements to drainage have been made between Highway 2 and Airport Road from Engleman Rd to North Rd to reduce risk of flooding. A Drainage study for the drainage slough that starts at Farmstead Subdivision by the Wood River Diversion and runs adjacent to the Meadowlane Subdivision and into Merrick County near the railroad tracks at Gunbarrel Rd has been discussed but has not started.



Mitigation Action	Reduce Tree Damage and Damage from Trees
Description	Conduct tree inventory; develop tree maintenance/trimming program; implement tree maintenance/trimming program; remove hazardous limbs and/or trees.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Winter Storms, Severe Thunderstorms, Grass/Wildfire
Estimated Cost	\$100+ per tree
Local Funding	General Fund
Timeline	2-5 Years
Priority	Medium
Lead Agency	Parks and Recreation
Status	Not Started

Mitigation Action	Storm Shelter / Safe Room
Description	Identify and evaluate existing safe rooms and/or storm shelters; improve and/or construct safe rooms and/or storm shelters; design and construct storm shelters and safe rooms in highly vulnerable areas such as mobile home parks, campgrounds, schools, etc.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms
Estimated Cost	\$150 square ft for retrofit; \$300 square ft for new construction
Local Funding	General Fund, Bonds
Timeline	5+ Years
Priority	Medium
Lead Agency	Emergency Management, Local Agencies
Status	Head start building beginning its construction. Stuhler Museum is in planning stage. Grand Island Public Schools incorporating safe rooms in construction of new school buildings.

## Plan Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside county planning documents (e.g., annual budgets and Capital Improvement Plans), during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

Hall County last reviewed their section of the HMP in 2018 and provided updates for historical events. The County Emergency Management Director, Regional Planner, and County Roads Supervisor will be responsible for reviewing and updating the plan in the future. These individuals will review the plan bi-annually. The public will be notified using social media, county website, board meetings, and through a partnership with the CPNRD.

## **Community Profile**

# **Village of Alda**

## **Central Platte NRD Hazard Mitigation Plan**

**2022**

## Local Planning Team

The Village of Alda's local planning team for the hazard mitigation plan are listed in the table below along with the meetings attended. All participant worksheets were filled out and returned by the community.

**Table ALD.1: Alda Local Planning Team**

Name	Title	Jurisdiction	R1 Meeting	R2 Meeting
<b>Ramona Schafer</b>	Clerk/Treasurer	Village of Alda	Grand Island	Grand Island
<b>Chad Nability</b>	Floodplain Administrator	Village of Alda, Hall County	Lexington – Virtually	Grand Island

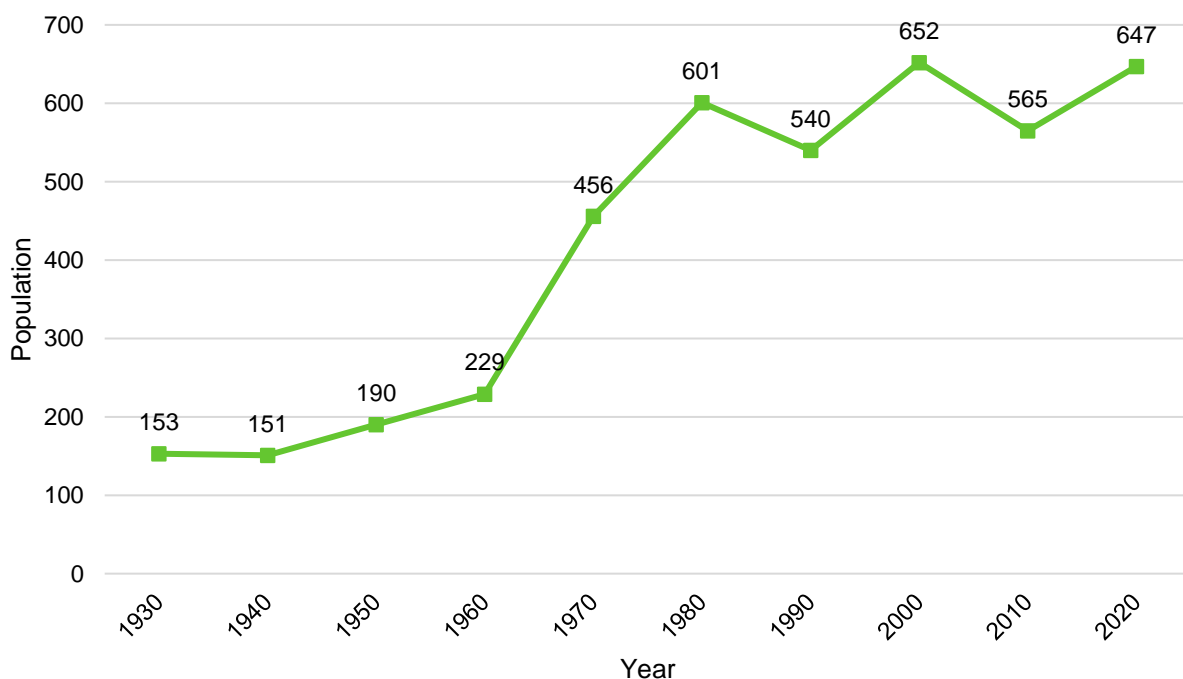
## Location and Geography

The Village of Alda is in the center of Hall County and covers an area of 0.35 square miles. The major waterway in the area is the Wood River.

## Demographics

The following figure displays the historical population trend for the Village of Alda. This figure indicates that the population of Alda has been increasing since 2010 to 647 people in 2020. Increasing populations are associated with increased hazard mitigation and emergency planning requirements for development. Increasing populations can also contribute to increasing tax revenues, allowing communities to pursue additional mitigation projects. Alda's population accounted for 1% of Hall County's population in 2020.<sup>1</sup>

**Figure ALD.1: Population 1930 - 2020**



Source: U.S. Census Bureau

<sup>1</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.

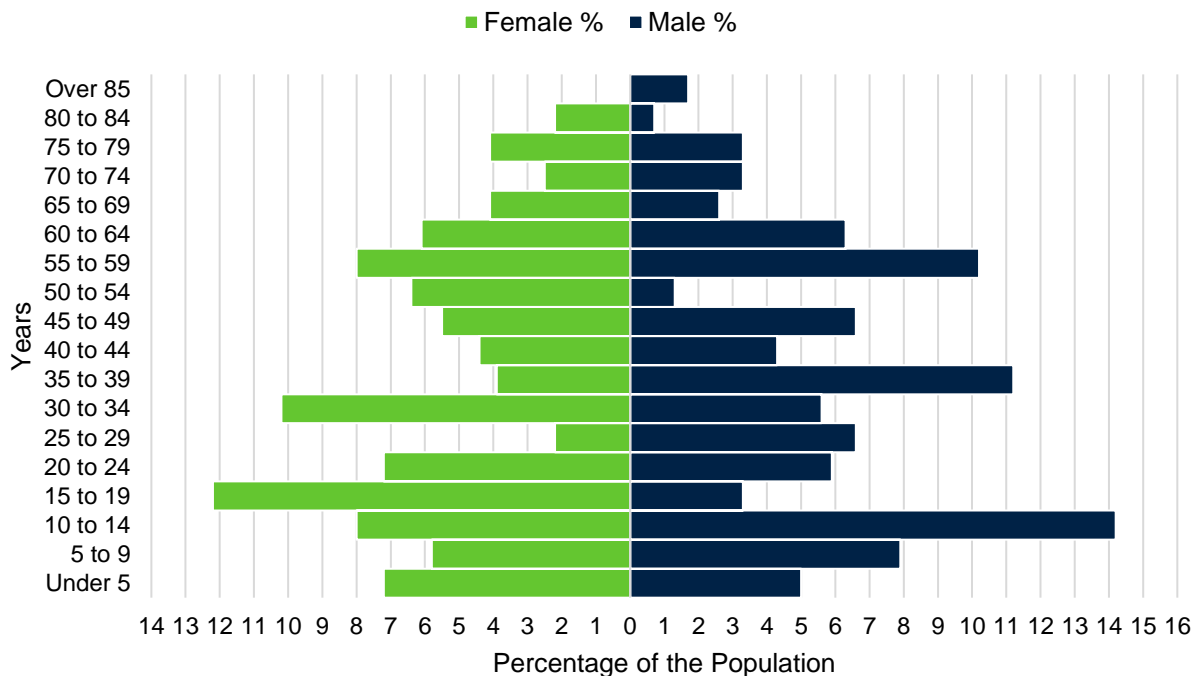
Figure ALD.2: Village of Alda



The young, elderly, and minority populations may be more vulnerable to certain hazards than other groups. Looking at Alda's population:

- **7.8% is non-white.** Since 2010, Alda grew more ethnically diverse. In 2010, 6.4% of the Alda's population was non-white. By 2019, 7.8% was non-white.<sup>2</sup>
- **34.5 median age.** The median age of Alda was 34.5 years in old 2019. The population grew older since 2010, when the median age was 33.5.<sup>3</sup>

**Figure ALD.3: Alda's Population Pyramid**



The figure above shows Alda's population percentage broken down by sex and five-year age groups. Alda's population is younger with a much higher percentage of the population below 40 years of age. This likely indicates a growing population in the years to come.

## Employment and Economics

Low-income populations, long distance commuters, and the unemployed may be more vulnerable to certain hazards than other groups. Alda's population has:

- **5% of people living below the poverty line.** The poverty rate (5%) in the Village of Alda was lower than the state's poverty rate (7.2%) in 2019.<sup>4</sup>
- **\$49,514 median household income.** Alda's median household income in 2019 (\$49,514) was \$11,000 lower than the state (\$61,439).<sup>4</sup>
- **3.8% unemployment rate.** In 2019 Alda had a higher unemployment rate (3.8%) when compared to the state (2.3%).<sup>4</sup>

2 United States Census Bureau. "2019 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

3 United States Census Bureau. "2019 Census Bureau American Community Survey: S0101: Age and Sex." <https://data.census.gov/cedsci/>.

4 United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." <https://data.census.gov/cedsci/>.

- **13.2% of workers commuted 30 minutes or more to work.** Fewer workers in Alda commuted 30 minutes or more to work than compared to workers commuting less than 15 minutes (13.2% compared to 41.6%).<sup>5</sup>

### Major Employers

The major employers in the community are Hornady, PMI, Traid, Futek, Bullet Weights, and Merrick Machines. Many of the residents in Alda commute to neighboring communities such as Grand Island, Kearney, and Wood River for work.

### Housing

The age of housing may indicate which housing units were built prior to the development of state building codes. Vacant housing stock may also be more vulnerable to hazard events if it is poorly maintained. Unoccupied housing may also suggest that future development may be less likely to occur. Communities with a substantial number of mobile homes may be more vulnerable to the impacts of high winds, tornadoes, and severe thunderstorms if those homes are not anchored correctly. The local planning team indicated that there are mobile homes located at Chestnut Street, Venus Street, 4<sup>th</sup> Street, and on Highway 30. Renter-occupied housing depends on the initiative of landlords for proper maintenance and retrofitting to be resilient to disasters. They are less likely than homeowners to have flood insurance, or to know their risks to flooding and other hazards.

- **25.4% of housing built prior to 1970.** Alda has a smaller share of housing built prior to 1970 than the state (25.4% compared to 46%).<sup>6</sup>
- **9.3% of housing units vacant.** Since 2010, Alda's vacancy rate decreased. In 2010 the vacancy rate was 11.2%. By 2019, 9.3% of housing units were vacant.<sup>6</sup>
- **35.8% mobile and manufacture housing.** The Village of Alda had a larger share of mobile and manufactured housing (35.8%) compared to the state (3.3%).<sup>6</sup>
- **20.6% renter-occupied.** The rental rate of Alda was 20.6% in 2019. The percentage went down since 2010, when renter occupied housing was at 21%.<sup>6</sup>

### Governance

A community's governance indicates the number of boards or offices that may be available to help implement hazard mitigation actions. The Village of Alda is governed by a four-member village board; other governmental offices and departments that may be involved in implementing hazard mitigation initiatives are listed below.

- Clerk/Treasurer
- Planning Commission
- Housing Authority
- Water and Sewer Department
- Volunteer Fire Department
- Village Board of Trustees
- Emergency Management
- Village Maintenance

<sup>5</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: S0802: Means of Transportation to Work by Selected Characteristics." <https://data.census.gov/cedsci/>.

<sup>6</sup> United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.



## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the community's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects.

**Table ALD.3: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning &amp; Regulatory Capability</b>	Comprehensive Plan	Yes
	Capital Improvements Plan	No
	Economic Development Plan	No
	Local Emergency Operations Plan	Yes
	Floodplain Management Plan	No
	Storm Water Management Plan	No
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	No
	Other (if any)	Water System Emergency Response Plan, 1 & 6 Year Transportation Plan, Wood River Watershed Flood Risk Reduction Plan, Wood River Watershed Study
<b>Administrative &amp; Technical Capability</b>	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	Yes - County
	Chief Building Official	No
	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager	No
	Mutual Aid Agreement	Yes
	Other (if any)	-
<b>Fiscal Capability</b>	Capital Improvement Plan/ 1- & 6-Year plan	Yes
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	Yes
	Gas/Electric Service Fees	No
	Storm Water Service Fees	No
	Water/Sewer Service Fees	Yes
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	Yes

Survey Components/Subcomponents		Yes/No
<b>Education &amp; Outreach Capability</b>	Other (if any)	-
	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes
	Natural Disaster or Safety related school programs	Yes
	StormReady Certification	No
	Firewise Communities Certification	No
	Tree City USA	No
	Other (if any)	-

Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Moderate
Staff/expertise to implement projects	Moderate
Public support to implement projects	Moderate
Time to devote to hazard mitigation	Limited

## Plan Integration

Alda has several planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The village will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

### 1- & 6-Year Street and Transportation Improvement Plan (2021)

Alda has a 1- & 6-Year Street Plan and Transportation Improvement Plan that is reviewed and updated annually. The plan includes many hazard mitigation projects such as stormwater projects, upsizing of culverts and drainage structures, and upgrading and regular maintenance of the storm sewer system. It also includes installing street aprons to facilitate drainage, improvements to transportation routes for drainage, bridge improvements, updating electrical distribution system, and installing emergency generators in critical facilities.

### Building Code (2018)

The Building Codes for Alda were recently updated in 2020 and are based on the 2018 International Building Codes. The codes allow for raingardens in residential areas and require the use of fire-resistant building materials.

### Comprehensive Plan (2003)

The comprehensive plan is designed to guide the future actions and growth of the village. It directs development away from the floodplain and directs housing away from chemical storage facilities and major transportation routes. The plan also encourages preservation of open space in hazard-

prone areas and allows for emergency access to all areas of town. The village plans to update the comprehensive plan sometime between 2022 and 2023.

### **Hall County Local Emergency Operations Plan (2020)**

Alda is an annex in the Hall County Local Emergency Operations Plan (LEOP). The LEOP establishes standardized policies, plans, guidelines, and procedures for emergency resources and governmental entities to respond and recover when a disaster event occurs. It contains information regarding direction and control, communications and warning, damage assessment, emergency public information, evacuation, fire services, health and human services, law enforcement, mass care, protective shelters, and resource management. This plan is updated every five years.

### **Floodplain Ordinance (2021), Zoning Ordinance (2021), and Subdivision Regulations (2021)**

The village's floodplain ordinance, zoning ordinance, and subdivision regulations outline where and how development should occur in the future. These documents prohibit development in the floodplain and discourage housing near chemical sites and major transportation routes. There are currently no plans to update these documents.

### **Water System Emergency Response Plan (2021)**

A water system emergency response plan serves as a guideline for water operators and village administration to minimize the disruption of normal services to consumers and to provide public health protection during an emergency event. The document identifies several natural and human-caused events and discusses the water system's response during those events.

### **Wood River Watershed Flood Risk Reduction Plan (Under Development)**

The primary purpose of the Wood River Watershed Flood Risk Reduction Plan is flood risk reduction within and near the communities of Riverdale, Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. It will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. This plan is being funded by the Central Platte NRD and NRCS through the Watershed and Flood Prevention Operations (WFPO) Program. Projects identified in the plan with a positive benefit-cost ratio will be reviewed for inclusion in the HMP.

### **Wood River Watershed Study (2020)**

This study was conducted by the Nebraska Silver Jackets to develop the 1% Annual Exceedance Probability (AEP) frequency flow data for the communities of Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. Results reflect that the flow frequency is larger than the effective Flood Insurance Study for the Kearney to Alda reach of the Wood River. The results also estimate a 1% AEP peak discharge that is 15% less than the current design for the Grand Island diversion channel. This study will help support ongoing WFPO studies and future NFIP mapping efforts in the region.

## **Future Development Trends**

Over the past five years, there have been some new businesses in the community. There has been no new housing developed and no housing planned for the next five years.

## Community Lifelines

### Transportation

Alda's major transportation corridors include US Highway 30, which has an average of 6,490 vehicles daily, 475 of which are trucks.<sup>7</sup> The village has one Union Pacific line traveling southwest to northeast on the southern edge of the community. The local planning team noted that no major transportation events have occurred locally. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the community, as well as areas more at risk of transportation incidents.

### Hazardous Materials

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are five chemical storage sites within or near Alda which house hazardous materials. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

**Table ALD.4: Chemical Storage Sites**

Name	Address	Located in Floodplain?
Bullet Weights Inc	122 S Apollo St	N
Hornady/Alda LLC	108 S Apollo St	N
Hornady Manufacturing Company	8350 W Old Potash Hwy	N
Island Supply Welding Co	4920 W US Highway 30	N
Platte Valley Energetics LLC	8318 W Old Potash Hwy	N

Source: Nebraska Department of Environment and Energy<sup>8</sup>

### Health and Medical Facilities

There are no medical and health facilities located within the community.

### Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the jurisdiction.

Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table ALD.5: Critical Facilities**

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	Emergency Operations Center	N	N	N
2	Fire Hall	N	Y – portable	N
3	Village Hall/Community Center	Y	Y	N
4	Wastewater Lagoon	N	N	Y (0.2%)
5	Water Tower and Well	N	N	N
6	Well	N	Y	N

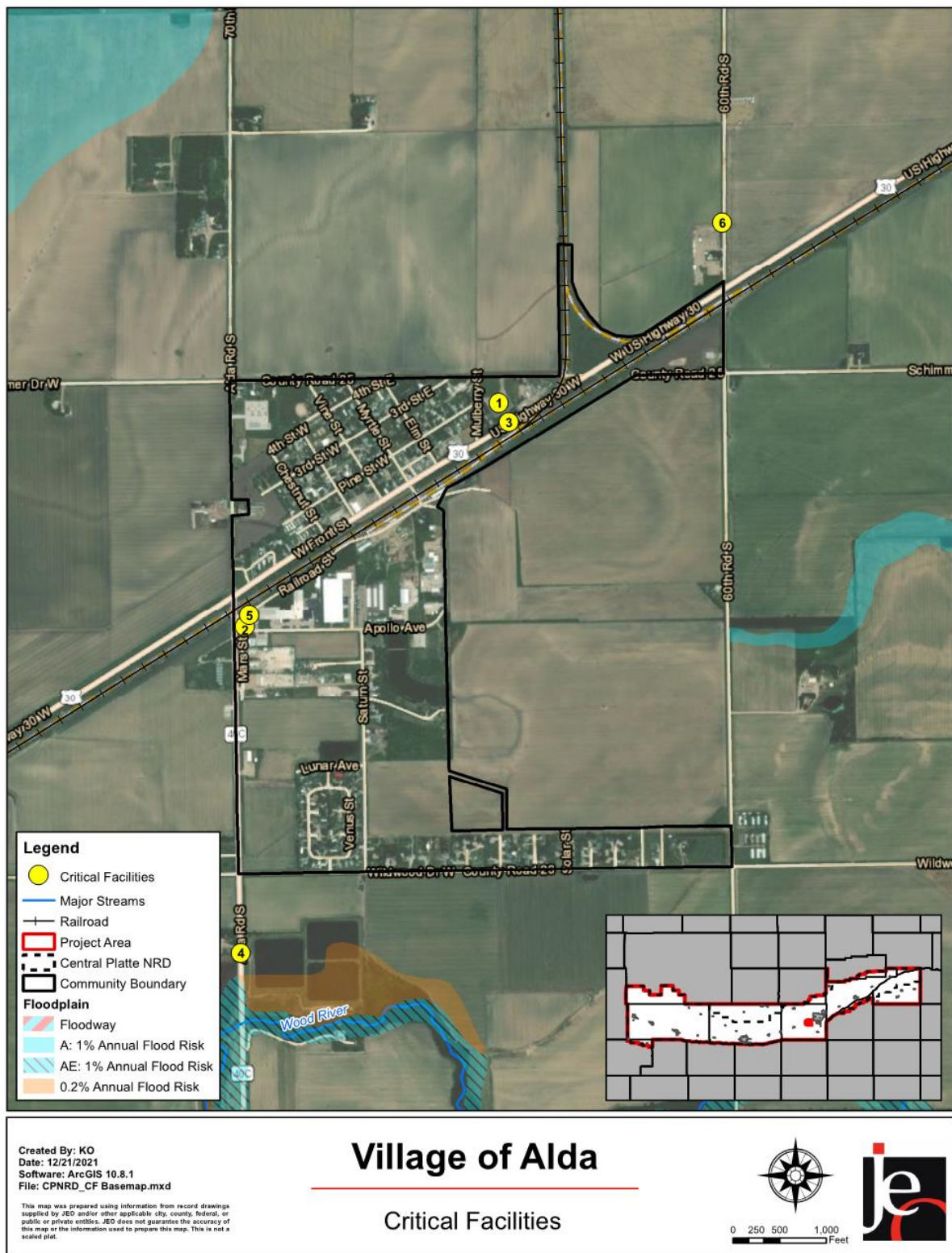
<sup>7</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map." [map].

<https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.

<sup>8</sup> Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.



Figure ALD.3: Critical Facilities



## Parcel Improvements and Valuation

The planning team acquired GIS parcel data from the County Assessor to analyze the location, number, and value of property improvements (e.g. buildings, garages, sheds etc.) at the parcel level. The data did not contain the number of structures on each parcel. A summary of the results of this analysis is provided in the following tables.

**Table ALD.6: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
288	\$24,194,435	0	\$0	0%

Source: County Assessor, 2021

**Table ALD.7: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
288	\$24,194,435	0	\$0	0%

Source: County Assessor, 2021

## Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries. Larger scale and more damaging events that impacted the community are discussed under Hazard Prioritization.

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the community. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the community's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

### Flooding

The village identified flooding as a top hazard of concern as they have a history of flooding. In 2005, torrential rainfall of 5-11 inches on May 11 and 12 led to widespread flash flooding throughout the county. Alda was part of an area that was declared a federal disaster area. Wood River near Alda, which had been dry for three years, tied a record with a crest of 12.2 feet early on the 12th. Records also indicate that Wood River flooded in 1967, 1968, and 1969, although no damage estimates are available. Flood crest data indicates that the June 1968 flood was 11.7 feet, and the March 1969 event was 12 feet. The Village of Alda has flood risk areas to the south and east of the village. To mitigate against this hazard, the village has created a temporary berm to divert floodwaters.

Most of the village falls under the Wood River Watershed Flood Risk Reduction Plan, which is currently under development. The plan will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. Projects deemed feasible in the plan will be added to this HMP once the planning process has concluded.



Alda is a member of the NFIP, and the village's Floodplain Administrator (Chad Nabity) will oversee the commitments and requirements of the NFIP. The initial FIRM for the village was delineated in 9/26/2008 and the current effective map date is 9/26/2008. As of October 31, 2021, there is one NFIP policy in-force covering \$175,000. Alda does not currently have any repetitive loss or severe repetitive loss structures.

### **Hazardous Materials Release**

The Village of Alda is concerned about chemical spills on the Union Pacific railway and Hwy 30. Gasoline, oil, anhydrous ammonia, and other chemicals are regularly transported on these routes. There are no significant chemical spills reported by PHMSA. Critical facilities vulnerable to a chemical spill during transportation include the village office and community center, water tower, fire hall, water booster station, and wastewater lagoons. Mitigation plans include participating in hazardous spill emergency exercises

### **Severe Thunderstorms**

Alda experiences severe summer thunderstorms annually. The worst of these was in August of 2014, when thunderstorm winds topping 60 mph coupled with one-inch hail that caused \$150,000 in property damages. According to NCEI data, there have been 25 severe thunderstorm events in the village that have caused \$645,000 in property damages. Community concerns about severe thunderstorms include property damage, power outages, and fire caused by lightning. Critical municipal records are protected by surge protectors. Approximately 25 percent of the power lines in the village are buried. The community has a weather radio in the Village Office. There are several hazardous trees on personal property that need to be removed.

### **Severe Winter Storms**

The most severe winter storm to occur in Alda in recent memory was in December of 2006. Half-inch ice deposits cause widespread tree damage and power outages. During the extreme cold event in February 2021, the village experienced a power outage but had minimal damage. The local planning team is concerned that future severe winter storms will lead to more power outages and a loss of mobility for residents of the village. There are no snow routes in the village, but there is one snow fence in use on the north side of Schimmer Drive. The village maintenance department has sufficient equipment to remove snow including a truck, bobcat, and loader with a snow blade.

### **Tornadoes and High Winds**

In 1974, a tornado passed through Alda, damaging homes and businesses. The village is covered by two warning sirens, one on the south and one on the north sides of the community. The County Emergency Manager offers text alerts. There is one public safe room at the Community Center, but it is not FEMA-certified. Education outreach occurs through the schools during October Safe Month and at the annual community festival, Alda Days. In the event of a future disaster, mutual aid agreements are in place with Rural Hall County, Wood River, Doniphan, Grand Island, Phillips, Chapman, Shelton, St. Libory, Cairo, and Aurora. Future mitigation plans include providing adequate public safe rooms and identifying existing storm shelters.

### **Mitigation Strategy**

Alda's municipal funds are limited to maintaining current facilities and systems and have stayed the same over recent years. Currently a large portion of funds are dedicated to a community center addition in the village.

**Completed Mitigation Actions**

Mitigation Action	Surge Protectors
Description	Purchase and install surge protectors on sensitive equipment in critical facilities.
Hazard(s) Addressed	Severe Thunderstorms, Severe Winter Storms
Status	Completed in 2021.

Mitigation Action	Update Emergency Response Equipment
Description	Improve emergency rescue and response equipment and facilities by providing additional or updating existing emergency response equipment (includes developing backup system for emergency vehicles and identifying and training additional personnel for emergency response).
Hazard(s) Addressed	All Hazards
Status	Purchased new vehicles for the fire department in 2016 and 2022.

**New Mitigation Actions**

Mitigation Action	Project Scoping
Description	Evaluate potential flood risk reduction alternatives as identified through the NRCS WFPO including project scoping and implementation.
Hazard(s) Addressed	Flooding
Estimated Cost	Varies by Project
Local Funding	General Fund, WFPO
Timeline	2-5 Years
Priority	Medium
Lead Agency	Village Board, Floodplain Administrator
Status	Wood River Watershed Flood Risk Reduction Plan is currently under development. No formal alternatives have yet been determined; however, several alternatives are under further review for each program with communities in the district.

Mitigation Action	Reduce Damages from Floods, Stormwater, and Heavy Precipitation Events
Description	Evaluate repetitive loss or potential loss structures located in floodplain; acquire and relocate or demolish flood prone property or elevate flood prone property; elevate equipment vulnerable to flooding.
Hazard(s) Addressed	Flooding
Estimated Cost	\$500,000+
Local Funding	General Fund
Timeline	Ongoing
Priority	Medium
Lead Agency	Floodplain Administrator
Status	This is an ongoing project. It is checked with each flood event.

**Kept Mitigation Actions**

Mitigation Action	Emergency Exercise: Hazardous Spill
Description	Utilize exercise to prepare for potential explosions or hazardous spills; ensure that nearby businesses and residents have appropriate plans in place.
Hazard(s) Addressed	Hazardous Materials Release
Estimated Cost	\$5,000+
Local Funding	General Fund
Timeline	1 Year
Priority	High
Lead Agency	Village Board, Emergency Management
Status	Not Started

Mitigation Action	Public Awareness and Education
Description	Obtain or develop hazard education materials; conduct multi-faceted public education; distribute fact sheets or maps at community events, public schools, other venues and to public and private communication systems; conduct scheduled siren/warning system tests; prepare educational materials listing safe rooms and shelters and evacuation plans; distribute educational materials listing safe rooms and shelters; purchase equipment such as overhead projectors and laptops to facilitate presentation of information.
Hazard(s) Addressed	All Hazards
Estimated Cost	\$3,000+
Local Funding	General Fund
Timeline	1 Year
Priority	High
Lead Agency	Village Board, Emergency Management
Status	Not Started

Mitigation Action	Storm Shelter / Safe Rooms
Description	Identify and evaluate existing safe rooms and/or storm shelters; improve and/or construct safe rooms and/or storm shelters; design and construct storm shelters and safe rooms in highly vulnerable areas such as mobile home parks, campgrounds, schools, etc.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms
Estimated Cost	\$150/sf for Retrofit, \$300/sf for New Construction
Local Funding	General Fund
Timeline	2-5 Years
Priority	High
Lead Agency	Village Board
Status	Currently looking at the possibility of an underground safe room.

Mitigation Action	Storm Shelter Identification
Description	Identify any existing private or public storm shelters.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms
Estimated Cost	Staff Time
Local Funding	Staff Time
Timeline	2-5 Years
Priority	High
Lead Agency	Village Board, Emergency Management
Status	Not Started

Mitigation Action	Tree Planting / Assistance for Tree Planting
<b>Description</b>	Educate public on appropriate tree planning and establish an annual tree trimming program to assist low income and elderly residents; develop tree planting and maintenance guidelines.
<b>Hazard(s) Addressed</b>	Tornadoes and High Winds, Severe Thunderstorms
<b>Estimated Cost</b>	\$500
<b>Local Funding</b>	General Fund, NRD Cost Share
<b>Timeline</b>	2-5 Years
<b>Priority</b>	High
<b>Lead Agency</b>	Village Board
<b>Status</b>	The village established a new park and trees will be planted there.

## Plan Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside community planning documents (e.g., annual budgets and Capital Improvement Plans), during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

Alda last reviewed their section of the HMP in 2017 during the plan update. The Board Chairman, Village Emergency Management Director, and Clerk/Treasurer will be responsible for reviewing and updating the plan in the future. These individuals will review the plan annually during a public board meeting. The public will also be notified through social media.

## **Community Profile**

# **Village of Cairo**

## **Central Platte NRD Hazard Mitigation Plan**

**2022**

## Local Planning Team

The Village of Cairo's local planning team for the hazard mitigation plan are listed in the table below along with the meetings attended. All participant worksheets were filled out and returned by the community.

**Table CAI.1: Cairo Local Planning Team**

Name	Title	Jurisdiction	R1 Meeting	R2 Meeting
Jaime Rathman	Clerk/Treasurer	Village of Cairo	Grand Island	Grand Island
Chad Nabity	Floodplain Administrator	Village of Cairo, Hall County	Lexington – Virtual	Grand Island

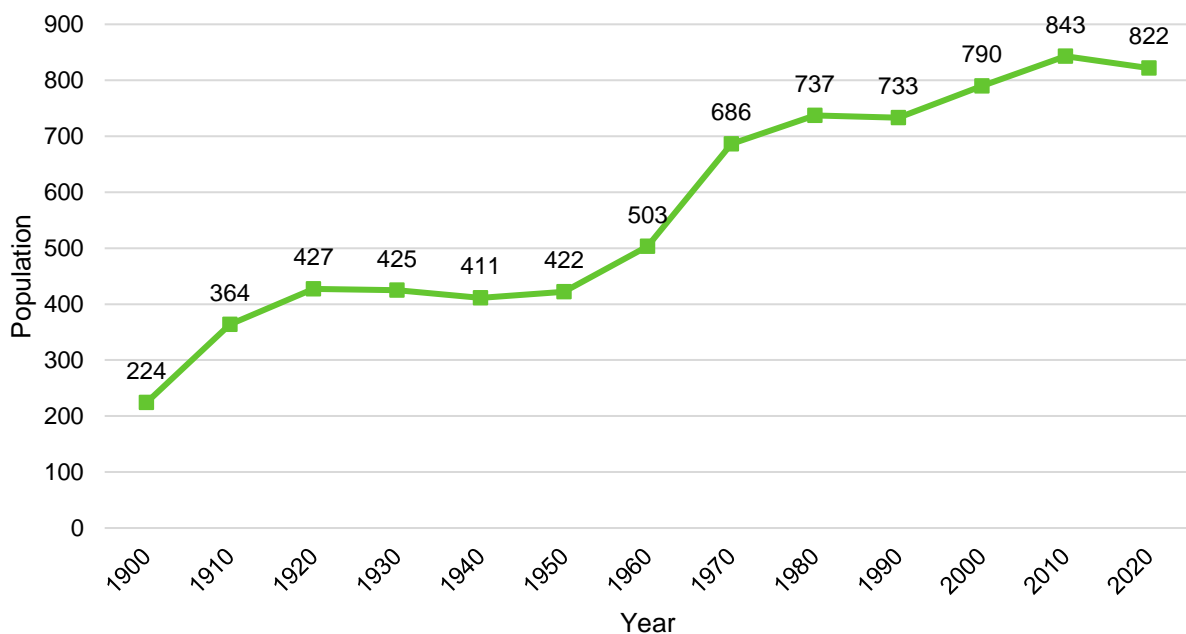
## Location and Geography

The Village of Cairo is in northwestern Hall County and covers an area of 0.77 square miles. The Middle Loup River is located a couple of miles north of the community.

## Demographics

The following figure displays the historical population trend for the Village of Cairo. This figure indicates that the population has been declining since 2010 to 822 people in 2020. A declining population can lead to more unoccupied housing that is not being maintained and is then at risk to high winds and other hazards. Furthermore, with fewer residents, there is decreasing tax revenue for the community, which could make implementation of mitigation projects more fiscally challenging. Cairo's population accounted for 1.3% of Hall County's population in 2020.<sup>1</sup>

**Figure CAI.1: Population 1900 – 2020**



Source: U.S. Census Bureau

<sup>1</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.



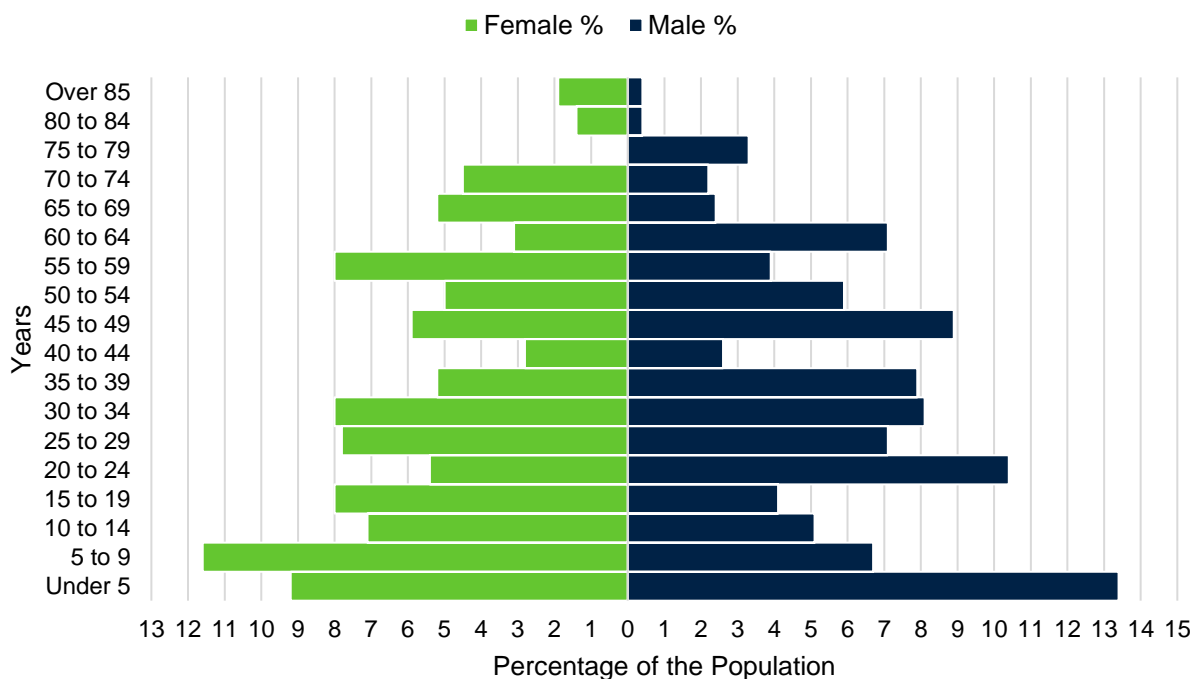
Figure CAI.2: Village of Cairo



The young, elderly, and minority populations may be more vulnerable to certain hazards than other groups. Looking at Cairo's population:

- **5.1% is non-white.** Since 2010, Cairo grew more ethnically diverse. In 2010, 0.8% of the villages' population was non-white. By 2019, 5.1% was non-white.<sup>2</sup>
- **Younger median age.** The median age of Cairo was 31.2 years in old 2019. The population grew younger since 2010, when the median age was 37.7.<sup>3</sup>

**Figure CA1.3: Cairo's Population Pyramid**



The figure above shows Cairo's population percentage broken down by sex and five-year age groups. Cairo's population is younger with a much higher percentage of the population below 40 years of age. This likely indicates a growing population in the years to come.

## Employment and Economics

Low-income populations, long distance commuters, and the unemployed may be more vulnerable to certain hazards than other groups. Cairo's population has:

- **11.8% of people living below the poverty line.** The poverty rate (11.8%) in the Village of Cairo was higher than the state's poverty rate (7.2%) in 2019.<sup>4</sup>
- **\$56,583 median household income.** Cairo's median household income in 2019 (\$56,583) was \$4,856 lower than the state (\$61,439).<sup>4</sup>
- **3.6% unemployment rate.** In 2019, Cairo has a higher unemployment rate (3.6%) when compared to the state (2.3%).<sup>4</sup>

2 United States Census Bureau. "2019 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

3 United States Census Bureau. "2019 Census Bureau American Community Survey: S0101: Age and Sex." <https://data.census.gov/cedsci/>.

4 United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." <https://data.census.gov/cedsci/>.

- **17.6% of workers commuted 30 minutes or more to work.** Fewer workers in Cairo commuted 30 minutes or more to work than compared to workers commuting less than 15 minutes (17.6% compared to 22.3%).<sup>5</sup>

### Major Employers

The major employers in the community are Baasch, Pump and Pantry, ABC Daycare, Medina Street Vault, Stretch Power Sports, and Centura. Many of the residents commute to Grand Island for work.

### Housing

The age of housing may indicate which housing units were built prior to the development of state building codes. Vacant housing stock may also be more vulnerable to hazard events if it is poorly maintained. Unoccupied housing may also suggest that future development may be less likely to occur. Communities with a substantial number of mobile homes may be more vulnerable to the impacts of high winds, tornadoes, and severe thunderstorms if those homes are not anchored correctly. The local planning team noted that there is a mobile home park with approximately 20 mobile homes located on the south edge of the village along W Oasis Street. Renter-occupied housing depends on the initiative of landlords for proper maintenance and retrofitting to be resilient to disasters. They are less likely than homeowners to have flood insurance, or to know their risks to flooding and other hazards.

- **56.7% of housing built prior to 1970.** Cairo has a larger share of housing built prior to 1970 than the state (56.7% compared to 46%).<sup>6</sup>
- **9.6% of housing units vacant.** Since 2010, Cairo's vacancy rate grew. In 2010 the vacancy rate was 7.2%. By 2019, 9.6% of housing units were vacant.<sup>6</sup>
- **7.8% mobile and manufacture housing.** The Village of Cairo had a larger share of mobile and manufactured housing (7.8%) compared to the state (3.3%).<sup>6</sup>
- **37% renter-occupied.** The rental rate of Cairo was 37% in 2019. The percentage went up since 2010, when renter occupied housing was at 24.6%.<sup>6</sup>

### Governance

A community's governance indicates the number of boards or offices that may be available to help implement hazard mitigation actions. The Village of Cairo is governed by a Board Chairperson and a four-member village board; other governmental offices and departments that may be involved in implementing hazard mitigation initiatives are listed below.

- Clerk/Treasurer
- Volunteer Fire Department
- Cairo QRT
- Street/Water Commissioner
- Park and Recreation
- Floodplain Administrator

<sup>5</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: S0802: Means of Transportation to Work by Selected Characteristics." <https://data.census.gov/cedsci/>.

<sup>6</sup> United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the community's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects.

The village creates a budget each year for all capital expense. There is a surplus of funds for emergencies, but those funds are rarely used. Municipal funds have stayed the same over recent years.

**Table CAI.3: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning &amp; Regulatory Capability</b>	Comprehensive Plan	Yes
	Capital Improvements Plan	No
	Economic Development Plan	No
	Local Emergency Operations Plan	Yes
	Floodplain Management Plan	No
	Storm Water Management Plan	No
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	No
	Other (if any)	-
<b>Administrative &amp; Technical Capability</b>	Planning Commission	County
	Floodplain Administration	Yes
	GIS Capabilities	No
	Chief Building Official	No
	Civil Engineering	No
	Local Staff Who Can Assess Community's Vulnerability to Hazards	No
	Grant Manager	Yes
	Mutual Aid Agreement	Yes
	Other (if any)	-
<b>Fiscal Capability</b>	Capital Improvement Plan/ 1- & 6-Year plan	No
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	No
	Gas/Electric Service Fees	No
	Storm Water Service Fees	No
	Water/Sewer Service Fees	Yes
	Development Impact Fees	No



Survey Components/Subcomponents		Yes/No
<b>Education &amp; Outreach Capability</b>	General Obligation Revenue or Special Tax Bonds	No
	Other (if any)	-
	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	No
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes
	Natural Disaster or Safety related school programs	No
	StormReady Certification	No
	Firewise Communities Certification	No
	Tree City USA	No
	Other (if any)	-

Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Moderate
Staff/expertise to implement projects	Limited
Public support to implement projects	High
Time to devote to hazard mitigation	Moderate

### Plan Integration

Cairo has several planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The village will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

#### Building Code (2018)

The building code sets standards for constructed buildings and structures. The village's building code was last updated in 2016 and follows Hall County's building code, which is based on the 2018 International Building Code. The code allows for raingardens in residential areas and requires the use of fire-resistant building materials. In a future update, the code will require a safe room in multiple dwelling units such as apartments.

#### Comprehensive Plan (2021)

The comprehensive plan is designed to guide the future actions and growth of the village. It contains goals and objectives aimed at safe growth, encourages clustering of development in sensitive areas, encourages elevation of structures located in the floodplain, identifies areas that need emergency shelters, and encourages preservation of open space in hazard-prone areas. Specific hazards such as flooding, severe weather, and drought are also discussed in the plan.

### **Hall County Local Emergency Operations Plan (2020)**

Cairo is an annex in the Hall County Local Emergency Operations Plan (LEOP). The LEOP establishes standardized policies, plans, guidelines, and procedures for emergency resources and governmental entities to respond and recover when a disaster event occurs. It contains information regarding direction and control, communications and warning, damage assessment, emergency public information, evacuation, fire services, health and human services, law enforcement, mass care, protective shelters, and resource management. This plan is updated every five years.

### **Zoning Ordinance (2004), Floodplain Ordinance, and Subdivision Regulations (2004)**

The village's floodplain ordinance, zoning ordinance, and subdivision regulations outline where and how development should occur in the future. These documents discourage development in the floodplain, prohibit development in the floodway, discourage residential development near chemical storage sites and major transportation routes, and contain natural hazard layers. They also encourage maintaining open space within the floodplain and limit development in the extraterritorial jurisdiction

### **1- & 6-Year Plan (2022)**

Cairo has a 1 & 6-Year Plan that is reviewed and updated annually. The plan includes stormwater projects, upsizing of culverts and drainage structures, regular maintenance of structures, and upgrading and maintenance of the storm sewer system. It also includes the installation of street aprons to facilitate drainage, improving transportation routes for drainage, bridge improvements and installing emergency generators in critical facilities.

## **Future Development Trends**

In the past five years, the Village of Cairo has had a new bank, golf course, and multiple homes built. There has also been new infrastructure built at the industrial park and two new lagoons constructed. In the next five years, the community hopes to have housing and businesses built at the industrial park.

## **Community Lifelines**

### **Transportation**

Cairo's major transportation corridors include State Highway 2, and 11. The most traveled route is Highway 2 with an average of 3,460 vehicles daily, 325 of which are trucks.<sup>7</sup> The village has one Burlington Northern Santa Fe Railway line traveling southeast to northwest through the central portion of the community. The local planning team noted that the fire department, senior center, and New Hope Christian School are all located along Highway 11. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the community, as well as areas more at risk of transportation incidents.

### **Hazardous Materials**

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are four chemical storage sites within or near Cairo which house hazardous materials. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

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7 Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map." [map]. <https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.



**Table CAI.4: Chemical Storage Sites**

Name	Address	Located in Floodplain?
<b>Agricultural Services Inc</b>	6068 N Highway 11	Y (1%)
<b>Aurora Co-op Elevator Company</b>	10501 W One-R Rd	Y (1%)
<b>Bosselman Energy Inc</b>	W Nebraska Highway 2	N
<b>CenturyLink</b>	103 E Nile St	N

Source: Nebraska Department of Environment and Energy<sup>8</sup>

## Health and Medical Facilities

There are no medical and health facilities located within the community.

## Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the jurisdiction.

Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table CAI.5: Critical Facilities**

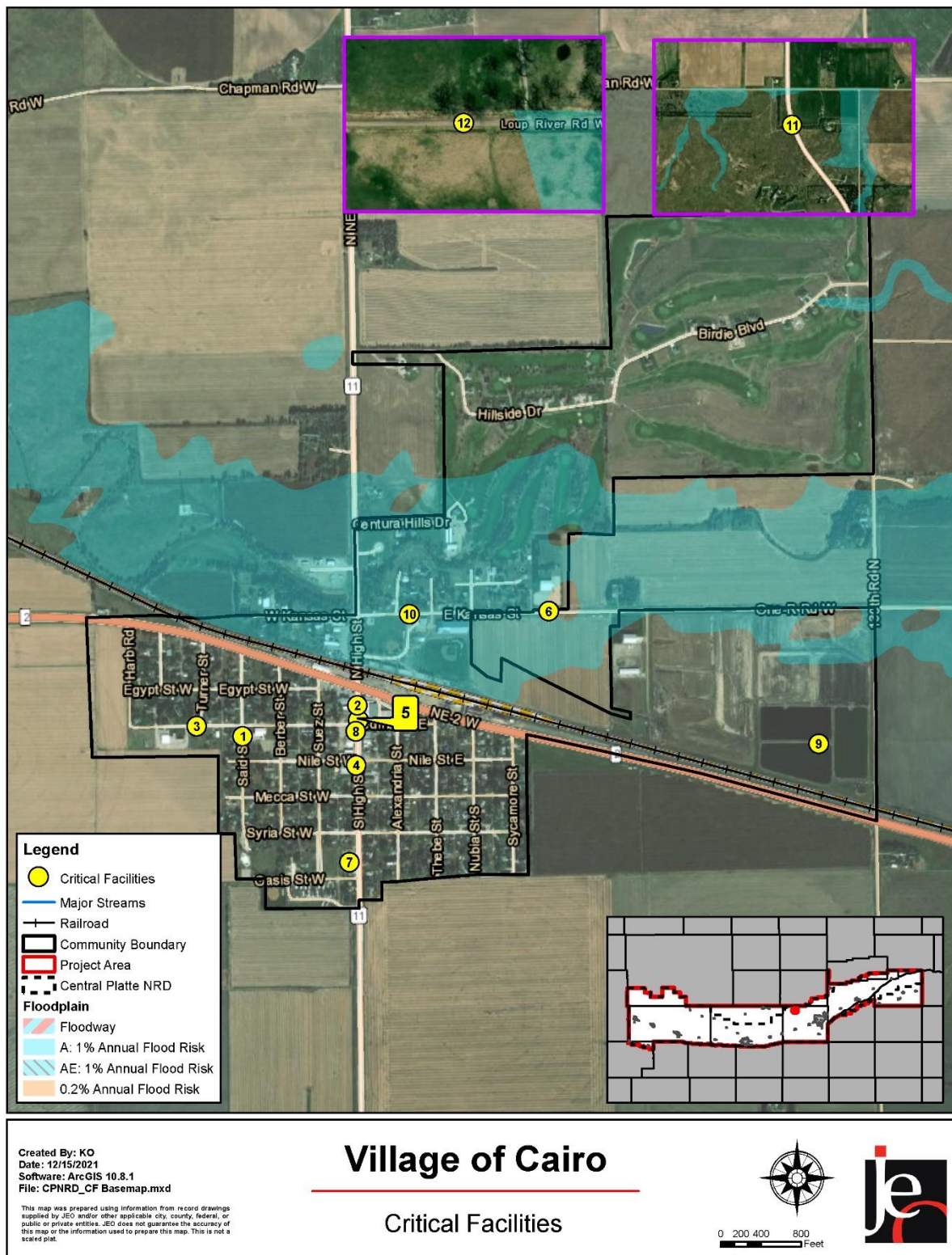
CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	Cairo Community Center	Y	N	N
2	Centura Public School	Y	N	N
3	Christ Lutheran Church	Y	N	N
4	Fire & Rescue/Village Hall Building	N	Y	N
5	First Baptist Church	Y	N	N
6	Methodist Church	N	N	Y (1%)
7	New Hope Christian School	N	N	N
8	Senior Center	N	N	N
9	Wastewater Lagoon	N	N	N
10	Water Tower	N	N	Y (1%)
11*	Water Well	N	N	N
12**	Water Well	N	N	N

\*Water well is located approximately two miles north of the village off Highway 11.

\*Water well is located approximately three miles northeast of the village off Loup River Rd W.

<sup>8</sup> Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.

Figure CAI.3: Critical Facilities



## Parcel Improvements and Valuation

The planning team acquired GIS parcel data from the County Assessor to analyze the location, number, and value of property improvements (e.g. buildings, garages, sheds etc.) at the parcel level. The data did not contain the number of structures on each parcel. A summary of the results of this analysis is provided in the following tables.

**Table CAI.6: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
390	\$45,041,079	35	\$5,212,307	9.0%

Source: County Assessor, 2021

**Table CAI.7: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
390	\$45,041,079	0	\$0	0%

Source: County Assessor, 2021

## Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries. Larger scale and more damaging events that impacted the community are discussed under Hazard Prioritization.

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the community. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the community's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

### Flooding

Cairo's flood risk area of concern passes through the center of the community parallel to Highway 2, along its northern edge. The creek in this area is at risk of flash flooding. Previously, the northern part of town was at greatest risk of flooding during heavy rain events, and poor stormwater drainage in that area was an issue. However, many of the risks associated with flooding have been mitigated in part by previous actions. The community conducted a stormwater drainage study and implemented the subsequent findings. During the flooding event in 2019 the village experienced high water in some areas but did not experience any damages. No evacuations were necessary during the event. The community has been working on drainage projects and has installed wider culverts to alleviate some flood-prone areas.

In 2007, the NRD provided \$50,000 to the community of Cairo to add a 48" drainage outlet for the downtown improvement project to divert excess water along the Highway 11 corridor. The previous drainage system couldn't handle a one-year rainfall event, which caused overflow ponds and flooding in low areas.

Cairo is a member of the NFIP, and the village's Floodplain Administrator (Chad Nabity) will oversee the commitments and requirements of the NFIP. The initial FIRM for the village was delineated in 6/20/1978 and the current effective map date is 9/26/2008. As of October 31, 2021,

there are four NFIP policies in-force covering \$616,400. Cairo does not currently have any repetitive loss or severe repetitive loss structures.

### **Severe Thunderstorms**

In May of 2002, a particularly strong thunderstorm passed through central Nebraska. In Cairo, 80mph winds blew windows out of cars and damage the roofs of businesses. Property damages totaled \$150,000 in the area. In 2019, severe thunderstorm winds caused damage to roofs, bleachers, and sprinklers that had to be replaced in the community. The primary concern regarding severe thunderstorms is power outages. Approximately ten percent of the power lines in Cairo are buried. There are weather radios in the Fire Hall and Centura Public Schools. Critical municipal records are protected with surge protectors and most critical facilities have backup power generators. Future thunderstorm hazard mitigation plans include providing backup generators to the critical facilities without backup sources of power and identifying storm shelters.

### **Severe Winter Storms**

Cairo has experienced many significant severe winter storms. The local planning team and NCEI report three storms that were particularly fierce. In January of 1999, several deaths were caused in vehicle accidents on Highway 30 when ice and snow caused the Highway to become treacherous. Sub-zero temperatures during this storm caused the death of a 55-year-old man in Cairo due to exposure. The December 2009 blizzard brought almost a foot of snow in three days and subsequent power outages across central Nebraska. The blizzard of February 2016 had such significant snow falls that snow removal and associated public works costs totaled \$438,000. The main concern about winter storms is power outages. Village Maintenance is in charge of snow removal for the village, especially along the snow route. The tractor, bobcat, and payloaders are considered adequate for Cairo's snow removal needs. The village recently purchased a blower attachment for the tractor to move larger amounts of snow. There are currently no designated snow routes in town. Severe winter storm hazard mitigation plans involve providing backup generators for those critical facilities without them.

### **Tornadoes and High Winds**

The last tornado to touch down near Cairo occurred in June of 1997. This F1 tornado destroyed a barn and resulted in \$450,000 in property damage. The local planning team is concerned about power outages related to tornadoes and high winds. Critical municipal records are backed up with software and thumb drives. There is a FEMA-certified safe room in the community center for public use, and alternate safe rooms in the bank and fire hall. Community education outreach centers mostly on tornadoes. The school conducts tornado drills, and the Fire Department sponsors weather alert meetings. Severe weather notification is limited to the warning siren located by the fire department. It effectively covers all of Cairo but does need to be updated. In the case of a disaster event, mutual aid agreements are in place with Doniphan, Wood River, Alda, Grand Island, and rural Hall County. The village has removed hazardous trees in the community. Hazard mitigation plans include providing backup generators, replacing the alert siren, and identifying storm shelters in the community.

## Mitigation Strategy

### New Mitigation Actions

Mitigation Action Name	Alert Sirens
Description	Evaluate and replace the existing tornado siren.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms
Estimated Cost	\$5,500
Local Funding	General Fund
Timeline	2-5 Years
Priority	High
Lead Agency	Village Board, Hall County Emergency Management
Status	Paperwork for the grant has been submitted.

Mitigation Action Name	Improve Flood and Stormwater Detention / Retention Capacity
Description	Expand the culvert on the south side of the community.
Hazard(s) Addressed	Flooding
Estimated Cost	Unknown
Local Funding	Street Account
Timeline	2-5 Years
Priority	Medium
Lead Agency	Village Board
Status	Planning Stage. Currently in talks with a bulldozer company for an estimate on cost.

Mitigation Action	Reduce Damages from Floods, Stormwater, and Heavy Precipitation Events
Description	Evaluate repetitive loss or potential loss structures located in floodplain; acquire and relocate or demolish flood prone property or elevate flood prone property; elevate equipment vulnerable to flooding.
Hazard(s) Addressed	Flooding
Estimated Cost	\$500,000+
Local Funding	General Fund
Timeline	Ongoing
Priority	Medium
Lead Agency	Floodplain Administrator
Status	This is an ongoing project. It is checked with each flood event.



**Kept Mitigation Actions**

Mitigation Action	Backup and Emergency Generators
<b>Description</b>	Identify and evaluate current backup and emergency generators; obtain additional generators based on identification and evaluation; provide portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations and other critical facilities and shelters.
<b>Hazard(s) Addressed</b>	All Hazards
<b>Estimated Cost</b>	\$20,000-\$75,000+ per Generator
<b>Local Funding</b>	General Fund
<b>Timeline</b>	2-5 Years
<b>Priority</b>	Medium
<b>Lead Agency</b>	Village Board
<b>Status</b>	Planning Stage

Mitigation Action	Storm Shelter Identification
<b>Description</b>	Identify any existing private or public storm shelters.
<b>Hazard(s) Addressed</b>	Tornadoes and High Winds, Severe Thunderstorms
<b>Estimated Cost</b>	Staff Time
<b>Local Funding</b>	Staff Time
<b>Timeline</b>	5+ Years
<b>Priority</b>	Medium
<b>Lead Agency</b>	Village Board, Hall County Emergency Management
<b>Status</b>	Planning Stage

**Plan Maintenance**

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside community planning documents (e.g., annual budgets and Capital Improvement Plans), during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

Cairo last reviewed their section of the HMP in 2017 during the required plan update. The Community Developer, Village Board, Clerk, and Deputy Clerk will be responsible for reviewing and updating the plan in the future. These individuals will review the plan annually at a council meeting.



## **Community Profile**

# **Village of Doniphan**

## **Central Platte NRD Hazard Mitigation Plan**

**2022**

## Local Planning Team

The Village of Doniphan's local planning team for the hazard mitigation plan are listed in the table below along with the meetings attended. All participant worksheets were filled out by the community.

**Table DON.1: Doniphan Local Planning Team**

Name	Title	Jurisdiction	R1 Meeting	R2 Meeting
Karee Dvorak	Village Emergency Manager	Village of Doniphan	-	Recording
Kim Finecy	Village Clerk	Village of Doniphan	-	-
Tyson Coble	Doniphan Fire Department	Village of Doniphan	Grand Island	-
Chad Nabity	Floodplain Administrator	Village of Doniphan, Hall County	Lexington – Virtually	Grand Island
Carla Maurer	-	Village of Doniphan	Grand Island	-

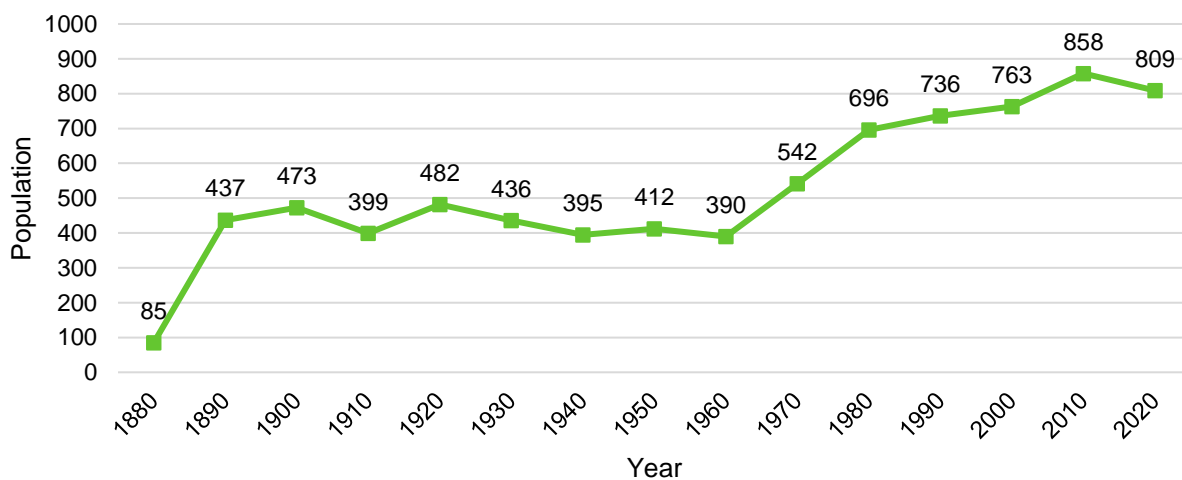
## Location and Geography

The Village of Doniphan is in the southeastern corner of Hall County and covers an area of 0.51 square miles. The major waterway in the area is the Platte River.

## Demographics

The following figure displays the historical population trend for the Village of Doniphan. This figure indicates that the population of Doniphan has been declining since 2010 to 809 people in 2020. A declining population can lead to more unoccupied housing that is not being maintained and is then at risk to high winds and other hazards. Furthermore, with fewer residents, there is decreasing tax revenue for the community, which could make implementation of mitigation projects more fiscally challenging. Doniphan's population accounted for 1.3% of Hall County's population in 2020.<sup>1</sup>

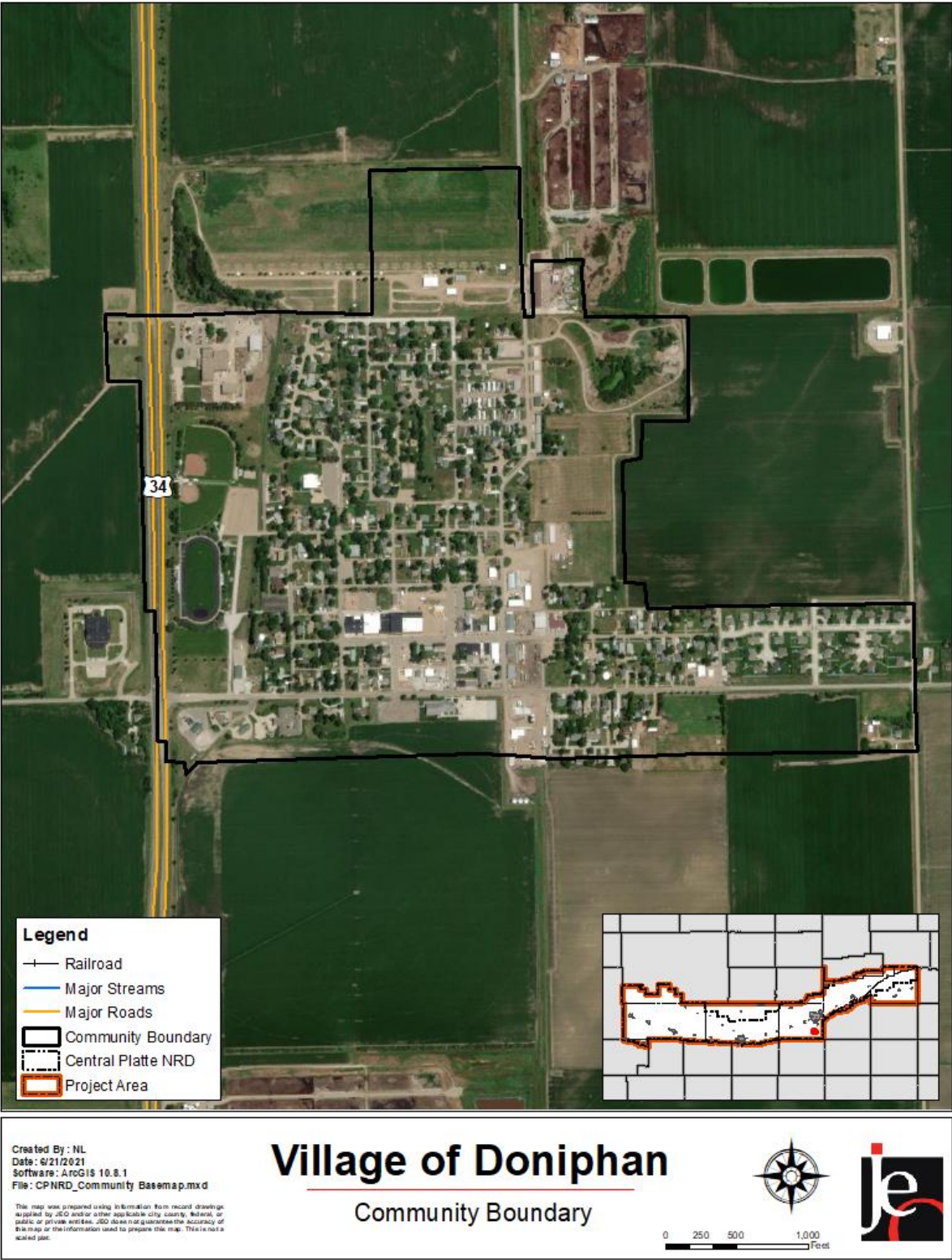
**Figure DON.1: Population 1880 – 2020**



Source: U.S. Census Bureau

<sup>1</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.

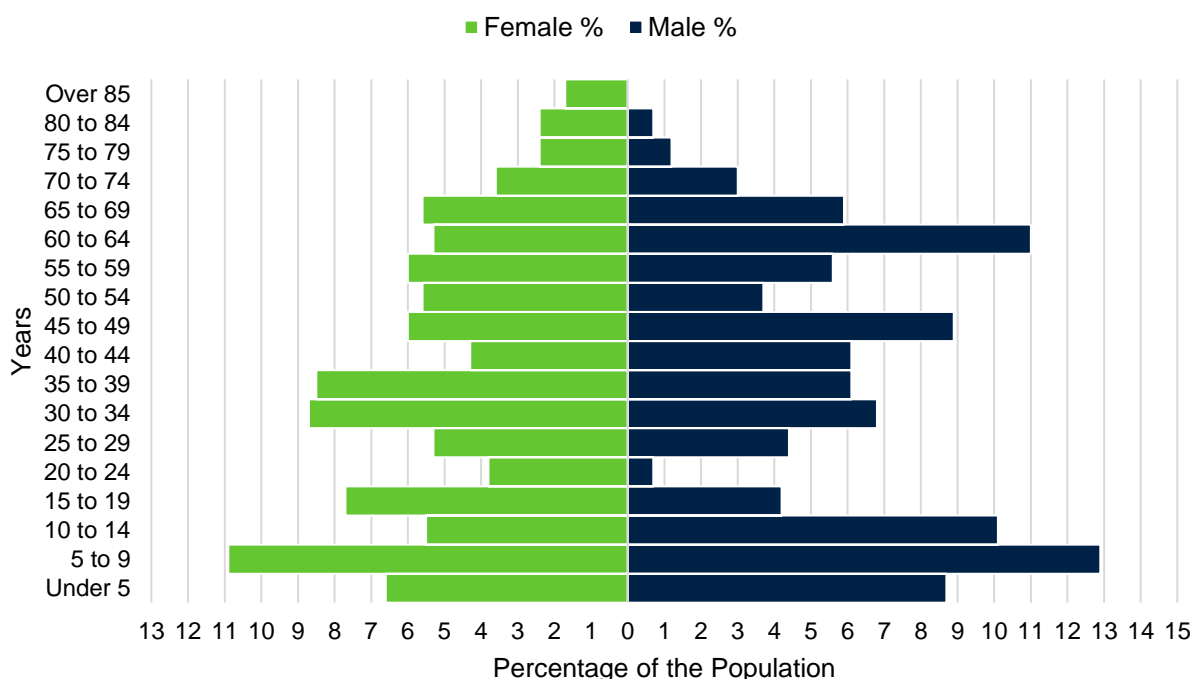
Figure DON.2: Village of Doniphan



The young, elderly, and minority populations may be more vulnerable to certain hazards than other groups. Looking at Doniphan's population:

- **1.1% is non-white.** Since 2010, Doniphan grew less ethnically diverse. In 2010, 4.2% of the Doniphan's population was non-white. By 2019, 1.1% was non-white.<sup>2</sup>
- **Older median age.** The median age of Doniphan was 36.9 years in old 2019. The population grew older since 2010, when the median age was 34.<sup>3</sup>

**Figure DON.3: Doniphan's Population Pyramid**



The figure above shows Doniphan's population percentage broken down by sex and five-year age groups. Doniphan's population is younger with a much higher percentage of the population below 40 years of age. This likely indicates a growing population in the years to come.

## Employment and Economics

Low-income populations, long distance commuters, and the unemployed may be more vulnerable to certain hazards than other groups. Doniphan's population has:

- **2.6% of people living below the poverty line.** The poverty rate (2.6%) in the Village of Doniphan was lower than the state's poverty rate (7.2%) in 2019.<sup>4</sup>
- **\$73,083 median household income.** Doniphan's median household income in 2019 (\$73,083) was \$11,000 higher than the state (\$61,439).<sup>4</sup>
- **5.5% unemployment rate.** In 2019 Doniphan had a higher unemployment rate (5.5%) when compared to the state (2.3%).<sup>4</sup>

2 United States Census Bureau. "2019 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

3 United States Census Bureau. "2019 Census Bureau American Community Survey: S0101: Age and Sex." <https://data.census.gov/cedsci/>.

4 United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." <https://data.census.gov/cedsci/>.

- **9% of workers commuted 30 minutes or more to work.** Less workers in Doniphan commuted 30 minutes or more to work than compared to workers commuting less than 15 minutes (9% compared to 28.4%).<sup>5</sup>

### Major Employers

The major employers in the community are the Doniphan-Trumbull School District, Frito Lay Distribution Center, H & H Concrete and Construction, and Nebraska Machinery. A large percentage of residents commute to work in Grand Island and Kearney.

### Housing

The age of housing may indicate which housing units were built prior to the development of state building codes. Vacant housing stock may also be more vulnerable to hazard events if it is poorly maintained. Unoccupied housing may also suggest that future development may be less likely to occur. Communities with a substantial number of mobile homes may be more vulnerable to the impacts of high winds, tornadoes, and severe thunderstorms if those homes are not anchored correctly. The local planning team noted that there is a large mobile home park with approximately 38 mobile homes located on the northeast side of the community. Renter-occupied housing depends on the initiative of landlords for proper maintenance and retrofitting to be resilient to disasters. They are less likely than homeowners to have flood insurance, or to know their risks to flooding and other hazards.

- **37.4% of housing built prior to 1970.** Doniphan has a smaller share of housing built prior to 1970 than the state (37.4% compared to 46%).<sup>6</sup>
- **10.4% of housing units vacant.** Since 2010, Doniphan's vacancy rate declined. In 2010 the vacancy rate was 11.10%. By 2019, 10.4% of housing units were vacant.<sup>6</sup>
- **8.4% mobile and manufacture housing.** The Village of Doniphan had a larger share of mobile and manufactured housing (8.4%) compared to the state (3.3%).<sup>6</sup>
- **21.5% renter-occupied.** The rental rate of Doniphan was 21.5% in 2019. The percentage went down since 2010, when renter occupied housing was at 23.2%.<sup>6</sup>

### Governance

A community's governance indicates the number of boards or offices that may be available to help implement hazard mitigation actions. The Village of Doniphan is governed by a Board Chairperson and four-member village board; other governmental offices and departments that may be involved in implementing hazard mitigation initiatives are listed below.

- Clerk/Treasurer
- Utility Department
- Streets/Parks Department
- Planning Commission
- Housing Authority
- Water and Sewer Department
- Volunteer Fire Department
- Maintenance Department
- Village Emergency Management

<sup>5</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: S0802: Means of Transportation to Work by Selected Characteristics." <https://data.census.gov/cedsci/>.

<sup>6</sup> United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the community's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects.

Municipal funds are limited to maintaining current facilities and systems. Funds have increased over recent years.

**Table DON.3: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning &amp; Regulatory Capability</b>	Comprehensive Plan	Yes
	Capital Improvements Plan	No
	Economic Development Plan	No
	Local Emergency Operations Plan	Yes
	Floodplain Management Plan	No
	Storm Water Management Plan	No
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	No
	Other (if any)	-
<b>Administrative &amp; Technical Capability</b>	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	No
	Chief Building Official	Yes
	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager	No
	Mutual Aid Agreement	Yes
	Other (if any)	-
<b>Fiscal Capability</b>	Capital Improvement Plan/ 1- & 6-Year plan	Yes
	Applied for grants in the past	No
	Awarded a grant in the past	No
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	No
	Gas/Electric Service Fees	No
	Storm Water Service Fees	No
	Water/Sewer Service Fees	Yes
	Development Impact Fees	No



Survey Components/Subcomponents		Yes/No
<b>Education &amp; Outreach Capability</b>	General Obligation Revenue or Special Tax Bonds	No
	Other (if any)	-
	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	No
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	No
	Natural Disaster or Safety related school programs	Yes
	StormReady Certification	No
	Firewise Communities Certification	No
	Tree City USA	Yes
	Other (if any)	-

Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Limited
Staff/expertise to implement projects	Moderate
Public support to implement projects	Moderate
Time to devote to hazard mitigation	Moderate

## Plan Integration

Doniphan has several planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The village will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

### Building Code (2018)

The building code sets standards for constructed buildings and structures. The village's building code was last updated in 2020 and follows Hall County's building code, which is based on the 2018 International Building Code. The code allows for raingardens in residential areas and require the use of fire-resistant building materials. In a future update, the code will require a safe room in multiple dwelling units such as apartments.

### Comprehensive Plan (2003)

The comprehensive plan is designed to guide the future actions and growth of the village. It contains goals and objectives aimed at directing development away from the floodplain, chemical storage facilities, and major transportation routes. It also limits density in areas adjacent to known hazards areas, encourages infill development, and encourages elevation of structures located in the floodplain. The plan also encourages preservation of open space in hazard-prone areas and allows for emergency access to all areas of the village. At this time, there is no strategy regarding further plan integration. Local officials may consider including a list of critical facilities, examination

of chemical storage, and documenting the hazard prioritization in future comprehensive plan updates.

### **Hall County Local Emergency Operations Plan (2020)**

Doniphan is an annex in the Hall County Local Emergency Operations Plan (LEOP). The LEOP establishes standardized policies, plans, guidelines, and procedures for emergency resources and governmental entities to respond and recover when a disaster event occurs. It contains information regarding direction and control, communications and warning, damage assessment, emergency public information, evacuation, fire services, health and human services, law enforcement, mass care, protective shelters, and resource management. This plan is updated every five years.

### **Zoning Ordinance (2021), Floodplain Ordinance, and Subdivision Regulations (2021)**

The zoning ordinance was last updated in 2021. The ordinance discourages development in the floodplain, prohibits development in the floodway, and discourages residential development near chemical storage sites and major transportation routes. It also encourages maintaining open space within the floodplain, limits development in the extrajurisdiction, and accounts for current population trends.

## **Future Development Trends**

In the past five years, the Village of Doniphan has had one new business come to the village. In the next five years some new housing is planned for development on the west side of Highway 281.

## **Community Lifelines**

### **Transportation**

Doniphan's major transportation corridor includes US Highway 34, which accommodates an average of 11,585 vehicles daily, 1,140 of which are trucks.<sup>7</sup> There are no rail lines in the community. The local planning team also identified Locust Street as another transportation route of concern. Fuel and fertilizer trucks are often transported along local routes. The village hall and prairie winds assisted living are both located along main transportation routes. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the community, as well as areas more at risk of transportation incidents.

### **Hazardous Materials**

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are six chemical storage sites within or near Doniphan which house hazardous materials. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

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<sup>7</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map." [map].  
<https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.

**Table DON.4: Chemical Storage Sites**

Name	Address	Located in Floodplain?
<b>Agricultural Services Inc</b>	101 E Pine St	N
<b>Nebraska Machinery Co</b>	10501 S US Highway 281	N
<b>Pioneer Hi-Bred Intl Inc</b>	12937 S US Highway 281	N
<b>Magellan Pipeline Company LP</b>	12275 S US Highway 281	N
<b>NPPD Doniphan Sys Control Ctr</b>	2060 W Platte River Dr	Y (1%)
<b>Aurora Co-op Elevator Company</b>	2062 W Binfield Rd	N

Source: Nebraska Department of Environment and Energy<sup>8</sup>

## Health and Medical Facilities

The following medical and health facilities are located within the community.

**Table DON.5: Health and Medical Facilities**

Name	Type of Facility	Address	Number of Beds
<b>Prairie Winds</b>	Assisted Living Facility	603 West 6th St	35

Source: Nebraska Department of Health and Human Services<sup>9,10,11,12</sup>

## Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the jurisdiction.

Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

8 Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.

9 Department of Health and Human Services. 2021. "State of Nebraska: Assisted Living Facilities." <https://dhhs.ne.gov/licensure/Documents/ALF%20Roster.pdf>.

10 Department of Health and Human Services. 2021. "State of Nebraska Roster: Hospitals." <https://dhhs.ne.gov/licensure/Documents/Hospital%20Roster.pdf>.

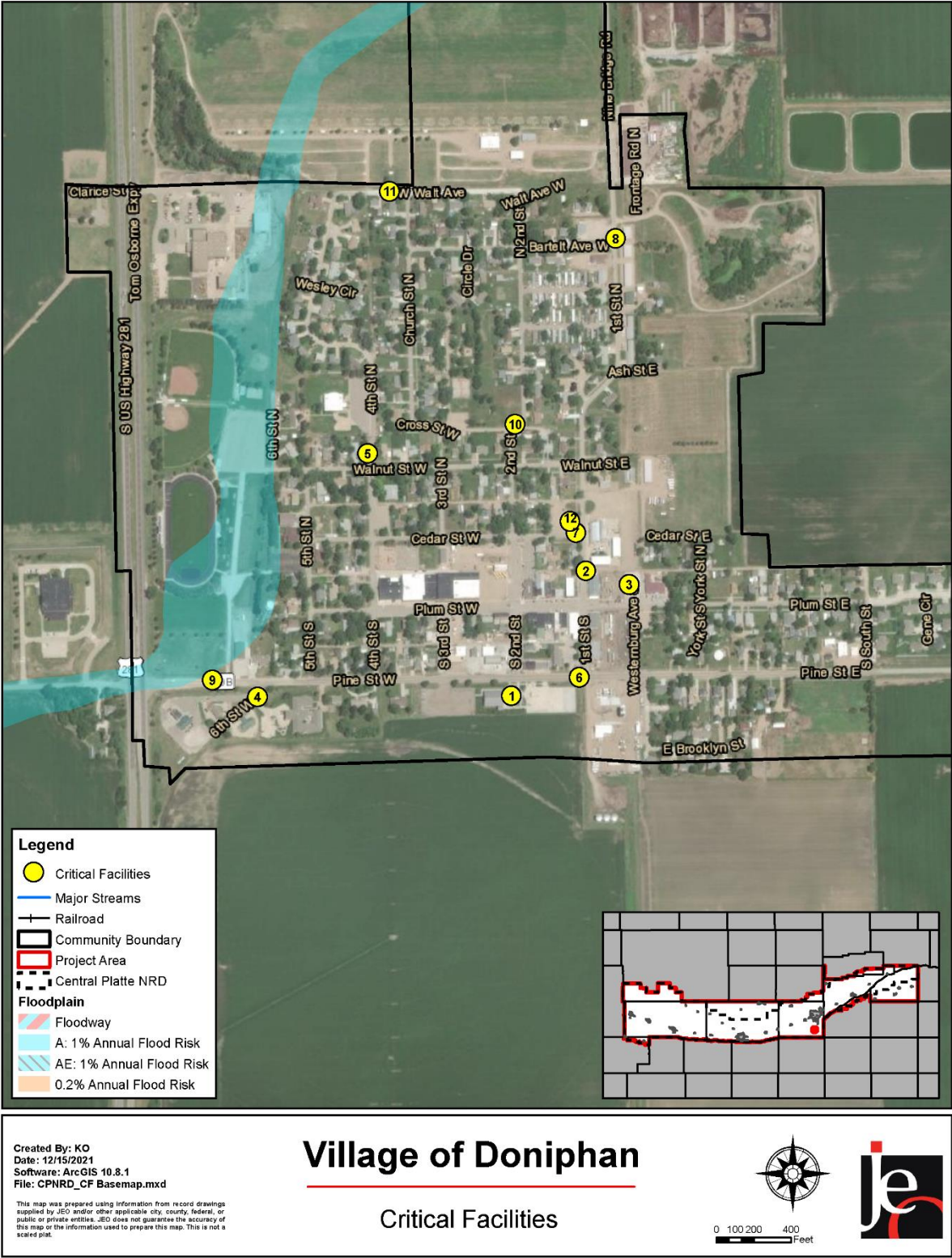
11 Department of Health and Human Services. 2021. "State of Nebraska Roster: Long Term Care Facilities." <https://dhhs.ne.gov/licensure/Documents/LTCRoster.pdf>.

12 Department of Health and Human Services. 2021. "State of Nebraska Roster: Rural Health Clinic." [https://dhhs.ne.gov/licensure/Documents/RHC\\_Roster.pdf](https://dhhs.ne.gov/licensure/Documents/RHC_Roster.pdf).

**Table DON.6: Critical Facilities**

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	Doniphan Community Center/EOC	N	N	N
2	Doniphan-Trumbull Public School	Y	N	N
3	Fire & Rescue	N	Y	N
4	Prairie Winds Assisted Living Center	Y	Y	N
5	United Methodist Church	Y	N	N
6	Village Hall	N	Y - Portable	N
7	Village Maintenance Shop	N	N	N
8	Wastewater Lagoon	N	N	N
9	Water Tower	N	N	N
10	Well	N	N	N
11	Well	N	N	N
12	Well	N	N	N

Figure DON.3: Critical Facilities





## Parcel Improvements and Valuation

The planning team acquired GIS parcel data from the County Assessor to analyze the location, number, and value of property improvements (e.g. buildings, garages, sheds etc.) at the parcel level. The data did not contain the number of structures on each parcel. A summary of the results of this analysis is provided in the following tables.

**Table DON.7: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
360	\$43,851,537	10	\$3,640,321	2.8%

Source: County Assessor, 2021

**Table DON.8: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
360	\$43,851,537	0	\$0	0%

Source: County Assessor, 2021

## Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries. Larger scale and more damaging events that impacted the community are discussed under Hazard Prioritization.

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the community. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the community's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

### Flooding

The Village of Doniphan has a flood risk area that goes through the western side of the community. According to NCEI data, there have been five flooding events since 1996 that have caused approximately \$1,006,000 in property damages. In December of 2010, ice jams caused the Platte River to flood, necessitating home evacuations for areas just west of Doniphan. A second flood in June of 2015 was caused by heavy rains. Water accumulated on the southbound lane of Highway 281 near Rosedale Road, causing a few traffic accidents.

Doniphan is a member of the NFIP, and the village's Floodplain Administrator (Chad Nabity) will oversee the commitments and requirements of the NFIP. The initial FIRM for the village was delineated in 8/1/1978 in and the current effective map date is 9/26/2008. As of October 31, 2021, there are no NFIP policies in place. Doniphan does not currently have any repetitive loss or severe repetitive loss structures.

The Village of Doniphan has gone through the Risk Mapping, Assessment, and Planning (MAP) process. Risk MAP is a FEMA program that provides communities with flood information and additional flood risk data (e.g., flood depth grids, percent chance grids, areas of mitigation interest, etc.). As part of that process, a HAZUS analysis was performed for the Risk MAP areas. The figure below shows the HAZUS analysis results for Doniphan.



**Figure DON.4: Estimated Potential Losses for Flood Event Scenarios**

Type	Inventory Estimated Value	% of Total	10% (10-yr) Dollar Losses <sup>1</sup>	10% Loss Ratio <sup>2</sup>	2% (50-yr) Dollar Losses <sup>1</sup>	2% Loss Ratio <sup>2</sup>	1% (100-yr) Dollar Losses <sup>1</sup>	1% Loss Ratio <sup>2</sup>	0.2% (500-yr) Dollar Losses <sup>1</sup>	0.2% Loss Ratio <sup>2</sup>	Annualized Losses <sup>3</sup> (\$/yr)	Ann. Loss Ratio <sup>2</sup>
Residential Building & Contents	\$110,600,000	76%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	\$26,300,000	18%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	\$8,500,000	6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Building & Contents <sup>3</sup>	\$146,400,000	100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Business Disruption <sup>4</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>TOTAL<sup>5</sup></b>	<b>\$146,400,000</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.

<sup>1</sup>Losses shown are rounded to nearest \$10,000 for values under \$100,000 and to the nearest \$100,000 for values over \$100,000.

<sup>2</sup>Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent.

<sup>3</sup>Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.

<sup>4</sup>Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.

<sup>5</sup>Total = Total Building and Contents + Business Disruption

The figures in this table only represent information within the West Fork Big Blue

Source: FEMA<sup>13</sup>

## Hazardous Materials Release

The planning team identified this a hazard of top concern due to concerns over fertilizer stations located in the community that have the potential to leak. Doniphan has experienced one chemical release incident on a transportation route. The incident occurred in 2011 and involved 42 liquid gallons of ammonia spilling on a county road and causing \$2,500 in damages. Additionally, Doniphan has experienced three fixed chemical spill events that involved 30 barrels of oil, 420 gallons of gasoline, and ammonia. In the event of a spill, the Doniphan Volunteer Fire Department would respond. They are trained on spill cleanup and have protective gear.

## Severe Thunderstorms

According to NCEI data, there have been 41 severe thunderstorm events in Doniphan that have caused \$1,418,500 in damages. Doniphan protects its critical municipal records with surge protectors and a cloud-based backup system. Approximately ten percent of power lines are buried leaving the village vulnerable to power outages from fallen trees and branches.

Hail is a top concern for the local planning team because of the potential for property damage. The most significant hail event in Doniphan caused \$1,000,000 in property damage in May of 2002 when 2.75-inch hail destroyed roofs, windows, and vehicles. The community's critical facilities are not fitted with hail resistant building materials but are insured for hail damage. Residents do not receive information on hail resistant building materials with building permits. The local tree board manages hazardous trees in the area.

## Severe Winter Storms

One of the worst winter storms in recent memory is an ice storm that occurred in December of 2006. Property damages of \$100,000 were incurred when freezing rain broke tree limbs and downed power lines and power poles. Several days of power outages were reported in the area. A blizzard in February 2016 had such significant snow falls that snow removal and associated public works costs totaled \$438,000. The local planning team is concerned about power outages and emergency personnel mobility during severe winter storms. There are no designated snow

<sup>13</sup> FEMA. January 2017. "Flood Risk Report: West Fork Big Blue, 10270203".

routes or snow fences in place. The Maintenance Department utilizes a truck with a plow and a loader with a plow for snow removal.

### Tornadoes and High Winds

According to NCEI data, there have been two tornadoes in the community. In June of 1997, several EF0 tornadoes passed near Doniphan, causing no property damage. In October of 2000, a funnel cloud was spotted near the village, also causing no property damage. Critical municipal records are backed up with cloud-based software. The warning siren in Doniphan is maintained by Hall County Emergency Management and can be heard throughout the community. The county also offers text alerts. Doniphan has mutual aid agreements with surrounding communities and participates in NEWARN, a mutual aid network that provides essential utilities after a disaster event. As there are no safe rooms in Doniphan, hazard mitigation actions include providing safe rooms to shelter the community. The event center and bank are available for shelter if necessary.

## Mitigation Strategy

### New Mitigation Actions

Mitigation Action	Reduce Damages from Floods, Stormwater, and Heavy Precipitation Events
Description	Evaluate repetitive loss or potential loss structures located in floodplain; acquire and relocate or demolish flood prone property or elevate flood prone property; elevate equipment vulnerable to flooding.
Hazard(s) Addressed	Flooding
Estimated Cost	\$500,000+
Local Funding	General Fund
Timeline	Ongoing
Priority	Medium
Lead Agency	Floodplain Administrator
Status	This is an ongoing project. It is checked with each flood event.

### Kept Mitigation Actions

Mitigation Action	Backup and Emergency Generators
Description	Identify and evaluate current backup and emergency generators; obtain additional generators based on identification and evaluation; provide portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations and other critical facilities and shelters.
Hazard(s) Addressed	All Hazards
Estimated Cost	\$20,000+
Local Funding	General Budget
Timeline	2-5 Years
Priority	High
Lead Agency	Utilities Department
Status	A backup generator is available in the Hoffman Subdivision. The village has a tractor for the wells. However, a backup generator would work better in the event the tractor is not available.

Mitigation Action	Reduce Tree Damage and Damage from Trees
Description	Conduct tree inventory; develop tree maintenance/trimming program; implement tree maintenance/trimming program; remove hazardous limbs and/or trees.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms, Severe Winter Storms
Estimated Cost	\$500
Local Funding	General Budget
Timeline	Ongoing
Priority	Medium
Lead Agency	Village Board, Utilities Department
Status	This is an ongoing action. Trees are trimmed with the help of the Southern Public Power District. Letters are sent to property owners to remove hazardous limbs from events.

Mitigation Action	Storm Shelter / Safe Room
Description	Identify and evaluate existing safe rooms and/or storm shelters; improve and/or construct safe rooms and/or storm shelters; design and construct storm shelters and safe rooms in highly vulnerable areas such as mobile home parks, campgrounds, schools, etc.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms
Estimated Cost	\$150/sq ft for retrofit; \$300/sq ft for new construction
Local Funding	General Budget
Timeline	5+ Years
Priority	Low
Lead Agency	Village Board
Status	The village currently uses the church as a storm shelter but will continue to seek out other storm shelters.

### Removed Mitigation Actions

Mitigation Action	Improve Electrical Service
Description	Evaluate hardening, retrofitting, looping and/or burying of power lines and related infrastructure and/or comparable protection measures; provide looped distribution service and other redundancies in the electrical system as a backup power supply in the event the primary system is destroyed or fails; implement measures to improve electrical service; bury power lines for future construction.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms, Severe Winter Storms
Status	This project is better handled by the Southern Public Power District as they take care of the electrical system including lines, service, construction, etc. in the village.

Mitigation Action	Weather Radios
Description	Purchase weather radios for all critical facilities; inform areas with high noise pollution to consider purchasing a weather radio.
Hazard(s) Addressed	All Hazards
Status	The village office has a weather radio, and all employees have their cell phones, which alert them in the event of a severe storm.

## **Plan Maintenance**

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside community planning documents (e.g., annual budgets and Capital Improvement Plans), during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

Doniphan last reviewed their section of the HMP in 2017 during the plan update. The Board Chairman, Maintenance Director, and Doniphan Emergency Management Director will be responsible for reviewing updating the plan in the future. These individuals will review the plan annually during a public board meeting.

## **Community Profile**

# **City of Grand Island**

## **Central Platte NRD Hazard Mitigation Plan**

**2022**

## Local Planning Team

The City of Grand Island's local planning team for the hazard mitigation plan are listed in the table below along with the meetings attended. All participant worksheets were filled out and returned by the community and local stakeholders.

**Table GRA.1: Grand Island Local Planning Team**

Name	Title	Jurisdiction	R1 Meeting	R2 Meeting
<b>Rashad Moxey</b>	Planner 1	City of Grand Island	-	-
<b>Chad Nabity</b>	Floodplain Administrator	Hall County, City of Grand Island	Lexington – Virtually	Grand Island
<b>Keith Kurz</b>	Assistant Public Works Director	City of Grand Island	Grand Island	Grand Island
<b>Shannon Callahan</b>	Street Superintendent	City of Grand Island	-	Grand Island
<b>Bill Redinger</b>	Risk Manager	Grand Island Regional Medical Center	Grand Island	Lexington - Virtually

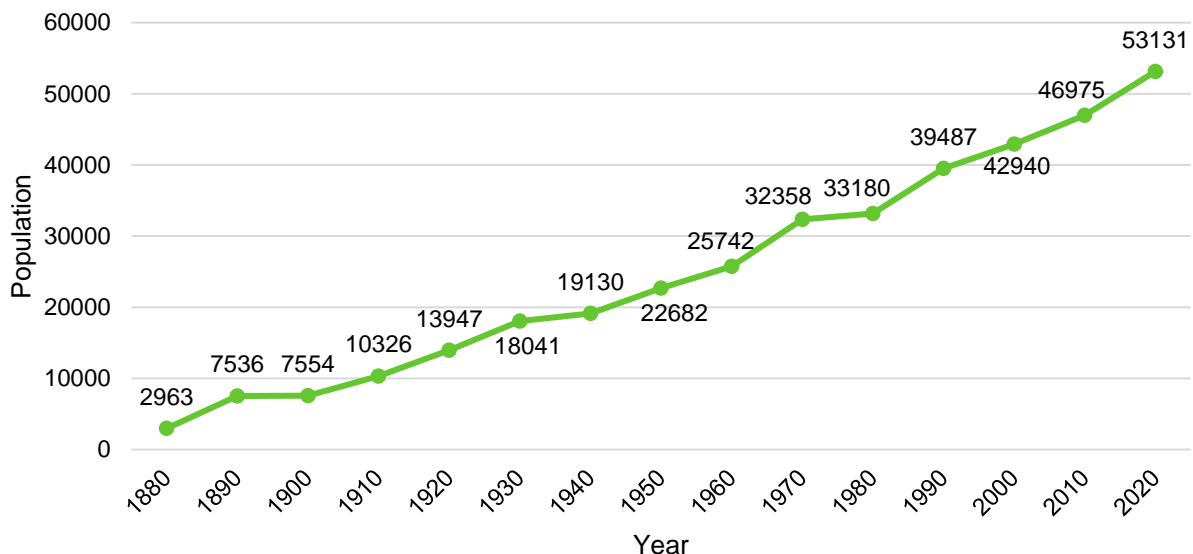
## Location and Geography

The City of Grand Island is in northeastern Hall County and covers an area of 28.6 square miles. The major waterway in the area is the Platte River, located south of the city and running from the southwest to the northeast. Grand Island is the county seat and largest community in Hall County.

## Demographics

The following figure displays the historical population trend for the City of Grand Island. This figure indicates that the population of Grand Island has been increasing since 1880 to 53,131 people in 2020. Increasing populations are associated with increased hazard mitigation and emergency planning requirements for development. Increasing populations can also contribute to increasing tax revenues, allowing communities to pursue additional mitigation projects. Grand Island's population accounted for 84.5% of Hall County's population in 2020.<sup>1</sup>

**Figure GRA.1: Population 1880 - 2020**

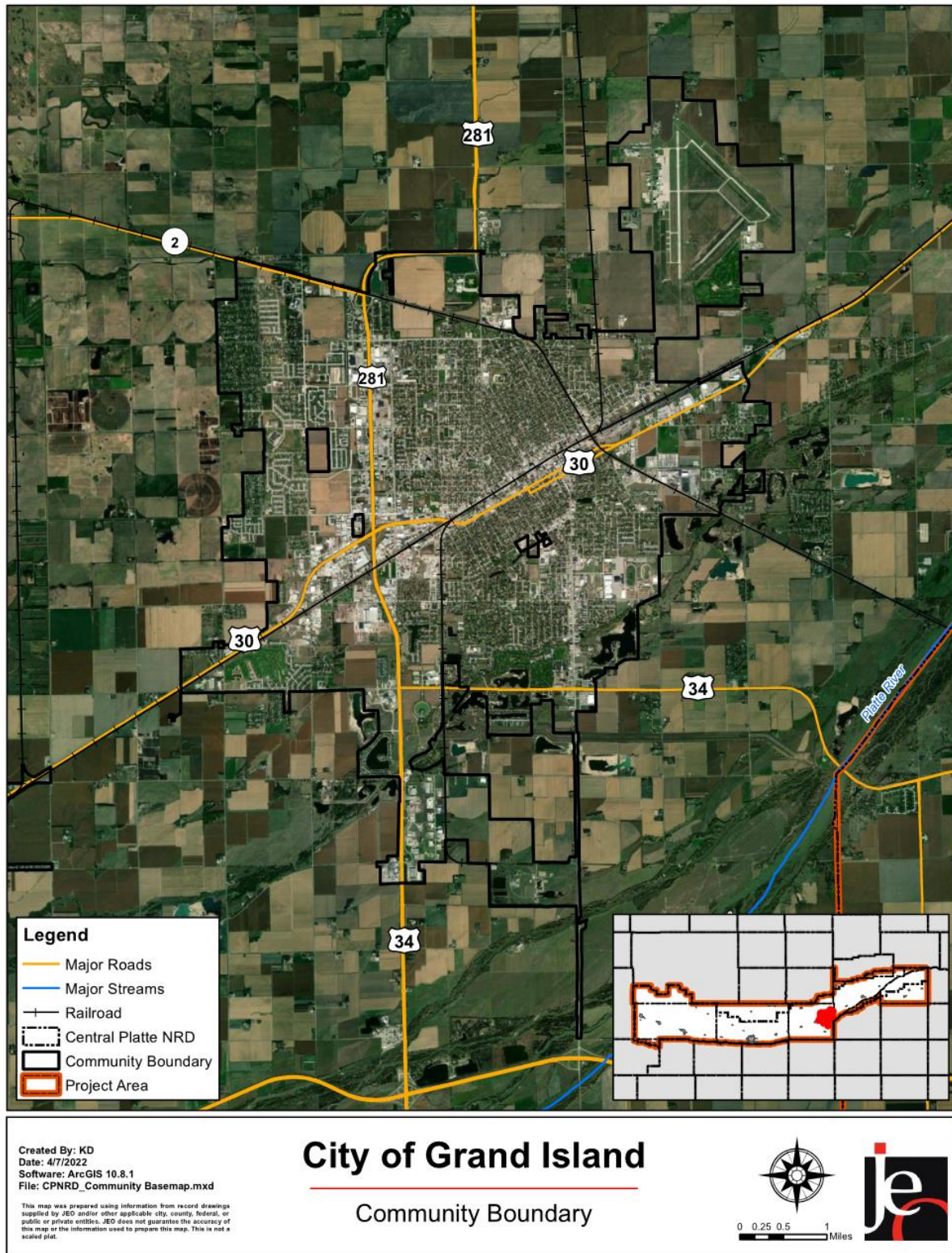


Source: U.S. Census Bureau

<sup>1</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.



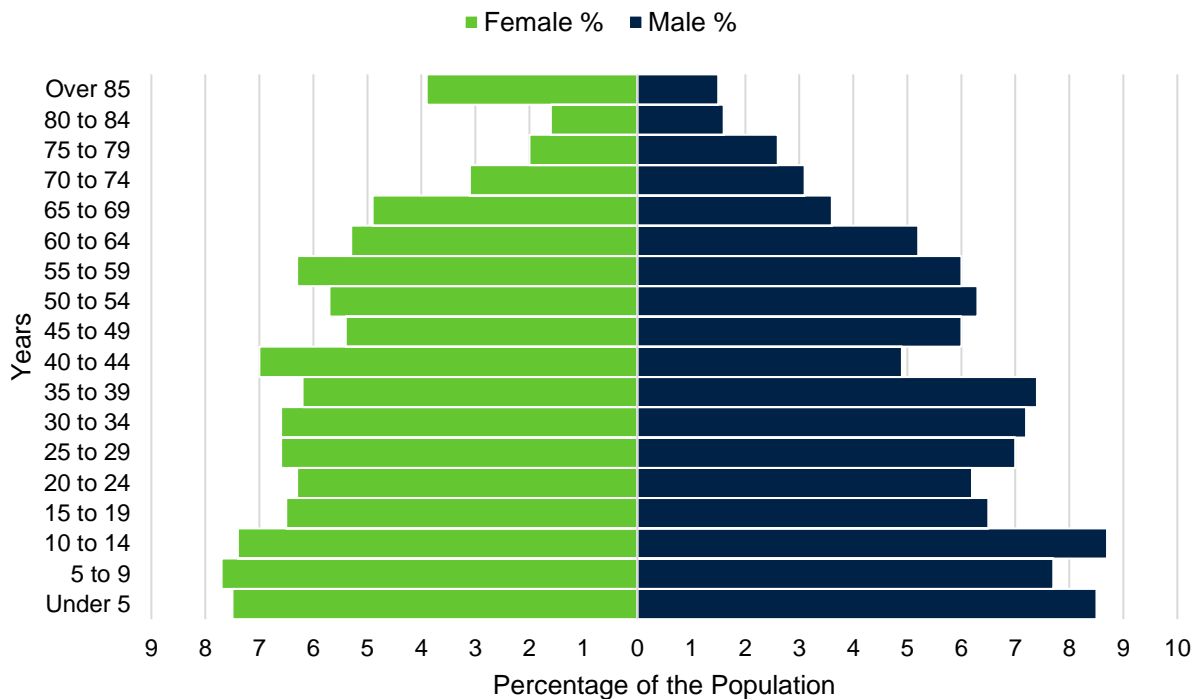
Figure GRA.2: City of Grand Island



The young, elderly, and minority populations may be more vulnerable to certain hazards than other groups. Looking at Grand Island's population:

- **18% is non-white.** Since 2010, Grand Island grew more ethnically diverse. In 2010, 11.6% of the Grand Island's population was non-white. By 2019, 18.0% was non-white.<sup>2</sup>
- **34.9 median age.** The median age of Grand Island was 34.9 years in old 2019. The population grew slightly older since 2010, when the median age was 34.7.<sup>3</sup>

**Figure GRA.3: Grand Island's Population Pyramid**



The figure above shows Grand Island's population percentage broken down by sex and five-year age groups. Grand Island's population is likely to continue growing with a higher percentage of the population less than 40 years of age.

## Employment and Economics

Low-income populations, long distance commuters, and the unemployed may be more vulnerable to certain hazards than other groups. Grand Island's population has:

- **10.9% of people living below the poverty line.** The poverty rate (10.9%) in the City of Grand Island was higher than the state's poverty rate (7.2%) in 2019.<sup>4</sup>
- **\$54,965 median household income.** Grand Island's median household income in 2019 (\$54,965) was \$6,474 lower than the state (\$61,439).<sup>4</sup>

2 United States Census Bureau. "2019 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

3 United States Census Bureau. "2019 Census Bureau American Community Survey: S0101: Age and Sex." <https://data.census.gov/cedsci/>.

4 United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." <https://data.census.gov/cedsci/>.

- **3% unemployment rate.** In 2019 Grand Island had a slightly higher unemployment rate (3.0%) when compared to the state (2.3%).<sup>4</sup>
- **14.3% of workers commuted 30 minutes or more to work.** Less workers in Grand Island commuted 30 minutes or more to work than compared to workers commuting less than 15 minutes (14.3% compared to 56.7%).<sup>5</sup>

## Major Employers

The major employers in the community are the St. Francis Hospital, JBS Swift, Principal Financial, Chief Industries, Grand Island Public Schools, Case IH, Hornady Manufacturing, and Global Industries. Most community members stay in Grand Island for work.

## Housing

The age of housing may indicate which housing units were built prior to the development of state building codes. Those houses and vacant housing may be more vulnerable to hazard events if they are poorly maintained. Unoccupied housing may also suggest that future development may be less likely to occur. Communities with a substantial number of mobile homes may be more vulnerable to the impacts of high winds, tornadoes, and severe thunderstorms if those homes are not anchored correctly. Renter-occupied housing depends on the initiative of landlords for proper maintenance and retrofitting to be resilient to disasters. They are less likely than homeowners to have flood insurance, or to know their risks to flooding and other hazards. Grand Island's housing stock has:

- **71% of housing built prior to 1970.** Grand Island has a larger share of housing built prior to 1970 than the state (71% compared to 46%).<sup>6</sup>
- **6.5% of housing units vacant.** Since 2010, Grand Island's vacancy rate grew. In 2010 the vacancy rate was 5.4%. By 2019, 6.5% of housing units were vacant.<sup>6</sup>
- **4.4% mobile and manufacture housing.** The City of Grand Island had a larger share of mobile and manufactured housing (4.4%) compared to the state (3.3%).<sup>6</sup> Northwest Grand Island has two mobile home parks, northeast Grand Island has two mobile home parks, and southeast Grand Island has three mobile home parks.
- **41.2% renter occupied.** The rental rate of Grand Island was 41.2% in 2019. The percentage went up since 2010, when renter occupied housing was at 36.6%.<sup>6</sup>

## Governance

A community's governance indicates the number of boards or offices that may be available to help implement hazard mitigation actions. The City of Grand Island is governed by a mayor and ten-member city council; other governmental offices and departments that may be involved in implementing hazard mitigation initiatives are listed below.

- Clerk/Treasurer
- Streets/Parks Superintendent
- Planning Commission
- Housing Authority
- Sewer and Stormwater Department
- Fire Department

5 United States Census Bureau. "2019 Census Bureau American Community Survey: S0802: Means of Transportation to Work by Selected Characteristics." <https://data.census.gov/cedsci/>.

6 United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.



- Tree Board
- City Engineer
- Floodplain Administrator
- Finance Department
- Utilities Department
- Police Department

## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the community's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects.

Municipal funds are sufficient to pursue new capital projects but are limited by the money available. Capital improvement plans are in place as budgets allow and are roughly planned several years out due to project timelines but can change as needs and budgets dictate. Currently a large portion of funds are already dedicated to stormwater drainage projects, the Platte Valley Industrial Park, and Upper Prairie Silver Moores Flood Control Project. Funds have increased over recent years.

**Table GRA.2: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning &amp; Regulatory Capability</b>	Comprehensive Plan	Yes
	Capital Improvements Plan	Yes
	Economic Development Plan	Yes
	Local Emergency Operations Plan	Yes
	Floodplain Management Plan	No
	Storm Water Management Plan	Yes
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Regulation	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	No
	Other (if any)	Long Range Transportation Plan, Wood River Watershed Flood Risk Reduction Plan, Wood River Watershed Study
<b>Administrative &amp; Technical Capability</b>	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	Yes
	Chief Building Official	Yes
	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager	Yes
	Mutual Aid Agreement	Yes

Survey Components/Subcomponents		Yes/No
	Other (if any)	-
<b>Fiscal Capability</b>	Capital Improvement Plan/ 1- & 6-Year plan	Yes
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	Yes
	Gas/Electric Service Fees	Yes
	Storm Water Service Fees	Yes
	Water/Sewer Service Fees	Yes
	Development Impact Fees	Yes
	General Obligation Revenue or Special Tax Bonds	Yes
	Other (if any)	-
<b>Education &amp; Outreach Capability</b>	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes
	Natural Disaster or Safety related school programs	Yes
	StormReady Certification	Yes
	Firewise Communities Certification	No
	Tree City USA	Yes
	Other (if any)	-

Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Moderate
Staff/expertise to implement projects	High
Public support to implement projects	High
Time to devote to hazard mitigation	Limited

## Plan Integration

Grand Island has several planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The city will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

### Building Codes (2021)

The building code sets standards for constructed buildings and structures. The city's building codes are based on the 2018 International Building Code and 2018 International Residential Code. The only amendment is to the emergency exits section.

### **Capital Improvements Plan (2022)**

The capital improvements plan annually outlines projects the city would like to pursue and provides a planning schedule and financing options. Projects include upsizing culverts and drainage structures, upgrading storm sewer systems, and improving roadway drainage. The capital improvements plan is updated annually. Projects identified in the HMP are reviewed for inclusion in the capital improvement plan.

### **Comprehensive Plan (2004)**

The comprehensive plan is designed to guide the future actions and growth of the city. The plan includes hazard mitigation goals that are similar to the goals identified in the HMP and includes a hazard mitigation section. This section has a risk assessment that discusses flooding, severe weather, erosion, drought, infrastructure failure, and hazardous material accidents. It also contains recommendations for implementation of the hazard mitigation goals and objectives. Due to the age of the document many of the recommendations will need to be updated and integrated with the current HMP. This plan will start to be updated in 2022.

### **Floodplain Ordinance, Zoning Ordinance, and Subdivision Regulations (2004)**

The city's floodplain ordinance, zoning ordinance, and subdivision regulations outline where and how development should occur in the future. They discourage development in the floodplain, require a floodplain permit for new developments or substantial improvements in the floodplain, require at least one foot of elevation above base flood elevation in the floodplain, prohibit new habitable structures within the floodway, and allow for the city to restrict the subdivision of land within the floodplain. They also discourage development near chemical storage sites and along major transportation routes. The documents encourage maintaining open space within the floodplain and limit development in the extrajurisdiction.

### **Hall County Local Emergency Operations Plan (2020)**

Grand Island is an annex in the Hall County Local Emergency Operations Plan (LEOP). The LEOP establishes standardized policies, plans, guidelines, and procedures for emergency resources and governmental entities to respond and recover when a disaster event occurs. It contains information regarding direction and control, communications and warning, damage assessment, emergency public information, evacuation, fire services, health and human services, law enforcement, mass care, protective shelters, and resource management. This plan is updated every five years.

### **Long Range Transportation Plan (2021)**

The long-range transportation plan is a 25-year plan for the region's future transportation system. It identifies the most pressing issues facing the transportation system and creates solutions to these issues. Alternatives identified in the plan were evaluated to see how well they would fit in the natural and built environment. Specific considerations were given to wetlands, floodplains, and levees.

### **Stormwater Management Ordinance (2004)**

The stormwater management ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system in order to help the city maintain compliance with the National Pollution Discharge Elimination System permit process. Objectives include prohibiting illicit connections and discharges, preventing non-stormwater discharges to the stormwater system, reducing pollutants from construction activities, and requiring stormwater runoff controls.



### **Wood River Watershed Flood Risk Reduction Plan (Under Development)**

The primary purpose of the Wood River Watershed Flood Risk Reduction Plan is flood risk reduction within and near the communities of Riverdale, Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. It will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. This plan is being funded by the Central Platte NRD and NRCS through the Watershed and Flood Prevention Operations (WFPO) Program. Projects identified in the plan with a positive benefit-cost ratio will be reviewed for inclusion in the HMP.

### **Wood River Watershed Study (2020)**

This study was conducted by the Nebraska Silver Jackets to develop the 1% Annual Exceedance Probability (AEP) frequency flow data for the communities of Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. Results reflect that the flow frequency is larger than the effective Flood Insurance Study for the Kearney to Alda reach of the Wood River. The results also estimate a 1% AEP peak discharge that is 15% less than the current design for the Grand Island diversion channel. This study will help support ongoing WFPO studies and future NFIP mapping efforts in the region.

### **Future Development Trends**

Over the past five years the new emergency operation center was completed, a fire station was relocated, and a new hospital was built along Husker Highway and Highway 281. In addition, road expansion and improvements were made to North Road/Old Potash Highway. No new structures were developed in the floodplain or other known hazardous areas. In the next five years, two new housing developments are planned. One will be located in northwest Grand Island near Highway 2 and Independence Avenue. The other is planned to be in the southern portion of Grand Island along Highway 281. A Tabitha housing project that will have 200 residents and staff will be completed in August 2022. The project will be directly west of the Grand Island Medical Center. This will add a high concentration of vulnerable individuals to the area.

**Figure GRA.4: Tabitha Housing Project Construction**



## Community Lifelines

### Transportation

Grand Island's major transportation corridors include US Highway 30, 34, 281 and State Highway 2. The most traveled route is Highway 281 with an average of 21,680 vehicles daily, 1,325 of which are trucks.<sup>7</sup> The city has a Burlington Northern Santa Fe, Union Pacific, and Nebraska Central Railroad Company rail lines that go through the community. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the community, as well as areas more at risk of transportation incidents.

### Hazardous Materials

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are 56 chemical storage sites within or near Grand Island which house hazardous materials. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

**Table GRA.3: Chemical Storage Sites**

Name	Address	Located in Floodplain?
Gerhold Concrete Co	1431 S Webb Rd	N
Overhead Door Co	2514 E US Highway 30	N
VA Nebraska - Western Iowa HCS	2201 N Broadwell Ave	N
US Foods	3636 W Stolley Park Rd	N
GI Truck Service	432 S Stuhr Rd	N
Swift Beef Company	555 S Stuhr Rd	N
McCain Foods USA Inc	2629 N Broadwell Ave	N
CNH Industrial America LLC	3445 W Stolley Park Rd	N
Agricultural Services Inc	2777 N Broadwell Ave	N
Trego/Dugan Aviation Inc	3661 Sky Park Rd	N
ARS Nebraska LLC	1209 S Alda Rd	N
Jiffy Lube 0029	3423 W State St	N
Lineage Logistics LLC	205 E Roberts St	N
Oil Dealers Association	4032 W Old Highway 30	N
Sapp Bros Petroleum Inc	1013 S Adams St	N
Consolidated Concrete Co	3440 W Old Highway 30	N
Ryder Truck Rental Inc 0987	4039 Stauss Rd	N
Chief Industries Inc	1119 S Adams St	N
Charter Communications NE23129	2533 W Old Lincoln Hwy	N
Christensen Concrete Products	3990 W US Highway 30	N
Chief Industries Buildings Div	2391 S North Rd	N
Bosselman Truck Plaza	3335 W Wood River Rd	Y (1%)*
Darling Ingredients Inc	5251 W Guenther Rd	Y (1%)
Sunbelt Rentals 416	510 Claude Rd	N
Grand Island Water Department	370 N Pine St	N
C W Burdick Generating Station	800 Bischeld St	N
Pepsi Bottling Group LLC	2422 E US Highway 30	N
Matheson Tri-Gas Inc	2320 S Webb Rd	N
Alter Nebraska Corporation	1119 E 4th St	N
Union Pacific Railroad	601 E South Front St	N
NDOT Grand Island Yard	3305 W Old Potash Hwy	N
Platte Generating Station	1035 W Wildwood Dr	N

<sup>7</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map." [map]. <https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.

Name	Address	Located in Floodplain?
Hornady Manufacturing Company	3625 W Old Potash Hwy	N
BKEP Materials LLC	4112 N Academy Rd	Y (1%)
CenturyLink Central Office	105 N Wheeler Ave	N
Sprint Grand Island POP	333 N Pine St	N
AT&T NE0900	144 W Roberts St	N
Chesterman Coca-Cola	1617 Holland Dr	N
Safety-Kleen Systems Inc	2700 W 2nd St	N
CNH America LLC - Miller Bldg	1011 Claude Rd	N
Sam's Club 6461	1510 N Diers Ave	N
Windstream Communications	3650 W 13th St	N
AmeriCold Logistics LLC	204 E Roberts St	N
The Home Depot Store 3208	911 Allen Dr	N
Grand Island Potable Water	2700 Wellfield Rd	Y (1%)
GIUD Rogers Reservoir	3990 W Old Potash Hwy	N
Standard Iron Inc	4160 Gold Core Rd	N
Army Aviation Support Facility	3010 E Airport Rd	N
Central Sand & Gravel Co 97	1672 S Shady Bend Rd	N
Aurora Co-op Elevator Company	4155 E US Highway 30	Y (1%)
Bosselman Energy Inc	4705 Juergen Rd	N
American Eagle Airlines	3743 Sky Park Rd	N
Verizon Wireless MTSO	3650 W 13th St	N
Verizon Wireless Newfair	1203 S Stuhr Rd	Y (1%)
RoadBuilders Machinery & Sup	4949 Juergen Rd	N
Grand Island Olsen Water Tower	997 S Engleman Rd	N

Source: Nebraska Department of Environment and Energy<sup>8</sup>

\*Has a LOMA.

## Health and Medical Facilities

The following medical and health facilities are located within the community.

Table GRA.4: Health and Medical Facilities

Name	Type of Facility	Address	Number of Beds
CHI Health St. Francis	Hospital	2620 West Faidley Ave	155
Grand Island Regional Medical Center	Hospital	3533 Prairieview St	67
Edgewood Grand Island Senior Living	Assisted Living Facility	214 North Piper	14
Emerald Nursing and Rehab Lakeview	Assisted Living Facility/Long Term Care Facility	1405 West HWY 34	113
Crane Meadows Assisted Living	Assisted Living Facility	4071 Timberline St	44
Grand Island Bickford Cottage LLC	Assisted Living Facility	3285 Woodridge Blvd	44
Grand Island Country House	Assisted Living Facility	833 Alpha St	29
Lebensraum Assisted Living	Assisted Living Facility	118 South Ingalls St	33
Primrose Retirement Community of Grand Island	Assisted Living Facility	3990 W Capital Ave	42
Riverside Lodge	Assisted Living Facility	404 Woodland Dr	75
The Heritage at Sagewood	Assisted Living Facility	1920 Sagewood Ave	136
Azria Health Broadwell	Long Term Care Facility	800 Stoeger Drive	76

8 Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.

<b>CHI Health St. Francis</b>	Long Term Care Facility	2116 West Faidley Ave	36
<b>Good Samaritan Society - Grand Island Village</b>	Long Term Care Facility	4061 Timberline St	67
<b>Tiffany Square</b>	Long Term Care Facility	3119 West Faidley Ave	103

Source: Nebraska Department of Health and Human Services<sup>9,10,11,12</sup>

## Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the jurisdiction.

Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table GRA.5: Critical Facilities**

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	American Red Cross	N	N	N
2	Barr Jr. High School	Y	N	N
3	Blessed Sacrament Church	Y	N	N
4	Burdick Power Station	N	N	N
5	Career Pathway Institute	N	N	N
6	Central District Health Department	N	Y*	N
7	Central NE Regional Airport	N	N	N
8	Century Link	N	N	N
9	Christ Lutheran School	N	N	N
10	City Hall	N	Y	N
11	Davita Dialysis	N	N	N
12	Dodge School	Y	N	N
13	E Free Church	Y	N	N
14	Early Learning Center	N	N	N
15	Elec Division Facility	N	N	N
16	Engleman Elementary School	Y	N	N
17	FBI Office	N	N	N
18	First Presbyterian Church	Y	N	N
19	Fonner Park	Y	N	N
20	Gates Elementary School	Y	Y	N
21	Grand Island Fire #1	N	Y	N
22	Grand Island Fire #2	N	Y	N
23	Grand Island Fire #3	N	Y*	N
24	Grand Island Fire #4	N	Y	N
25	Grand Island Fleet Services/Streets Division	N	N	N
26	Grand Island Public Schools Administration	Y	Y	N
27	Grand Island Regional Medical Center	N	Y	N

9 Department of Health and Human Services. 2021. "State of Nebraska: Assisted Living Facilities."

<https://dhhs.ne.gov/licensure/Documents/ALF%20Roster.pdf>.

10 Department of Health and Human Services. 2021. "State of Nebraska Roster: Hospitals."

<https://dhhs.ne.gov/licensure/Documents/Hospital%20Roster.pdf>.

11 Department of Health and Human Services. 2021. "State of Nebraska Roster: Long Term Care Facilities."

<https://dhhs.ne.gov/licensure/Documents/LTCRoster.pdf>.

12 Department of Health and Human Services. 2021. "State of Nebraska Roster: Rural Health Clinic."

[https://dhhs.ne.gov/licensure/Documents/RHC\\_Roster.pdf](https://dhhs.ne.gov/licensure/Documents/RHC_Roster.pdf).

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
28	Grand Island Rural Fire	N	Y	N
29	Grand Island Senior High School	Y	N	N
30	Heartland Lutheran High School	N	N	N
31	Howard Elementary School	Y	N	N
32	Jefferson Elementary School	Y	N	N
33	West Lawn Elementary School	Y	N	N
34	Knickrehm Elementary School	Y	N	N
35	KRGI	N	Y	N
36	Law Enforcement Center	N	Y	N
37	Lift Station 1	N	Y*	N
38	Lift Station 4	N	Y*	N
39	Lift Station 6	N	Y*	N
40	Lift Station 7	N	Y	N
41	Lift Station 17	N	Y*	N
42	Lift Station 18	N	Y*	N
43	Lift Station 22	N	Y*	N
44	Lift Station 23	N	Y	N
45	Lift Station 24	N	Y*	N
46	Lift Station 25	N	Y	Y (1%)
47	Lift Station 26	N	Y	Y (1%)
48	Lift Station 28	N	Y	N
49	Lift Station 29	N	Y	N
50	Lift Station 30	N	Y	N
51	Lincoln Elementary School	Y	N	N
52	NDOR District Office	N	Y	N
53	NDOR Maintenance Yard	N	Y	N
54	Nebraska Health and Human Services	N	N	N
55	Nebraska Law Enforcement Training Center	N	Y	N
56	Nebraska State Patrol	N	Y	N
57	Newell Elementary School	Y	Y	N
58	Northwest High School	Y	N	N
59	Westridge Middle School	Y	N	N
60	Phelps Control Center	N	N	N
61	Platte Generation Station	N	N	Y (1%)
62	Private Northview Lift Station	N	N	N
63	Salvation Army	N	N	N
64	Seedling Mile Elementary	Y	Y	N
65	Shoemaker Elementary School	Y	N	N
66	Southern Public Power	N	Y	N
67	St. Francis Medical Center	N	Y	N
68	St. Leos Church	Y	N	N
69	St. Paul's Lutheran Church	Y	N	N
70	Starr Elementary School	Y	Y	N
71	Stolley Park Elementary School	Y	N	N
72	Transfer Station	N	N	N
73	Islander Annex	N	Y	N
74	United Veterans Club, Inc.	Y	N	Y (1%)
75	Water Division	N	N	N
76	Wasmer Elementary School	Y	N	N
77	Wastewater/Water Treatment Plant	N	Y	Y (1%)
78	Y.M.C.A.	Y	N	N
79	Y.W.C.A.	Y	N	N

\*Portable generator available.



Figure GRA.5: Critical Facilities 1-41

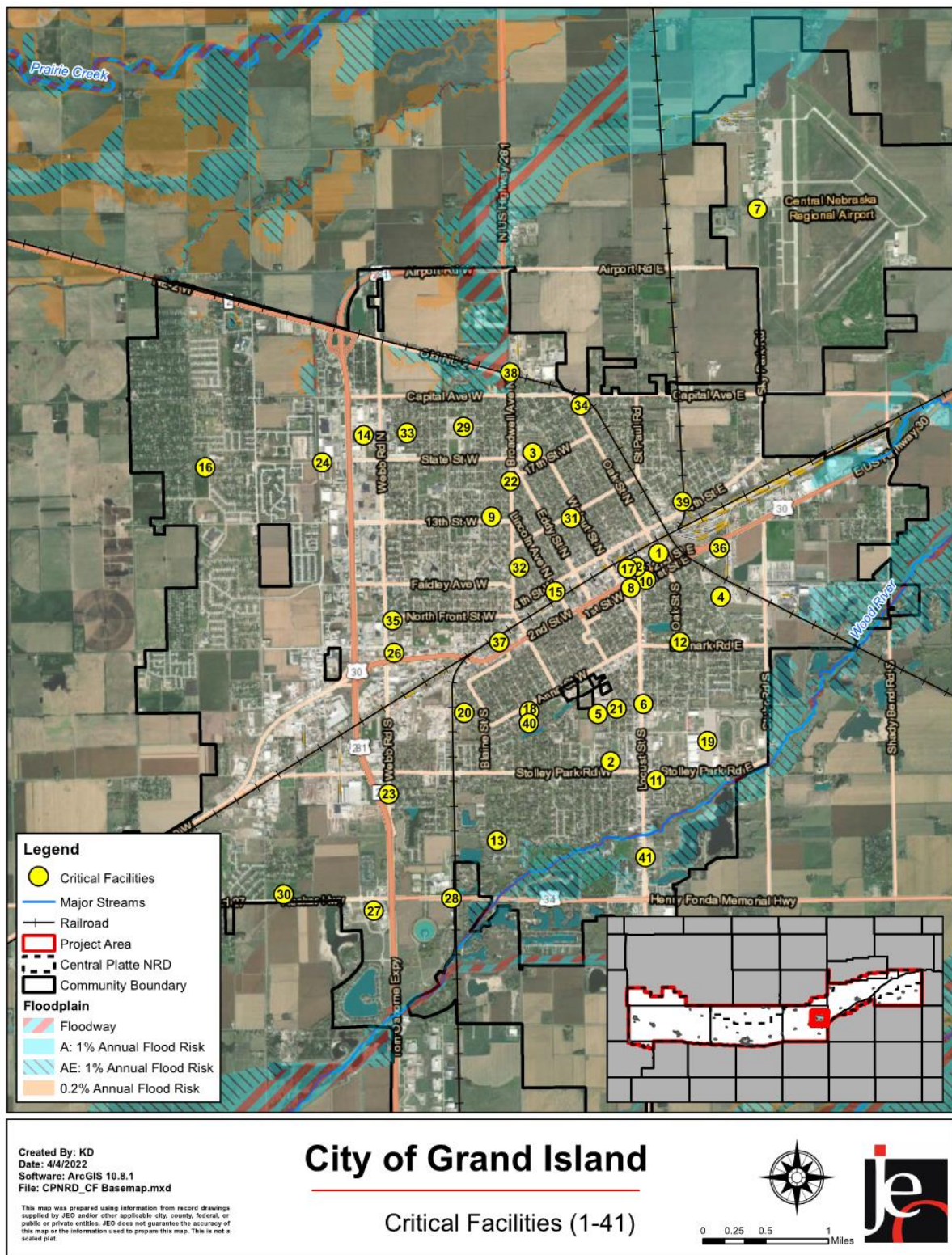
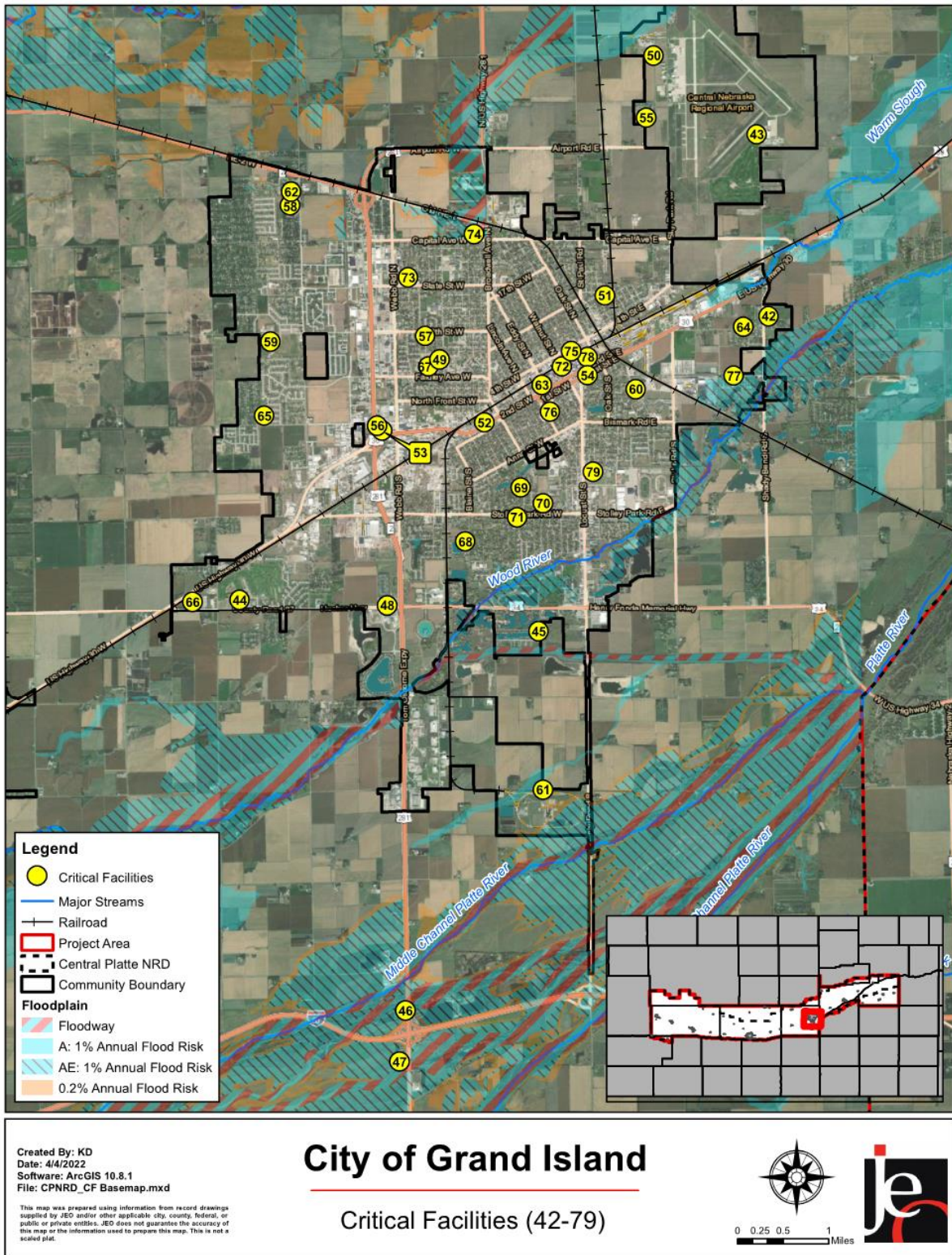




Figure GRA.6: Critical Facilities 42-79



## Parcel Improvements and Valuation

The planning team acquired GIS parcel data from the County Assessor to analyze the location, number, and value of property improvements (e.g. buildings, garages, sheds etc.) at the parcel level. The data did not contain the number of structures on each parcel. A summary of the results of this analysis is provided in the following tables.

**Table GRA.6: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
17,314	\$3,061,583,607	271	\$146,891,911	1.6%

Source: County Assessor, 2021

**Table GRA.7: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
17,314	\$3,061,583,607	79	\$22,894,956	0.5%

Source: County Assessor, 2021

## Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries. Larger Scale and more damaging events that impacted the community are discussed under Hazard Prioritization.

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the community. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the community's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

### Flooding

Grand Island's flood risk areas of concern surround the city on the north, east, and south sides. The planning team also noted that the areas in the community most prone to flooding are northwest Grand Island, north of Capitol Avenue, west of Highway 281. Compounding this, the planning team mentioned that when the city receives brief intense rain events (at least two plus inches of water per hour), stormwater drainage systems lose efficiency. The closest bodies of water of concern are Wood River, Prairie Creek, Silver Creek, and Moores Creek.

The local planning team listed several dates of Grand Island flooding events, 1947, 1949, 1967, 1976, 1993-94, 2005, 2007, 2011, 2015, and 2019. In May 2005, the city set a rainfall record for a single event with over 7.21 inches of rain. Thirty-six homes were evacuated as flooding was worse in the west and north parts of the city. Many businesses and residential houses sustained some type of water damage from the event.

The city has completed and is finishing flood control projects to mitigate flooding in the community. First, the Wood River floodplain has largely been mitigated due to the construction of a levee system, completed in 2004. Then in partnership with the CPNRD, the Upper Prairie Silver Moores Flood Control Project impacted the northern floodplain. The flood control project that included stormwater detention cells, a diversion channel, and a series of upland detention dams. This

project was completed in 2019 and removed 600 structures out of the floodplain. Damage from the 2019 floods was minimal thanks in large part to the Upper Prairie Silver Moores Flood Control Project. It was estimated that in 2019, Grand Island avoided \$47 million in potential damages because of the project. In July of 2019, the city and Central Platte NRD hosted a “Flood Control Stroll” through downtown Grand Island to increase community awareness of flood mitigation and flood safety.

The southern portion of the city falls under the Wood River Watershed Flood Risk Reduction Plan, which is currently under development. The plan will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. Projects deemed feasible in the plan will be added to this HMP once the planning process has concluded.

The Grand Island Regional Medical Center is concerned with low level flooding affecting transportation in and out of the medical center. The center is 10 feet above the floodplain, but the surrounding area is much lower and is more likely to flood.

Grand Island is a member of the NFIP, and the city’s Floodplain Administrator (Chad Nabity) will oversee the commitments and requirements of the NFIP. The initial FIRM for the city was delineated in 3/2/1983 and the current effective map date is 9/26/2008. As of October 31, 2021, there are 50 NFIP policies in-force covering \$11,315,600. Grand Island has two single-family repetitive loss structures. A mitigation action can be found in the city’s Mitigation Strategy to address this structure.

### **Hazardous Materials Release**

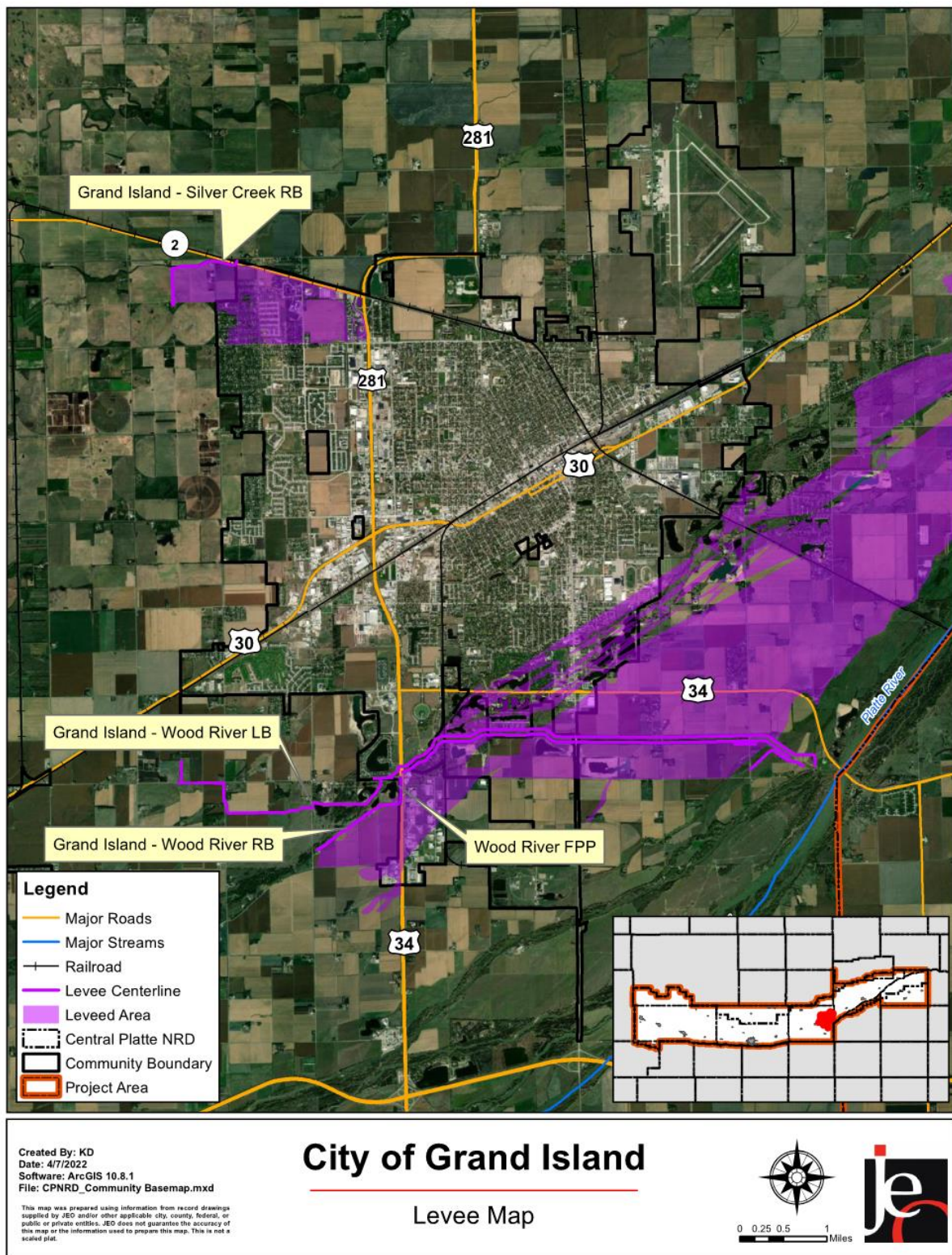
Union Pacific, Central Nebraska Railroad Company, and Burlington Northern Santa Fe have main rail lines through Grand Island. In addition, Highways 2, 30, and 281 all run through the city. Many manufacturing facilities have reportable quantities of stored hazardous material. Chemicals are presumed to be transported daily by highway; however, the local planning team is not sure which types of chemicals are being transported. According to the Pipeline and Hazardous Materials Safety Administration, there have been 128 reports of chemical spills. Most of the events were small but in total the spills have caused \$196,910 in damages. The most damaging occurred in 2013 when 70 liquid gallons of hypochlorite solution caused \$94,000 in damage. Hall County LEPC works regularly to identify and mitigate hazardous chemicals, including trainings and exercises. The hospital has all necessary components to receive patients affected by a hazardous materials event but would like to participate in more practical exercises.

### **Levee Failure**

Levee failure may cause loss of life and injuries as well as damages to property, the environment, and the economy. There are four levee systems in or near Grand Island, the Wood River FPP, Grand Island – Wood River RB, Grand Island – Silver Creek RB, and Grand Island – Wood River LB. These levees protect 9,428 people and 3,833 buildings with a combined property value of \$936 million. The Grand Island – LB accounts for most of the protected people and buildings. Wood River FPP, Grand Island – Wood River RB, and Grand Island – Wood River LB are FEMA accredited. The figure below shows the locations of the levees. There have been no reports of levee failure in Grand Island. All levees are regularly inspected and maintained.



Figure GRA.7: Levee Map



### **Public Health Emergency**

This hazard was identified by the Grand Island Regional Medical Center as a hazard of top concern. A public health emergency similar to the ongoing Covid-19 pandemic could stretch hospital equipment and staffing. The hospital would be the primary location for patients to go during a public health emergency. The ongoing Covid-19 pandemic impacted the hospital on the essential supply equipment side. To help with the potential impacts of this hazard, MOUs with other nearby hospitals are in place and the medical center is part of the TRIMRS 23 County Healthcare Coalition.

### **Severe Thunderstorms**

The NCEI reported 198 severe thunderstorm events since 1996. Official reports of property damage topped \$20,149,500 for Grand Island. The most damaging event occurred in 2017 when 2.5-inch hail caused \$10,000,000 in damages. The planning team is concerned with the potential impact on utilities and transportation routes as well as property damage. There are weather radios in critical facilities, but not all have backup generators. Grand Island has an active tree management program that seeks to reduce the damage from falling trees and branches. Grand Island City Utilities estimates that 30% of their lines are buried and SPPD reports 10% of their lines are buried. Most of the critical facilities are fitted with hail resistant building materials and are insured. Building code limits community members to one layer of shingles which encourages hail resistant building materials. The city also has educational materials for severe thunderstorms, winter storms, and tornadoes on its website.

### **Severe Winter Storms**

This hazard was identified by the Grand Island Regional Medical Center as a hazard of top concern. During the winter of 2020, whiteout conditions affected staffing availability and patient care. Extreme snow events can impact supply lines for equipment, fuel for generators, and transportation routes to and from the medical center. The hospital has built some relationships with small local companies to remove snow in proximity to the hospital but needs to work closer with the City of Grand Island on priority snow removal areas. In addition, the Prairie Commons Medical Office Building that is attached to the hospital has an emergency generator and could be used to house a significant number of individuals during a disaster event.

### **Terrorism**

This hazard was identified by the Grand Island Regional Medical Center as a hazard of top concern. They are primarily concerned with cyber terrorism. Hospitals have been targeted more than other industries and one cyber-attack could cripple the hospital's operational processes. Grand Island has two unaffiliated hospitals, so if one were to go down the other could help take patients if necessary.

### **Tornadoes and High Winds**

There are two reports of tornadoes since 1996 in the City of Grand Island. However, on June 3rd, 1980, there were seven tornadoes that touched down in or near the community over the span of nearly three hours. This outbreak devastated entire sections of Grand Island killing five people and injuring more than 400. When it was over, the tornadoes had caused \$300 million in damages. This event is most famously referred to as Night of the Twisters after a book and television movie were made based on these events. Now, municipal servers are backed up to multiple locations; the city has warning sirens and some safe rooms, which are FEMA-certified. The County Emergency Management Agency offers text alerts, and the community does educational outreach through Grand Island TV, and the Weatherwise program.

## Mitigation Strategy

### Completed Mitigation Actions

Mitigation Action	Develop an Emergency Preparedness Plan
Description	Develop an Emergency Preparedness Plan (EPP) for the Grand Island Levee System in coordination with Hall County Emergency Management and the CPNRD (the plan should include stakeholder roles and responsibilities, a risk communication plan, emergency activation levels, activation process, evacuation plan, and training and exercise plan)
Hazard(s) Addressed	Levee Failure
Status	Completed in 2018.

### New Mitigation Actions

Mitigation Action	Emergency Exercise: Hazardous Spill
Description	Perform tabletop exercises for a hazardous materials release for all who would be involved.
Hazard(s) Addressed	Hazardous Materials Release
Estimated Cost	Staff Time
Local Funding	Staff Time
Timeline	2-5 Years
Priority	Medium
Lead Agency	City Administrator, Fire Department, County Emergency Management, Grand Island Regional Medical Center
Status	Not Started

Mitigation Action	Phragmites Reduction
Description	Work with Platte River Resiliency Project to fund projects to reduce phragmites in the Platte River to help keep channels open and flowing.
Hazard(s) Addressed	Flooding, Animal and Plant Disease
Estimated Cost	\$750,000 per year
Local Funding	General Fund
Timeline	Ongoing
Priority	High
Lead Agency	Planning Commission, Platte River Resiliency Project, Central Platte NRD, Hall County
Status	This is an ongoing action with phragmites reduction occurring annually.

Mitigation Action	Project Scoping
Description	Evaluate potential flood risk reduction alternatives as identified through the NRCS WFPO including project scoping and implementation.
Hazard(s) Addressed	Flooding
Estimated Cost	Varies by Project
Local Funding	General Fund, WFPO
Timeline	2-5 Years
Priority	Medium
Lead Agency	City Engineer, City Administrator, Floodplain Administrator
Status	Wood River Watershed Flood Risk Reduction Plan is currently under development. No formal alternatives have yet been determined; however, several alternatives are under further review for each program with communities in the district.



Mitigation Action	Repetitive Loss Property Mitigation
Description	Identify and perform flood mitigation options on repetitive loss properties within the community.
Hazard(s) Addressed	Flooding
Estimated Cost	Varies by Project
Local Funding	General Fund, Private Owner Funds
Timeline	5+ Years
Priority	Low
Lead Agency	City Administrator, Floodplain Administrator, City Engineer
Status	Not Started

### Kept Mitigation Actions

Mitigation Action	Improve Electrical Service
Description	Evaluate hardening, retrofitting, looping and/or burying of power lines and related infrastructure and/or comparable protection measures; provide looped distribution service and other redundancies in the electrical system as a backup power supply in the event the primary system is destroyed or fails; implement measures to improve electrical service; bury power lines for future construction
Hazard(s) Addressed	All Hazards
Estimated Cost	\$1,000,000+
Local Funding	General Fund
Timeline	5+ Years
Priority	Low
Lead Agency	City Engineer
Status	Not Started

Mitigation Action	Improve Warning Systems
Description	Evaluate current warning systems (defined as alert sirens, weather radios, and television, telephone, and radio warning systems, etc.); improve warning systems/develop new warning system; obtain/upgrade warning system equipment and methods; conduct evaluation of existing alert sirens for replacement or placement of new sirens; identify location of weather warning radios; improve weather radio system; obtain/upgrade weather radios.
Hazard(s) Addressed	All Hazards
Estimated Cost	\$25,000 - \$50,000
Local Funding	City Emergency Management Budget
Timeline	Ongoing
Priority	High
Lead Agency	City Administrator, County Emergency Management
Status	Ongoing effort to upgrade and replace aging sirens. Instituted IPAWS capabilities. New sirens are installed as the city continues to grow.

Mitigation Action	Public Awareness/Education
<b>Description</b>	Obtain or develop hazard education materials; conduct multi-faceted public education; distribute fact sheets or maps at community events, public schools, other venues and to public and private communication systems; conduct scheduled siren/warning system tests; prepare educational materials listing safe rooms and shelters and evacuation plans; distribute educational materials listing safe rooms and shelters; purchase equipment such as overhead projectors and laptops to facilitate presentation of information.
<b>Hazard(s) Addressed</b>	All Hazards
<b>Estimated Cost</b>	\$5,000
<b>Local Funding</b>	Staff Time
<b>Timeline</b>	Ongoing
<b>Priority</b>	High
<b>Lead Agency</b>	City Administrator, County Emergency Management
<b>Status</b>	Ongoing Action. Promoting preparedness through social media, local media, BeReady, siren tests, and the Flood Control Stroll. No equipment has been purchased yet.

Mitigation Action	Reduce Damages from Floods, Stormwater, and Heavy Precipitation Events
<b>Description</b>	Evaluate repetitive loss or potential loss structures located in floodplain; acquire and relocate or demolish flood prone property or elevate flood prone property; elevate equipment vulnerable to flooding. Conduct stormwater drainage study; evaluate and implement recommendations or comparable measures to improve drainage; evaluate and improve stormwater system. Analyze system for issues and develop a plan to remedy the issues.
<b>Hazard(s) Addressed</b>	Flooding
<b>Estimated Cost</b>	\$500,000+
<b>Local Funding</b>	General Fund
<b>Timeline</b>	Ongoing
<b>Priority</b>	Medium
<b>Lead Agency</b>	Floodplain Administrator
<b>Status</b>	This is an ongoing project. It is checked with each flood event.

Mitigation Action	Reduce Tree Damage and Damage from Trees
<b>Description</b>	Conduct tree inventory; develop tree maintenance/trimming program; implement tree maintenance/trimming program; remove hazardous limbs and/or trees.
<b>Hazard(s) Addressed</b>	Tornadoes, Severe Winter Storms, Severe Thunderstorms, High Winds, Grass/Wildfire
<b>Estimated Cost</b>	\$5,000+
<b>Local Funding</b>	General Fund
<b>Timeline</b>	Ongoing
<b>Priority</b>	Medium
<b>Lead Agency</b>	Tree Board
<b>Status</b>	Trees are trimmed when issues are identified.

Mitigation Action	Storm Shelter / Safe Room
<b>Description</b>	Identify and evaluate existing safe rooms and/or storm shelters; improve and/or construct safe rooms and/or storm shelters; design and construct storm shelters and safe rooms in highly vulnerable areas such as mobile home parks, campgrounds, schools, etc.
<b>Hazard(s) Addressed</b>	Tornadoes, Severe Thunderstorms, High Winds
<b>Estimated Cost</b>	\$200 - \$250 per sq ft
<b>Local Funding</b>	General Fund
<b>Timeline</b>	5+ Years
<b>Priority</b>	Low
<b>Lead Agency</b>	Planning Commission, County Emergency Management
<b>Status</b>	Some saferoom projects have been identified and an NOI has been submitted.

### Plan Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside community planning documents (e.g., annual budgets and Capital Improvement Plans), during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

Grand Island last reviewed their section of the HMP in 2019. The Floodplain Administrator, County Emergency Management Director, and Public Works Director will be responsible for reviewing and updating the plan in the future. These individuals will review the plan annually. The public will be notified using social media, the city's website, and council meetings.

Community Profile

# City of Wood River

Central Platte NRD  
Hazard Mitigation Plan

2022

Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

**Worksheets Due By:** \_\_\_\_\_

*Please answer the questions in red italics. Your responses are critical for completing this Community Profile. If you are unsure of any questions, think of who could supply the information, please provide their name and position in the community.*

**Completed Community Profiles and other worksheets can be returned to JEO Consulting Group, Attn: Karl Dietrich, 2000 Q Street Ste 500, Lincoln, NE 68503 or [kdietrich@jeo.com](mailto:kdietrich@jeo.com). If you have any questions, please call 402-742-7213.**

### Local Planning Team

Table WRV.1: Wood River Local Planning Team

Name	Title	Jurisdiction
Eric Nielsen	City Council	City of Wood River
Greg Cramer	Mayor	City of Wood River
Todd King	Fire Chief	Wood River Rural Fire Dept.

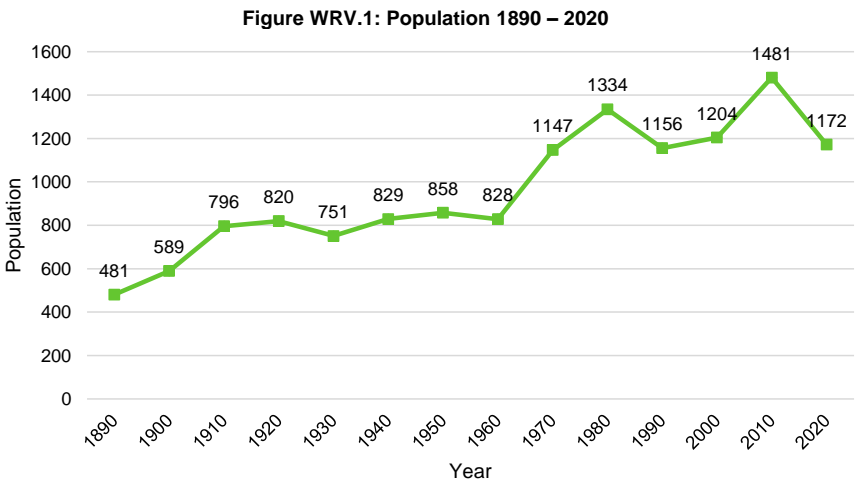
### Location and Geography

The City of Wood River is in western Hall County and covers an area of 0.79 square miles. The major waterway in the area is the Wood River.

### Demographics

The following figure displays the historical population trend for the City of Wood River. This figure indicates that the population of Wood River has been declining since 2010 to 1,172 people in 2020. A declining population can lead to more unoccupied housing that is not being maintained and is then at risk to high winds and other hazards. Furthermore, with fewer residents, there is decreasing tax revenue for the community, which could make implementation of mitigation projects more fiscally challenging. Wood River's population accounted for 1.9% of Hall County's population in 2020.<sup>1</sup>

**Commented [KV1]:** Population did not go down according to planning team.



Source: U.S. Census Bureau

<sup>1</sup> United States Census Bureau. "2020 Decennial Census: P1: DEC Redistricting Data." <https://data.census.gov/cedsci/>.

Figure WRV.2: City of Wood River



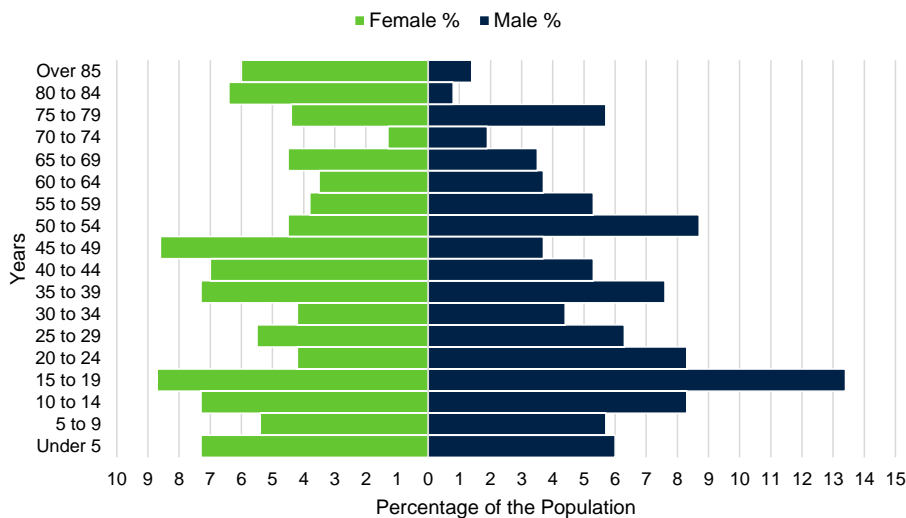


## Section Seven | City of Wood River Community Profile

The young, elderly, and minority populations may be more vulnerable to certain hazards than other groups. Looking at Wood River's population:

- **21% is non-white.** Since 2010, Wood River grew more ethnically diverse. In 2010, 4.7% of the Wood River's population was non-white. By 2019, 21% was non-white.<sup>2</sup>
- **Younger median age.** The median age of Wood River was 36.7 years in old 2019. The population grew younger since 2010, when the median age was 38.6.<sup>3</sup>

Figure WRV.3: Wood River's Population Pyramid



The figure above shows Wood River's population percentage broken down by sex and five-year age groups. Wood River's population is younger with a much high percentage of the population below 50 years of age. This likely indicates a growing population in the years to come.

### Employment and Economics

Low-income populations, long distance commuters, and the unemployed may be more vulnerable to certain hazards than other groups. Wood River's population has:

- **6.1% of people living below the poverty line.** The poverty rate (6.1%) in the City of Wood River was lower than the state's poverty rate (7.2%) in 2019.<sup>4</sup>
- **\$54,750 median household income.** Wood River's median household income in 2019 (\$54,750) was \$6,500 lower than the state (\$61,439).<sup>4</sup>
- **5% unemployment rate.** In 2019 Wood River has a higher unemployment rate (5%) when compared to the state (2.3%).<sup>4</sup>

<sup>2</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." <https://data.census.gov/cedsci/>.

<sup>3</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: S0101: Age and Sex." <https://data.census.gov/cedsci/>.

<sup>4</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." <https://data.census.gov/cedsci/>.

- **26.4% of workers commuted 30 minutes or more to work.** More workers in Wood River commuted 30 minutes or more to work than compared to workers commuting less than 15 minutes (26.4% compared to 22.6%).<sup>5</sup>

### Major Employers

Major employers for the community include the City of Wood River, Wood River Aqueduct Center, Wood River Schools, Stick Creek Kids Child Center, Green Plains Ethanol, Agricultural Services, Cooperative Producers Incorporated, Aurora Coop, Hefty Seeds, Soil View, ABC Siding, Casey's, Dollar General, MNO Market, Mead Industries, Mead Fabrication, Watts Welding, Tourney Brothers Fabrication, Heritage Bank, Whiskey River Bar, American Legion, Wood River Post Office, Subway. Many of the community's residents commute to neighboring cities including Grand Island, Kearney, and Hastings.

### Housing

The age of housing may indicate which housing units were built prior to the development of state building codes. Vacant housing stock may also be more vulnerable to hazard events if it is poorly maintained. Unoccupied housing may also suggest that future development may be less likely to occur. Communities with a substantial number of mobile homes may be more vulnerable to the impacts of high winds, tornadoes, and severe thunderstorms if those homes are not anchored correctly. The local planning team noted that there are three areas in town with mobile homes. Packer Trailer Court West located at 8<sup>th</sup> and Dodd, Packer Trailer Court East located at 13<sup>th</sup> and Pine, a few trailers located on 13<sup>th</sup> and Lily Street, and a few located on the south side of town near 5<sup>th</sup> street. Renter-occupied housing depends on the initiative of landlords for proper maintenance and retrofitting to be resilient to disasters. They are less likely than homeowners to have flood insurance, or to know their risks to flooding and other hazards.

- **49% of housing built prior to 1970.** Wood River has a larger share of housing built prior to 1970 than the state (49% compared to 46%).<sup>6</sup>
- **12.5% of housing units vacant.** Since 2010, Wood River's vacancy rate grew. In 2010 the vacancy rate was 9.8%. By 2019, 12.5% of housing units were vacant.<sup>6</sup>
- **19.7% mobile and manufacture housing.** The City of Wood River had a larger share of mobile and manufactured housing (19.7%) compared to the state (3.3%).<sup>6</sup>
- **26.4% renter-occupied.** The rental rate of Wood River was 26.4% in 2019. The percentage went up since 2010, when renter occupied housing was at 16.5%.<sup>6</sup>

### Governance

A community's governance indicates the number of boards or offices that may be available to help implement hazard mitigation actions. The City of Wood River is governed by a Mayor and five-member city council; other governmental offices and departments that may be involved in implementing hazard mitigation initiatives are listed below.

- Clerk/Treasurer
- Economic Development
- Housing Authority
- Police Department

<sup>5</sup> United States Census Bureau. "2019 Census Bureau American Community Survey: S0802: Means of Transportation to Work by Selected Characteristics." <https://data.census.gov/cedsci/>.

<sup>6</sup> United States Census Bureau. "2019 Bureau American Community Survey: DP04: Selected Housing Characteristics." <https://data.census.gov/cedsci/>.

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- Parks & Recreation
- Stick Creek Kids Board of Directors
- Volunteer Fire Department
- Wood River Library Board
- 2020 Wood River Vision Board

### Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the community's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects.

Municipal funds are limited to maintaining current facilities and systems with a large portion already dedicated to a downtown revitalization project, Walnut and Pine Street drainage project, FSU drainage study, and street repairs. Funds have increased over recent years.

**Table WRV.3: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning &amp; Regulatory Capability</b>	Comprehensive Plan	Yes
	Capital Improvements Plan	Yes
	Economic Development Plan	Yes
	Local Emergency Operations Plan	Yes
	Floodplain Management Plan	Yes
	Storm Water Management Plan	No
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	No
	Other (if any)	Blight & Substandard Determination Study, General Redevelopment Plan, Wood River Watershed Flood Risk Reduction Plan, Wood River Watershed Study
<b>Administrative &amp; Technical Capability</b>	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	Yes
	Chief Building Official	Yes
	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager	No
	Mutual Aid Agreement	Yes
	Other (if any)	-
<b>Fiscal Capability</b>	Capital Improvement Plan/ 1- & 6-Year plan	Yes

Section Seven | City of Wood River Community Profile

Survey Components/Subcomponents		Yes/No
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	Yes
	Gas/Electric Service Fees	Yes
	Storm Water Service Fees	No
	Water/Sewer Service Fees	Yes
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	Yes
	Other (if any)	-
	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes – Hall County LEPC
Education & Outreach Capability	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes
	Natural Disaster or Safety related school programs	Yes
	StormReady Certification	No
	Firewise Communities Certification	No
	Tree City USA	No
	Other (if any)	-
Overall Capability		Limited/Moderate/High
Financial resources to implement mitigation projects		Limited
Staff/expertise to implement projects		Moderate
Public support to implement projects		High
Time to devote to hazard mitigation		Moderate

### Plan Integration

Wood River has several planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The city will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

#### Blight & Substandard Determination Study & General Redevelopment Plan (2018)

The City of Wood River had a blight and substandard determination study done on the between Wood River Road, Elm Street, Fifth Street, County Road 150<sup>th</sup>, and Highway 11. This area was found to be blighted and substandard. This means there are aging and deteriorating structures in the area that could be impacted more from a hazard event. Since the area was determined to be blighted and substandard, it is now eligible for redevelopment assistance through TIF, private

investment, and various grants. While the study is not integrated with the hazard mitigation plan, both could be used to determine priority areas for redevelopment.

#### **Building Code (2018)**

The building code sets standards for constructed buildings and structures. The village's building code follows Hall County's building code, which is based on the 2018 International Building Code.

#### **Comprehensive Plan (2018)**

The comprehensive plan is designed to guide the future actions and growth of the city. It directs development away from the floodplain and from major transportation routes. It also encourages infill development, preservation of open space in hazard-prone areas, and allows for emergency access to all areas of town. With the plan having been updated recently, there is currently no plan to further integrate the HMP into the Comprehensive Plan.

#### **Hall County Local Emergency Operations Plan (2020)**

Wood River is an annex in the Hall County Local Emergency Operations Plan (LEOP). The LEOP establishes standardized policies, plans, guidelines, and procedures for emergency resources and governmental entities to respond and recover when a disaster event occurs. It contains information regarding direction and control, communications and warning, damage assessment, emergency public information, evacuation, fire services, health and human services, law enforcement, mass care, protective shelters, and resource management. This plan is updated every five years.

#### **Wood River Watershed Flood Risk Reduction Plan (Under Development)**

The primary purpose of the Wood River Watershed Flood Risk Reduction Plan is flood risk reduction within and near the communities of Riverdale, Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. It will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. This plan is being funded by the Central Platte NRD and NRCS through the Watershed and Flood Prevention Operations (WFPO) Program. Projects identified in the plan with a positive benefit-cost ratio will be reviewed for inclusion in the HMP.

#### **Wood River Watershed Study (2020)**

This study was conducted by the Nebraska Silver Jackets to develop the 1% Annual Exceedance Probability (AEP) frequency flow data for the communities of Kearney, Gibbon, Shelton, Wood River, Alda, and Grand Island. Results reflect that the flow frequency is larger than the effective Flood Insurance Study for the Kearney to Alda reach of the Wood River. The results also estimate a 1% AEP peak discharge that is 15% less than the current design for the Grand Island diversion channel. This study will help support ongoing WFPO studies and future NFIP mapping efforts in the region.

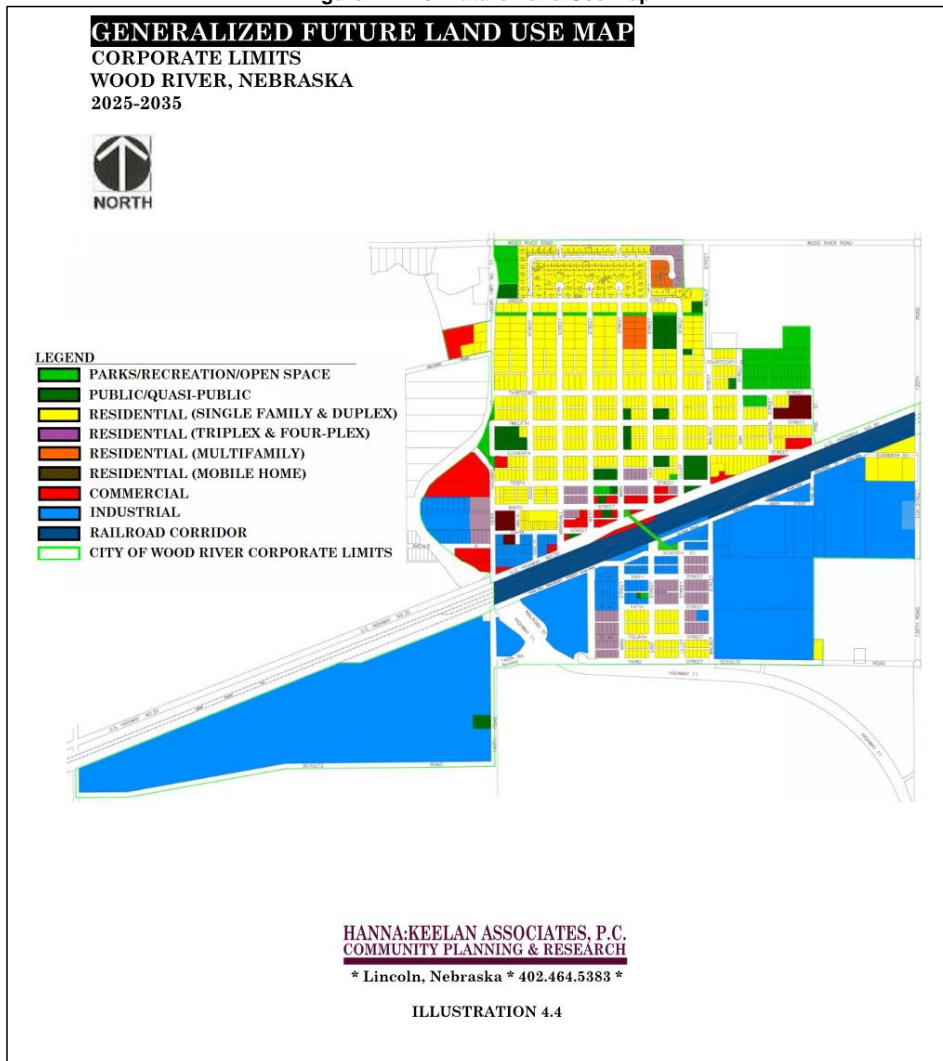
#### **Zoning Ordinance (2015), Floodplain Ordinance, and Subdivision Regulations (2004)**

The city's floodplain ordinance, zoning ordinance, and subdivision regulations outline where and how development should occur in the future. The Ordinance discourages development in the floodplain, identifies floodplain areas as parks of open space, and requires at least more than one foot of elevation above base flood elevation in the floodplain. It also prohibits development within the floodways, encourages maintaining open space within the floodplain, and accounts for current population trends.

## Future Development Trends

In the past five years, Wood River has seen six new businesses, 15 new homes, demolished two buildings and three homes, and several street updates. Street improvements include the Dodd Street extension, Thelen Street, Pine Street reconfigure, and Marshall Street extension. Additionally, there were drainage improvements on Walnut Street and new industrial park development. No new structures were developed in the floodplain. In the next five years, new housing is planned for the Thelen Subdivision and Industrial Park continuation.

Figure WRV.3: Future Land Use Map





## Community Lifelines

### Transportation

Wood River's major transportation corridors include US Highway 30 and State Highway 11. The most traveled route is Highway 30 with an average of 4,640 vehicles daily, 395 of which are trucks.<sup>7</sup> The city has one Union Pacific rail line traveling southwest to northeast on the southern edge of the community. The planning team noted that chemicals are regularly transported along Highway 11, Highway 30, and on the Union Pacific Railroad. Additional transportation routes of concern include Walnut Street, Wood River Road, Shultz Road, Elm Street, 140<sup>th</sup> Road, and 1<sup>st</sup> Street. Some critical facilities are located along major transportation routes. The fire station is located along Highway 11, the electrical substation is located next to the Union Pacific Rail Line, and the natural gas station is located along Highway 30. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the community, as well as areas more at risk of transportation incidents.

### Hazardous Materials

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are nine chemical storage sites within or near Wood River which house hazardous materials. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

Table WRV.4: Chemical Storage Sites

Name	Address	Located in Floodplain?
Pilot Flying J 912	11775 S Nebraska Hwy 11	Y (1%)
TA Grand Island West	8033 W Holling Rd	N
Agricultural Services Inc	106 W Railroad St	N
CenturyLink Central Office	1005 Main St	Y (0.2%)
Aurora Co-op Elevator Company	6236 S Schauppsville Rd	Y (0.2%)
Cooperative Producers Inc	15123 W Wood River Rd	N
Bosselman Oil Inc	4380 S Nebraska Hwy 11	N
Green Plains Wood River LLC	7874 S 140th Rd	N
Hefty Seed	8099 S 150th Rd	N

Source: Nebraska Department of Environment and Energy<sup>8</sup>

### Note as an additional concern in this section -

Casey's General Store  
Get N' Split

### Health and Medical Facilities

There are no medical and health facilities located within the community.

<sup>7</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map." [map]. <https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.  
<sup>8</sup> Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.

### Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the jurisdiction.

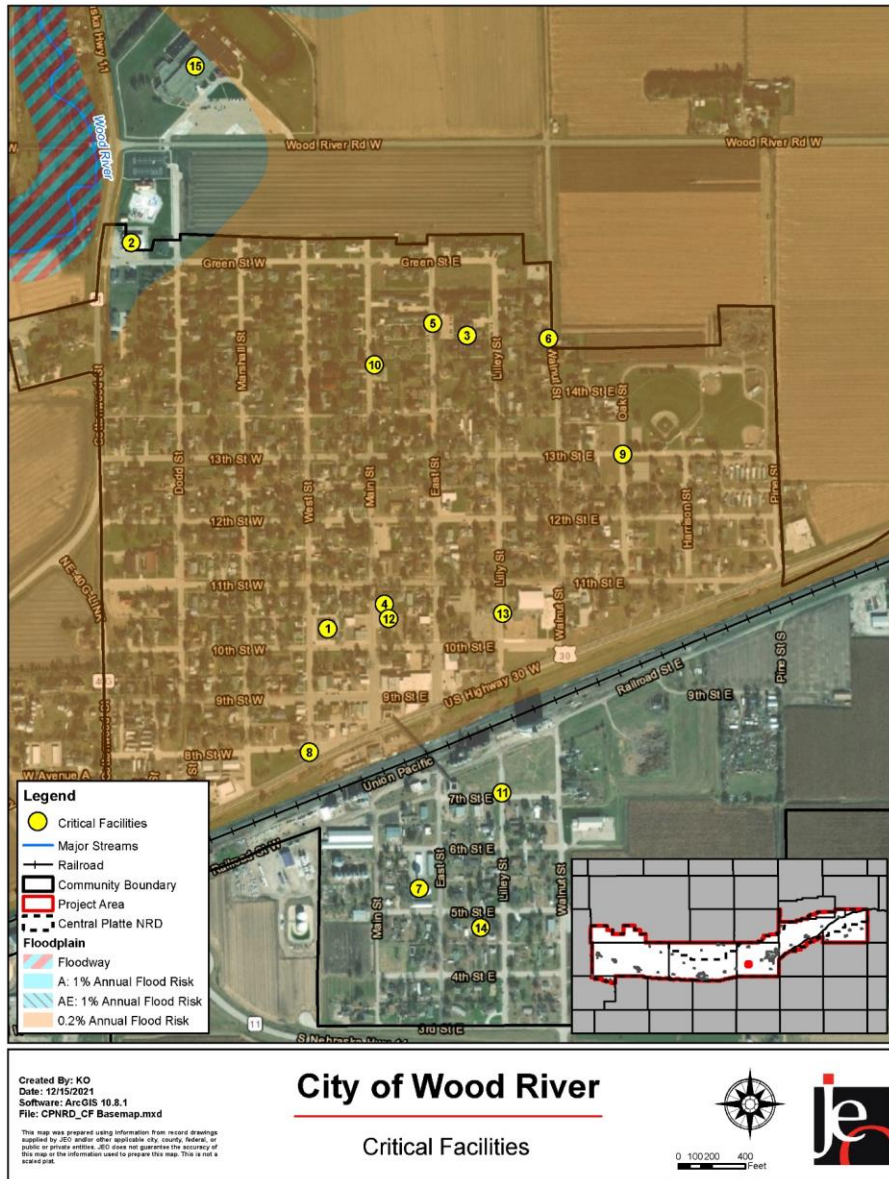
Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table WRV.5: Critical Facilities**

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	City Hall/Community Center/Public Works	N	Y	Y (0.2%)
2	Fire Station	N	Y	N
3	Good Samaritan Center	N	N	Y (0.2%)
4	Police Department	N	N	Y (0.2%)
5	Stick Creek Child Center	N	Y	Y (0.2%)
6	Wastewater Treatment Plant	N	Y	Y (0.2%)
7	Water Tower (New)	N	N	N
8	Water Tower (Old)	N	N	Y (0.2%)
9	Well (Lilley Street)	N	Y	Y (0.2%)
10	Well	N	N	Y (0.2%)
11	Well	N	N	N
12	Wood River Blue 4H Building	N	N	Y (0.2%)
13	Wood River Elementary School	Y	N	Y (0.2%)
14	Wood River Public Works So. Quancet	N	N	N
15	Wood River Rural High School	N	N	Y (0.2%)

**Figure WRV.4: Critical Facilities**

Section Seven | City of Wood River Community Profile



### Parcel Improvements and Valuation

The planning team acquired GIS parcel data from the County Assessor to analyze the location, number, and value of property improvements (e.g. buildings, garages, sheds etc.) at the parcel level. The data did not contain the number of structures on each parcel. A summary of the results of this analysis is provided in the following tables.

**Table WRV.6: Parcel Improvements and Value in the 1% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
541	\$52,893,880	0	\$0	0%

Source: County Assessor, 2021

**Table WRV.7: Parcel Improvements and Value in the 0.2% Annual Flood Risk Area**

Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	Percentage of Improvements in Floodplain
541	\$52,893,880	450	\$44,583,334	83.2%

Source: County Assessor, 2021

### Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries.

### Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the community. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the community's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

#### Flooding

The flood risk areas of concern for the City of Wood River are located north of Highway 30 and impacts almost all of the northern portion of the city. In May 2005, 12 people were evacuated due to rising water and it was estimated that every structure in Wood River sustained some sort of storm damage. Twelve homes sustained severe damages. The City of Wood River experienced a devastating flood in March of 2019. This flood was the result of a strong blizzard followed by a rapid melting of ice which caused water to escape the banks of the Wood River and flow into the city from the west. Covering streets from 8<sup>th</sup> Street to Green Street in several feet of water with 11<sup>th</sup> street being inundated with over eight feet of water. Evacuations occurred from 8<sup>th</sup> street to Green Street and impacted many residents. This water caused massive damage in the city with 372 structures affected, 128 having minor flood damage, and 39 structures sustaining structural damage with some houses having to be demolished. A second flood in July of 2019 bore down on the city caused by torrential rains near Kearney resulting in the Wood River flooding allowing water to escape its banks. This time emergency management officials had a little more time to react allowing for flood diversions efforts to be deployed pushing over 38 million gallons of water around the city by forcing the waters to the south side ditch of highway 30 near the Highway 11 overpass. This allowed the remaining 27 million gallons of water to easily pass-through the city down 11th street and not affecting any homes or businesses.

**Figure WRV.5: 2019 Flooding**



Wood River has Mutual Aid Agreements with the Hall County Rural Fire Department, Grand Island, Cairo, and Doniphan. Future flooding mitigation actions include educating the public on flood hazards and mitigation action. The community has also undergone building code changes and other flood mitigation efforts such as the Walnut Street drainage project, Pine Street drainage project, FHU drainage study, installation of water diversion berm at the base of Highway 11 overpass near Highway 30 and regrading of the Highway 30 south ditch.

The entire city falls under the Wood River Watershed Flood Risk Reduction Plan, which is currently under development. The plan will identify projects within the watershed to help reduce flood risk and damages to agricultural property, homes, and businesses. Projects deemed feasible in the plan will be added to this HMP once the planning process has concluded.

#### **Hazardous Materials Release**

There are two chemical spills along transportation routes near Wood River recorded by PHMSA. The first was a hydrogen peroxide leak in a defective transport container in 1984. The second spill occurred in January of 2003, when blizzard conditions cause a tanker carrying liquid helium to crash. Neither of these was a significant release event. Ethanol, ammonia and other unknown chemicals are frequently transported by Hwy 30 and the railroad. These transportation corridors are within a half-mile of the community center, city hall, fire hall, and elementary school. The community has an adequate warning system. Local response resources include a regional hazmat team located in Grand Island and Platte Valley mutual aid, both of which are equipped with foam dispensers and storage. Chemical spill mitigation projects involve participating in a hazardous chemical spill emergency exercise and educating the public on chemical spill hazards and response.

#### **Severe Thunderstorms**

Wood River's local planning team is concerned about property damage, phone service, power outages, injuries, and crop damage related to hail. According to NCEI data, there have been 46



severe thunderstorm events in the community that caused \$884,000 in property damages. The most severe hailstorm recorded by the NCEI occurred in June of 2006 when 1.75-inch hail damage property, trees, and crops throughout the area. Property damage from this event totaled \$200,000. Approximately 10% of power lines are buried in the community between 13<sup>th</sup> Street and Green Street. Wood River has recently improved the severe weather notification systems in their critical facilities to mitigate some of the risk associated with hail. Many of the city and fire buildings are constructed of metal or block/brick materials. The community has added a generator to the community well located on Lilley Street as well as a generator to the fire station. Some remodeling has been done to the community center and Stick Creek Child Center to ensure they are better suited for severe weather events. They also plan to educate the public on the hazards and response to hailstorms.

### Tornadoes and High Winds

Concerns around tornadoes and high winds in Wood River are property damage, communication tower damage, power loss, injuries, and an interruption in natural gas distribution. According to NCEI data, there have been five tornadoes in the community since 1999 that have caused a total of \$250,000 in property damages. A high wind event in May of 2012 caused \$350,000 in property damage from fallen trees and power poles. This storm tripped the main breakers at the substation, causing power to be lost until noon the next day. The fire hall also suffered some damage during this event. An EF0 tornado hit the south side of Wood River in May of 2005. This tornado caused damage to a house, trees, and overturned an empty rail car. The city hall, fire hall, residential homes, and one city well have backup generators. Critical municipal records are backed up on an external hard drive. The fire hall and city hall have weather radios. There are warning sirens in the community that are activated by the Hall County Emergency Management. The city has community shelters in the local churches, but no FEMA-certified safe rooms. The city also maintains hazardous and dead trees through regular trimming and maintenance. Wood River plans to mitigate the hazards associated with tornadoes and high winds by providing adequate safe rooms to the community, educating the public on tornado and high wind hazards, and continue to remodel facilities to be more weather resistant.

### Mitigation Strategy

*Please review the following mitigation actions identified in the previous HMP, make any changes needed, and fill in missing information. Mark if each action has been completed, kept, or should be removed and describe the current status of the action.*

#### New Mitigation Actions

Mitigation Action	Project Scoping
Description	Evaluate potential flood risk reduction alternatives as identified through the NRCS WFPO including project scoping and implementation.
Hazard(s) Addressed	Flooding
Estimated Cost	Varies by Project
Local Funding	General Budget, WFPO
Timeline	2-5 Years
Priority	Medium
Lead Agency	City Council, Floodplain Administrator
Status	Wood River Watershed Flood Risk Reduction Plan is currently under development. No formal alternatives have yet been determined; however, several alternatives are under further review for each program with communities in the district.



### Review of Actions

Mitigation Action	Community Education and Awareness
<b>Description</b>	Obtain or develop hazard education materials; conduct multi-faceted public education; distribute fact sheets or maps at community events, public schools, other venues and to public and private communication systems; conduct scheduled siren/warning system tests; prepare educational materials listing safe rooms and shelters and evacuation plans; distribute educational materials listing safe rooms and shelters; purchase equipment such as overhead projectors and laptops to facilitate presentation of information.
<b>Hazard(s) Addressed</b>	All Hazards
<b>Estimated Cost</b>	Staff Time
<b>Local Funding</b>	Staff Time
<b>Timeline</b>	5+ Years
<b>Priority</b>	High
<b>Lead Agency</b>	Clerk, Department Heads, County Emergency Management
<b>UPDATE (CIRCLE ONE)</b>	Completed Keep Remove
<b>Status</b>	What is the current status of this project?

Mitigation Action	Emergency Exercise: Hazardous Spill
<b>Description</b>	Utilize exercise to prepare for potential explosions or hazardous spills; ensure that nearby businesses and residents have appropriate plans in place.
<b>Hazard(s) Addressed</b>	Hazardous Materials Release
<b>Estimated Cost</b>	\$5,000+
<b>Local Funding</b>	General Fund
<b>Timeline</b>	1 Year
<b>Priority</b>	High
<b>Lead Agency</b>	City Council, County Emergency Management
<b>UPDATE (CIRCLE ONE)</b>	Completed Keep Remove
<b>Status</b>	What is the current status of this project?

Section Seven | City of Wood River Community Profile

Mitigation Action	Ensure Adequate Water Supply for Health and Safety
Description	Work with the Nebraska Department of Health and Human Services to secure revolving loan funding for supplementing Wood River's water supply with an additional source; determine a method to have citizens from Wood River voluntarily reduce demand for water during times of drought: this may involve instituting a moratorium on unnecessary water usage and implementing a fine/penalty system for those found in violation.
Hazard(s) Addressed	Drought
Estimated Cost	
Local Funding	Taxes, Service Fees, State Hwy Enterprise Funds
Timeline	5+ Years
Priority	Medium
Lead Agency	Utilities
UPDATE (CIRCLE ONE)	Completed Keep Remove
Status	What is the current status of this project?

Mitigation Action	Reduce Tree Damage and Damage from Trees
Description	Conduct tree inventory; develop tree maintenance/trimming program; implement tree maintenance/trimming program; remove hazardous limbs and/or trees.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms, Severe Winter Storms, Grass/Wildfire
Estimated Cost	\$100+ per tree
Local Funding	General Budget, Cost Share Program with Homeowners
Timeline	5+ Years
Priority	Medium
Lead Agency	Parks, Utilities
UPDATE (CIRCLE ONE)	Completed Keep Remove
Status	What is the current status of this project?

Section Seven | City of Wood River Community Profile

Mitigation Action	Safe Rooms and Storm Shelters
Description	Identify and evaluate existing safe rooms and/or storm shelters; improve and/or construct safe rooms and/or storm shelters; design and construct storm shelters and safe rooms in highly vulnerable areas such as mobile home parks, campgrounds, schools, etc.
Hazard(s) Addressed	Tornadoes and High Winds, Severe Thunderstorms
Estimated Cost	\$150 square ft for retrofit; \$300 square ft for new construction
Local Funding	Taxes, Service Fees
Timeline	2-5 Years
Priority	High
Lead Agency	City Council, Fire Department
UPDATE (CIRCLE ONE)	Completed Keep Remove
Status	What is the current status of this project?

**New Mitigation Actions**

*If there are additional mitigation actions your jurisdiction is interested in pursuing or interested in applying for grant funding, complete the table(s) below. Please fill out all rows.*

*For examples of mitigation actions, review the provided FEMA Handbook ([https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas\\_02-13-2013.pdf](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf)) or reach out to a JEO Project Contact.*

Mitigation Action	Reduce Damages from Floods, Stormwater, and Heavy Precipitation Events
Description	Evaluate repetitive loss or potential loss structures located in floodplain; acquire and relocate or demolish flood prone property or elevate flood prone property; elevate equipment vulnerable to flooding.
Hazard(s) Addressed	Flooding
Estimated Cost	\$500,000+
Local Funding	General Fund
Timeline	Ongoing
Priority	Medium
Lead Agency	Floodplain Administrator
Status	This is an ongoing project. It is checked with each flood event.

Mitigation Action Name	
Description	
Hazard(s) Addressed	
Estimated Cost	

Section Seven | City of Wood River Community Profile

<b>Local Funding</b>			
<b>Timeline</b>	1 Year	2-5 Years	5+ Years
<b>Priority</b>	High	Medium	Low
<b>Lead Agency</b>			
<b>Status</b>			
<b>Mitigation Action Name</b>			
<b>Description</b>			
<b>Hazard(s) Addressed</b>			
<b>Estimated Cost</b>			
<b>Local Funding</b>			
<b>Timeline</b>	1 Year	2-5 Years	5+ Years
<b>Priority</b>	High	Medium	Low
<b>Lead Agency</b>			
<b>Status</b>			
<b>Mitigation Action Name</b>			
<b>Description</b>			
<b>Hazard(s) Addressed</b>			
<b>Estimated Cost</b>			
<b>Local Funding</b>			
<b>Timeline</b>	1 Year		5+ Years

Section Seven | City of Wood River Community Profile

		2-5 Years	
Priority	High	Medium	Low
Lead Agency			
Status			

### Plan Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside community planning documents (e.g., annual budgets and Capital Improvement Plans), during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

*When was your community profile last reviewed by the local planning team?*

*Date:* \_\_\_\_\_

*What revisions or changes were identified during the last review?*

*For your jurisdiction, what positions are responsible for reviewing and updating the community profile outside of the five-year update?*

*Position:* \_\_\_\_\_

*Position:* \_\_\_\_\_

*Position:* \_\_\_\_\_

*Please indicate how frequently your jurisdiction intends to review/revise the profile. (circle one)*

*Every 6 months*

*Annually*

*Bi-annually*

*How will your jurisdiction notify and involve the public in the plan review and revision? (For example, social media, website updates, letters to all residents, board/council meetings, etc.)*



## School District Profile

# Centura Public Schools

## Central Platte NRD Hazard Mitigation Plan Update

2022

Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

**Worksheets Due By:** \_\_\_\_\_

***Please answer the questions in red italics. Your responses are critical for completing this Community Profile. If you are unsure of any questions, think of who could supply the information, please provide their name and position in the community.***

***Completed Community Profiles and other worksheets can be returned to JEO Consulting Group, Attn: Karl Dietrich, 2000 Q Street Ste 500, Lincoln, NE 68503 or [kdietrich@jeo.com](mailto:kdietrich@jeo.com). If you have any questions, please call 402-742-7213.***

## Local Planning Team

**Table CNS.1: Centura Public Schools Local Planning Team**

Name	Title	Jurisdiction
Ryan Ruhl	Superintendent	Centura Public Schools

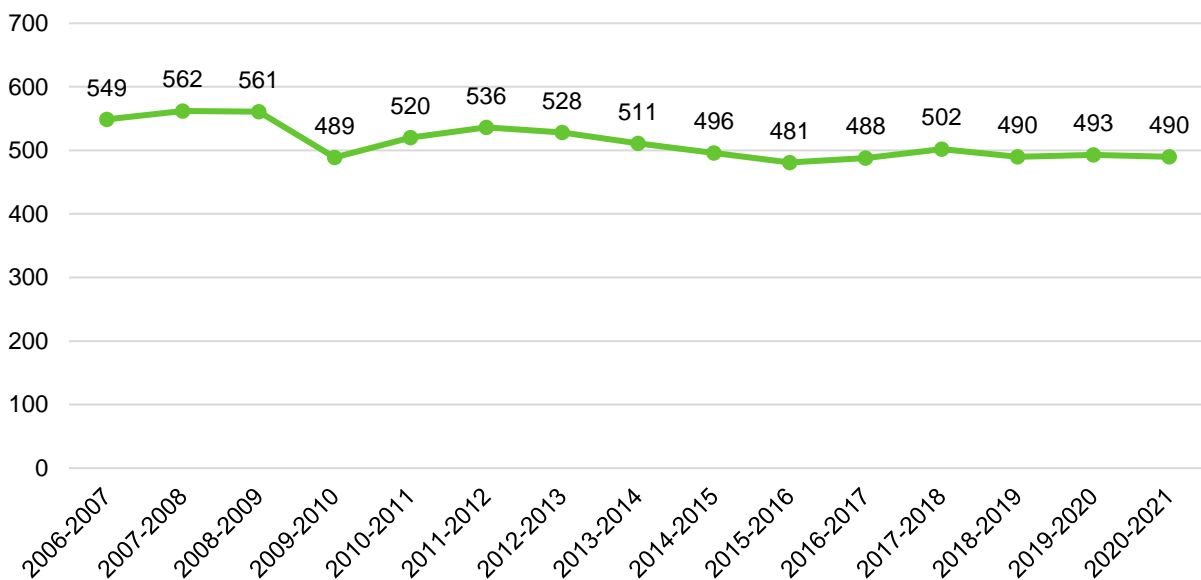
## Location

Centura Public Schools is consolidated district located in northwest Hall County, northeast Buffalo County, southwest Howard County, and southeast Sherman. The district has two schools: Centura Elementary School and Centura Secondary School. Other district owned buildings include two storage buildings, a press box, and a shed. The district is located five miles from the communities of Boelus, Cairo, and Dannebrog and covers approximately 214 square miles. The school district provides services to students in the communities of Boelus, Cairo, Dannebrog, and the rural areas surrounding them.

## Demographics

The following figure displays the historical student population trend starting with the 2006-07 school year and ending with the 2020-2021 year. It indicates that the student population has been declined slightly since 2006. There are 490 students enrolled in the district.<sup>1</sup> The district anticipates a slight increase in student population in the coming years. Both English and Spanish are spoken in the district.

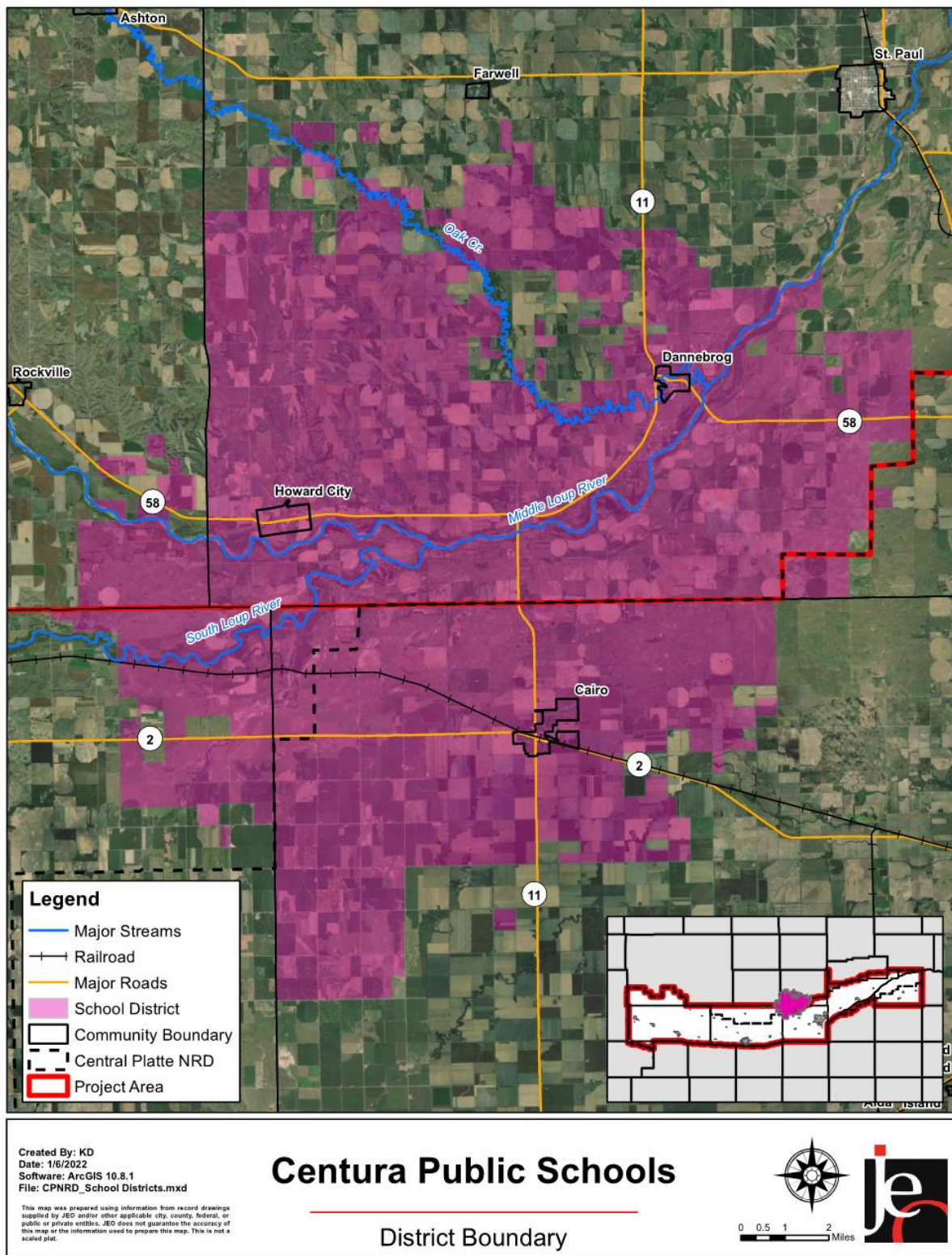
**Figure CNS.1: Student Population 2007-2021**

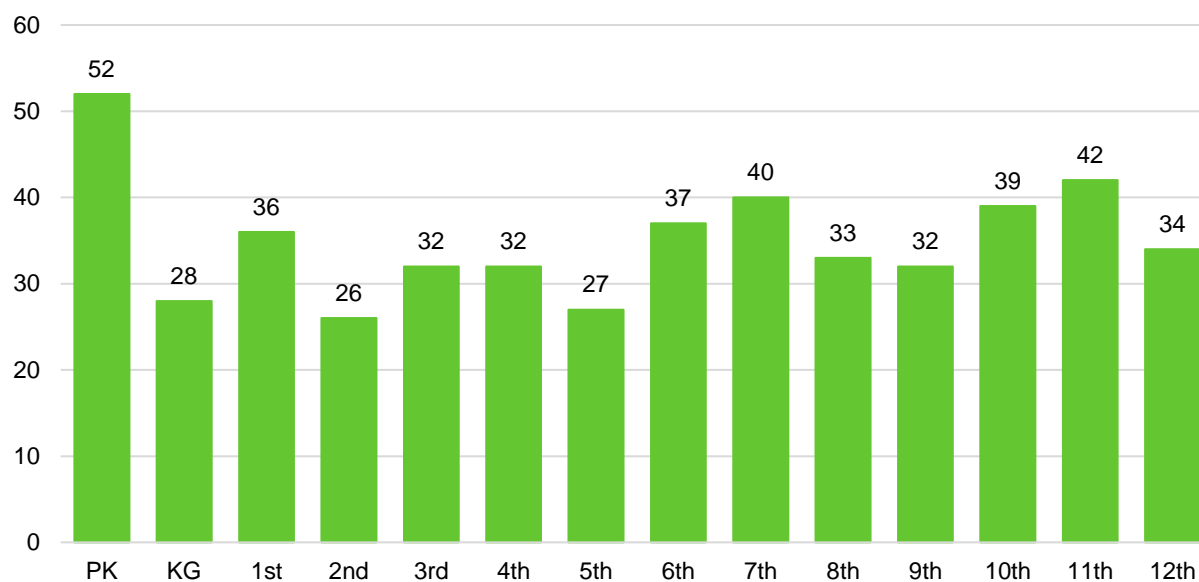


Source: Nebraska Department of Education

<sup>1</sup> Nebraska Department of Education. July 2021. "2019-2020 Education Profile for District: Grand Island Public Schools." <https://nep.education.ne.gov/Districts/Index/40-0002-000?DataYears=20192020>

Figure CNS.2: Centura Public Schools



**Figure CNS.3: Number of Students by Grade, 2020-2021**

Source: Nebraska Department of Education

The figure above indicates that the largest number of students are in prekindergarten and 11th grades. The lowest population of students are in the 2nd and 5th grades. According to the Nebraska Department of Education (NDE), 32.24% of students receive either free or reduced priced meals at school. This is lower than the state average of 46.33%. Additionally, 14.84% of students are in the Special Education Program and the district mobility rate is 9.12%. These particular students may be more vulnerable during a hazardous event than the rest of the student population.

**Table CNS.2: Student Statistics, 2020-2021**

	School District	State of Nebraska
Free/Reduced Priced Meals	32.24%	46.33%
School Mobility Rate	6.62%	9.12%
English Language Learners	*	7.25%
Special Education Students	14.84%	15.67%

\*Indicates 10 students or less.

Source: Nebraska Department of Education<sup>2</sup>

## Administration and Staff

The school district has a superintendent and two principals. The school board is made up of a six-member panel. Approximately 50 staff are employed by the district. Professional development and staff meetings are where staff are trained on emergency procedures.

## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the district's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects. Students and families are educated about emergency procedures through video messages and paper handouts. The district partners with the local fire department for educational outreach.

<sup>2</sup> Nebraska Education Profile. "School Report Card." Accessed January 2022. <http://nep.education.ne.gov/Home/>.

District funds are limited to maintaining current facilities and systems with a large portion of funds already dedicated to new restrooms. Funds have stayed the same over recent years.

**Table CNS.3: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning Capability</b>	Capital Improvements Plan/Long-Term Budget	Yes
	Continuity of Operations Plan	No
	Disaster Response Plan	No
	Other (if any)	-
<b>Administration &amp; Technical Capability</b>	GIS Capabilities	No
	Civil Engineering	No
	Local staff who can assess community's vulnerability to hazards	Yes
	Grant Manager	Yes
	Mutual Aid Agreement	No
<b>Fiscal Capability</b>	Other (if any)	-
	Applied for grants in the past	Yes
	Awarded grants in the past	Yes
	Authority to levy taxes for specific purposes such as mitigation projects	No
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	No
	Approved bonds in the past	No
	Flood Insurance	Yes
	Other (if any)	-
	Local school groups or non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations, etc. (Ex. Parent groups, hazard mitigation boards, etc.)	No
<b>Education &amp; Outreach Capability</b>	Ongoing public education or information program (Ex. Responsible water use, fire safety, household preparedness, environmental education, etc.)	Yes
	StormReady Certification	No
	Other (if any)	-
<b>Drills</b>	Fire	10 / year
	Tornado	2 / year
	Intruder	2 / year
	Bus evacuation	2 / year
	Evacuation	2 / year
	Other (if any)	-



Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Limited
Staff/expertise to implement projects	Limited
Public support to implement projects	Limited
Time to devote to hazard mitigation	Limited

## Plan Integration

Centura Public Schools has two planning documents that discuss or relate to hazard mitigation. Each plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The district will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

### Strategic Plan (2021-2022)

The strategic plan for the district reflects master planning to improve facilities, safety, technology, and curriculum. Mitigation actions in the hazard mitigation plan will be reflected in the district's strategic plan going forward.

### Crisis Response Plan (2021-2022)

The crisis response plan for the school provides response protocols for unique situations such as large-scale natural disaster or criminal activities. It assigns specific responsibilities to individuals, addresses shelter in place protocols and locations, identifies scenarios that would require evacuation, provides evacuation routes, and identifies opportunities for mitigation following an event. The entire school is familiar with the crisis response plan.

## Future Development Trends

Over the past five years, the district has updated its boiler and renovated the gym and science room. In the next five years, the district is going to perform master planning.

## Community Lifelines

### Transportation

Three major transportation corridors travel through the district: Nebraska State Highways 2, 11, and 58. The most traveled route is Highway 11 with an average of 2,965 vehicles daily, 265 of which are trucks.<sup>3</sup> County roads are of most concern to the district due to poor road conditions for the bus routes during the winter and after heavy rains. A Burlington Northern Santa Fe Railway rail line runs west to east through the district. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the district, as well as areas more at risk of transportation incidents. The district owns 12 buses with over 300 students bused to and from school across six routes.

### Hazardous Materials

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are five chemical storage sites within the district which house hazardous materials. The school building is not located near any of the chemical facilities. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

<sup>3</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map."  
<https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.



**Table CNS.4: Chemical Storage Sites**

Name	Address	Located in Floodplain?
<b>Bosselman Energy Inc.</b>	W Nebraska Highway 2 Cairo, NE	N
<b>Agricultural Services Inc.</b>	6068 N Highway 11 Cairo, NE	Y (1%)
<b>CenturyLink</b>	103 E Nile St Cairo, NE	N
<b>Aurora Co-op Elevator Company</b>	30250 Shelton Rd Ravenna, NE	Y (1%)
<b>Agricultural Services Inc.</b>	422 8 <sup>th</sup> St Boelus, NE	N

Source: Nebraska Department of Environment and Energy<sup>4</sup>

### Critical Facilities

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the district.

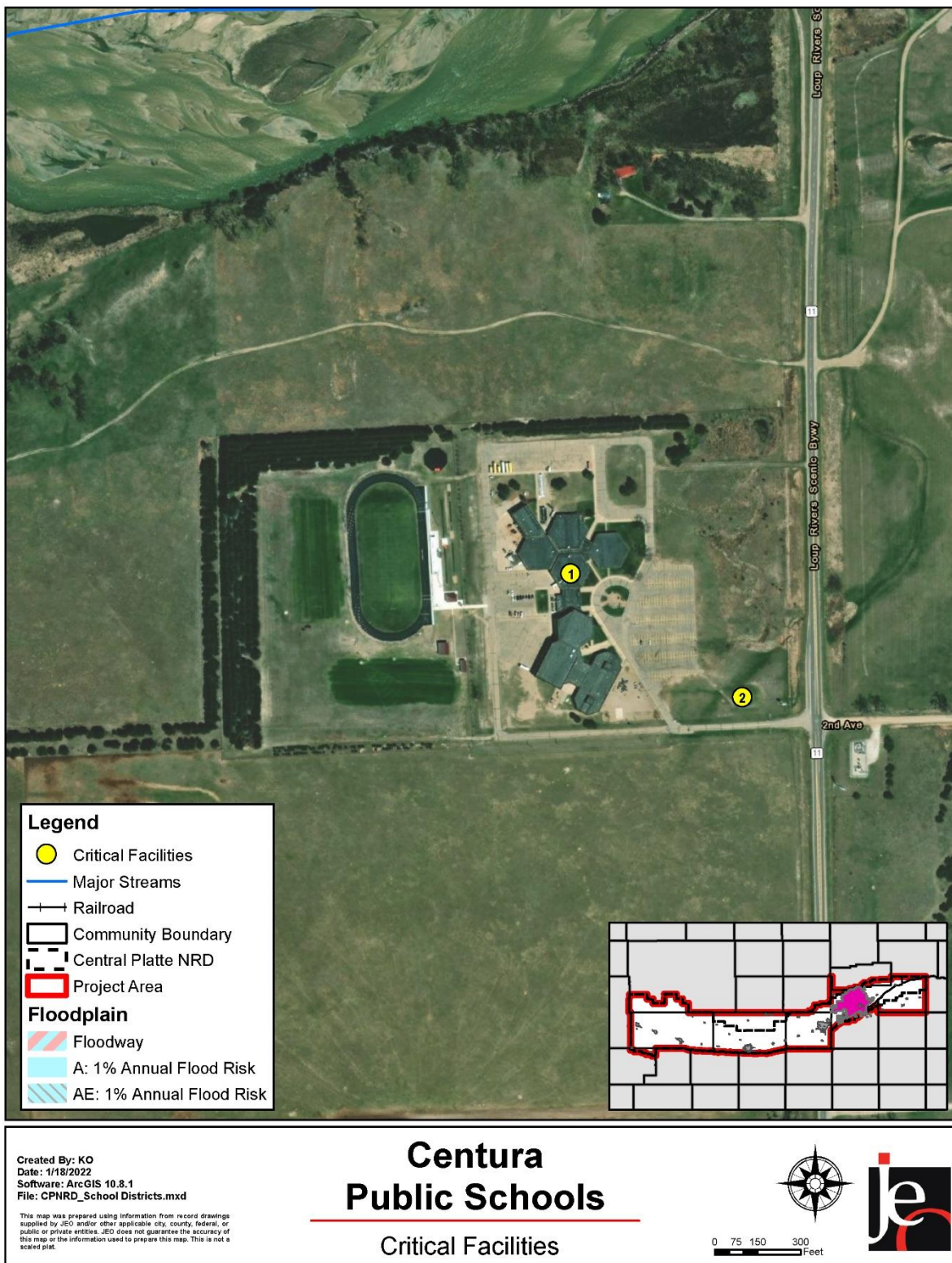
Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table CNS.5: Critical Facilities**

CF Number	Name	Mass Care (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	School Building	Y	Y	N
2	Sewer Plant	N	Y	N

<sup>4</sup> Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.

Figure CNS.4: Critical Facilities



## Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries.

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the district. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the district's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

### Grass/Wildfire

*What are the concerns for the district related to grass/wildfire?*

*Has the district been impacted by wildfire in the past? When and what were the impacts?*

*If an evacuation of the school is required where would students and staff go? How would they get there?*

*What has the district done to reduce the impact/risk from grass/wildfire?*

### Severe Thunderstorms

*What are the concerns for the district related to severe thunderstorms?*

*Has the district been impacted in the past by severe thunderstorms? When and what were the impacts?*

*Does the school have hail resistant roofing?*

*Are power lines on school property buried?*

*What has the district done to reduce the impact from severe thunderstorms?*

## **Tornadoes and High Winds**

*What are the concerns for the district related to tornadoes and high winds?*

*Has the district been impacted by tornadoes and high winds in the past? When and what were the impacts?*

*Does the school have a FEMA certified safe room?*

*Where are students supposed to go during a tornado warning?*

*What educational outreach on tornado safety is given to students and staff?*

*What has the district done to reduce the impact from tornadoes and high winds?*

## Mitigation Strategy

### New Mitigation Actions

*If there are additional mitigation actions your jurisdiction is interested in pursuing or interested in applying for grant funding, complete the table(s) below. Please fill out all rows.*

*For examples of mitigation actions, review the provided FEMA Handbook ([https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas\\_02-13-2013.pdf](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf)) or reach out to a JEO Project Contact.*

Mitigation Action Name			
Description			
Hazard(s) Addressed			
Estimated Cost			
Local Funding			
Timeline	1 Year	2-5 Years	5+ Years
Priority	High	Medium	Low
Lead Agency			
Status			

<b>Mitigation Action Name</b>			
<b>Description</b>			
<b>Hazard(s) Addressed</b>			
<b>Estimated Cost</b>			
<b>Local Funding</b>			
<b>Timeline</b>	1 Year	2-5 Years	5+ Years
<b>Priority</b>	High	Medium	Low
<b>Lead Agency</b>			
<b>Status</b>			

<b>Mitigation Action Name</b>			
<b>Description</b>			
<b>Hazard(s) Addressed</b>			
<b>Estimated Cost</b>			
<b>Local Funding</b>			
<b>Timeline</b>	1 Year	2-5 Years	5+ Years
<b>Priority</b>	High	Medium	Low
<b>Lead Agency</b>			
<b>Status</b>			



## Plan Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside planning documents, during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

***When was your profile last reviewed by the local planning team?***

***Date:*** \_\_\_\_\_

***What revisions or changes were identified during the last review?***

***For your jurisdiction, what positions are responsible for reviewing and updating the profile outside of the five-year update?***

***Position:*** \_\_\_\_\_

***Position:*** \_\_\_\_\_

***Position:*** \_\_\_\_\_

***Please indicate how frequently your jurisdiction intends to review/revise the profile. (circle one)***

***Every 6 months***

***Annually***

***Bi-annually***

***How will your jurisdiction notify and involve the public in the plan review and revision? (For example, social media, website updates, letters to all residents, board/council meetings, etc.)***

**School District Profile**

# **Wood River Rural Schools**

**Central Platte NRD  
Hazard Mitigation Plan Update**

**2022**

## Local Planning Team

Wood River Rural School's local planning team for the hazard mitigation plan are listed in the table below along with the meetings attended. All participant worksheets were filled out and returned by the district.

**Table WRS.1: Wood River Rural Schools Local Planning Team**

Name	Title	Jurisdiction	R1 Meeting	R2 Meeting
Terry Zessin	Superintendent	Wood River Rural Schools	Grand Island	Grand Island

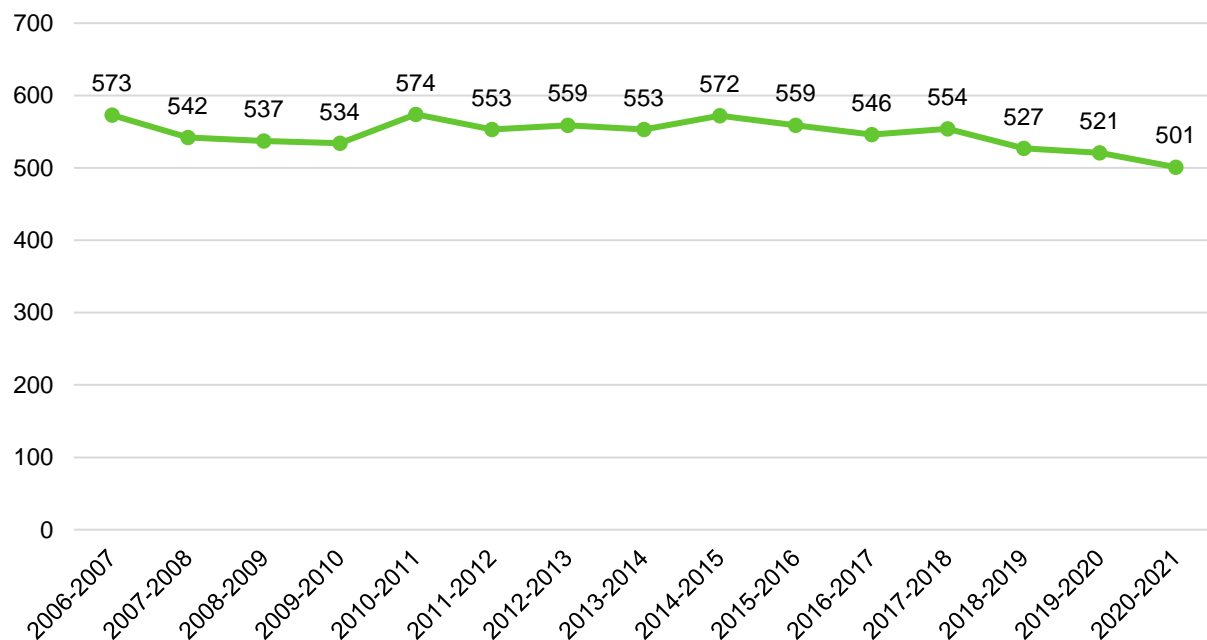
## Location

Wood River Rural Schools is located in central and western Hall County. It serves three schools: Wood River Elementary School, Wood River Rural Middle School, and Wood River Rural High School. The district was formed in June of 2006 when Wood River Rural High School merged with Alda Elementary and Wood River Elementary. The school district provides services to students in the communities of Wood River, Alda, and the rural areas surrounding them.

## Demographics

The following figure displays the historical student population trend starting with the 2006-07 school year and ending with the 2020-2021 year. It indicates that the student population has been declining since 2007. There are 501 students enrolled in the district.<sup>1</sup> The local planning team anticipates little change in the student population in the next few years. However, there is a potential for it to increase with the additional housing being built in the community. Many students in the district are bilingual in English and Spanish. Most emergency instructions are available in both English and Spanish.

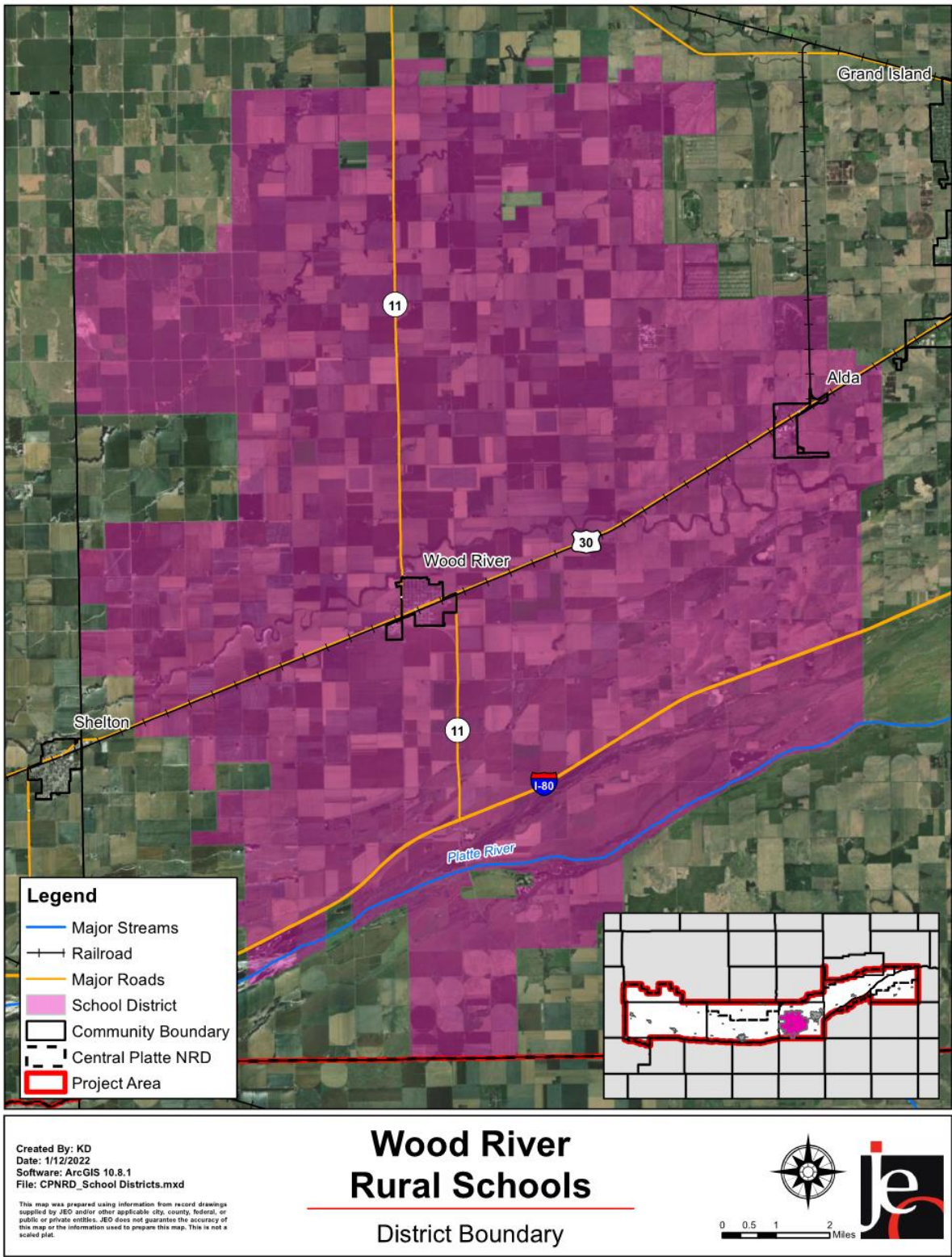
**Figure WRS.1: Student Population 2007-2021**

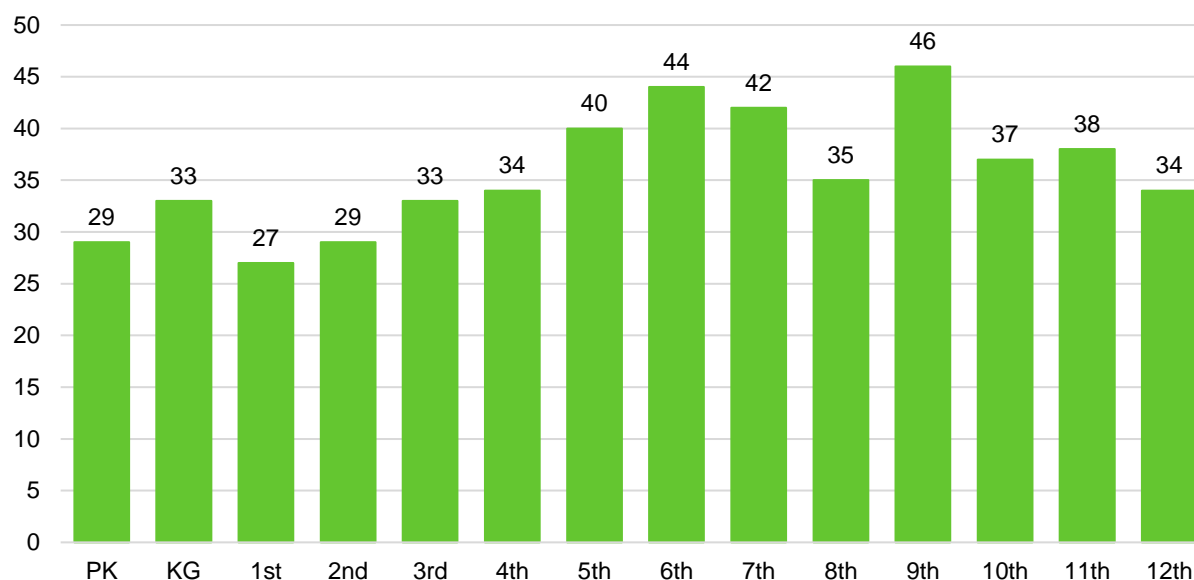


Source: Nebraska Department of Education

<sup>1</sup> Nebraska Department of Education. July 2021. "2019-2020 Education Profile for District: Grand Island Public Schools." <https://nep.education.ne.gov/Districts/Index/40-0002-000?DataYears=20192020>

Figure WRS.2: Wood River Rural Schools



**Figure WRS.3: Number of Students by Grade, 2020-2021**

Source: Nebraska Department of Education

The figure above indicates that the largest number of students are in the 9th and 6th grades. The lowest population of students are in pre-kindergarten, 1st, and 2nd grades. According to the Nebraska Department of Education (NDE), 41.72% of students receive either free or reduced priced meals at school. This is lower than the state average of 46.33%. Additionally, 11.02% of students are in the Special Education Program, the school mobility rate is 5.72%, and 6.14% of students are English Language Learners. These particular students may be more vulnerable during a hazardous event than the rest of the student population.

**Table WRS.2: Student Statistics, 2020-2021**

	School District	State of Nebraska
Free/Reduced Priced Meals	41.72%	46.33%
School Mobility Rate	5.72%	9.12%
English Language Learners	6.14%	7.25%
Special Education Students	11.02%	15.67%

Source: Nebraska Department of Education<sup>2</sup>

## Administration and Staff

The school district has a superintendent and three principals. The school board is made up of a six-member panel. 87 staff are employed by the district. Staff are trained on emergency procedures through ESU, outside agencies, and the Nebraska Department of Education.

## Capability Assessment

The capability assessment consisted of a review of local existing policies, regulations, plans, and programs with hazard mitigation capabilities. The following tables summarize the district's planning and regulatory capability; administrative and technical capability; fiscal capability; educational and outreach capability; and overall capability to implement mitigation projects. The local fire department partners schools for education and drills but not as often as they could.

<sup>2</sup> Nebraska Education Profile. "School Report Card." Accessed July 2021. <http://nep.education.ne.gov/Home/>.

District funds are limited to maintaining current facilities and systems, but the administration is trying to get to the ability to do new capital projects. A large portion of funds is already dedicated to remodeling and renovating science rooms. District funds have increased slightly over recent years.

**Table WRS.3: Capability Assessment**

Survey Components/Subcomponents		Yes/No
<b>Planning Capability</b>	Capital Improvements Plan/Long-Term Budget	No
	Continuity of Operations Plan	Yes
	Disaster Response Plan	No
	Other (if any)	-
<b>Administration &amp; Technical Capability</b>	GIS Capabilities	Yes
	Civil Engineering	No
	Local staff who can assess community's vulnerability to hazards	Yes
	Grant Manager	Yes
	Mutual Aid Agreement	No
<b>Fiscal Capability</b>	Other (if any)	-
	Applied for grants in the past	Yes
	Awarded grants in the past	Yes
	Authority to levy taxes for specific purposes such as mitigation projects	No
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	Yes
	Approved bonds in the past	Yes
	Flood Insurance	No
	Other (if any)	-
<b>Education &amp; Outreach Capability</b>	Local school groups or non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations, etc. (Ex. Parent groups, hazard mitigation boards, etc.)	Yes (County)
	Ongoing public education or information program (Ex. Responsible water use, fire safety, household preparedness, environmental education, etc.)	No
	StormReady Certification	No
	Other (if any)	-
<b>Drills</b>	Fire	10 / year
	Tornado	2 / year
	Intruder	1 / year
	Bus evacuation	2 / year
	Evacuation	1 / year
	Other (if any)	-



Overall Capability	Limited/Moderate/High
Financial resources to implement mitigation projects	Limited
Staff/expertise to implement projects	Limited
Public support to implement projects	High
Time to devote to hazard mitigation	Limited

## Plan Integration

Wood River Rural Schools has one planning document that discusses or relates to hazard mitigation. The plan is listed below along with a short description of how it is integrated with the hazard mitigation plan. The district will seek out and evaluate any opportunities to integrate the results of the current hazard mitigation plan into other planning mechanisms and updates.

### Crisis Response Plan

The crisis response plan for the school provides response protocols for unique situations such as large-scale natural disaster or criminal activities. It assigns address shelter in place protocols, identifies scenarios that would require evacuation, identifies evacuation routes, and lists sheltering locations. Specific hazards addressed in the plan include winter storms, flooding, tornado, fire, and terrorism. The plan will be fully completed and updated during the 2021-2022 academic year.

## Future Development Trends

Over the past five years, there have been no major changes to district buildings. In the next five years, the science rooms will be renovated and there is the potential to remodel the front entrances to make them more secure and accessible.

## Community Lifelines

### Transportation

Three major transportation corridors travel through the district: Interstate 80, US Highway 30, and Nebraska State Highway 11. The most traveled route is Interstate 80 with an average of 23,040 vehicles daily, 8,100 of which are trucks.<sup>3</sup> Bus routes on rural roads are the most concern due to poor road conditions. A Union Pacific rail line runs east to west through the district. Transportation information is important to hazard mitigation plans because it suggests possible evacuation corridors in the district, as well as areas more at risk of transportation incidents. The district owns six busses.

### Hazardous Materials

According to the Tier II System reports submitted to the Nebraska Department of Environment and Energy, there are 14 chemical storage sites within the district which house hazardous materials.<sup>4</sup> A list of the sites and addresses can be found in the Wood River and Alda participant sections. Agricultural Services Inc. is located three blocks southwest of Wood River Elementary. In the event of a chemical spill, the local fire department and emergency response may be the first to respond to the incident.

<sup>3</sup> Nebraska Department of Roads. 2018. "Interactive Statewide Traffic Counts Map."  
<https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34>.  
<sup>4</sup> Nebraska Department of Environment and Energy. "Search Tier II Data." Accessed June 2021.

### Critical Facilities

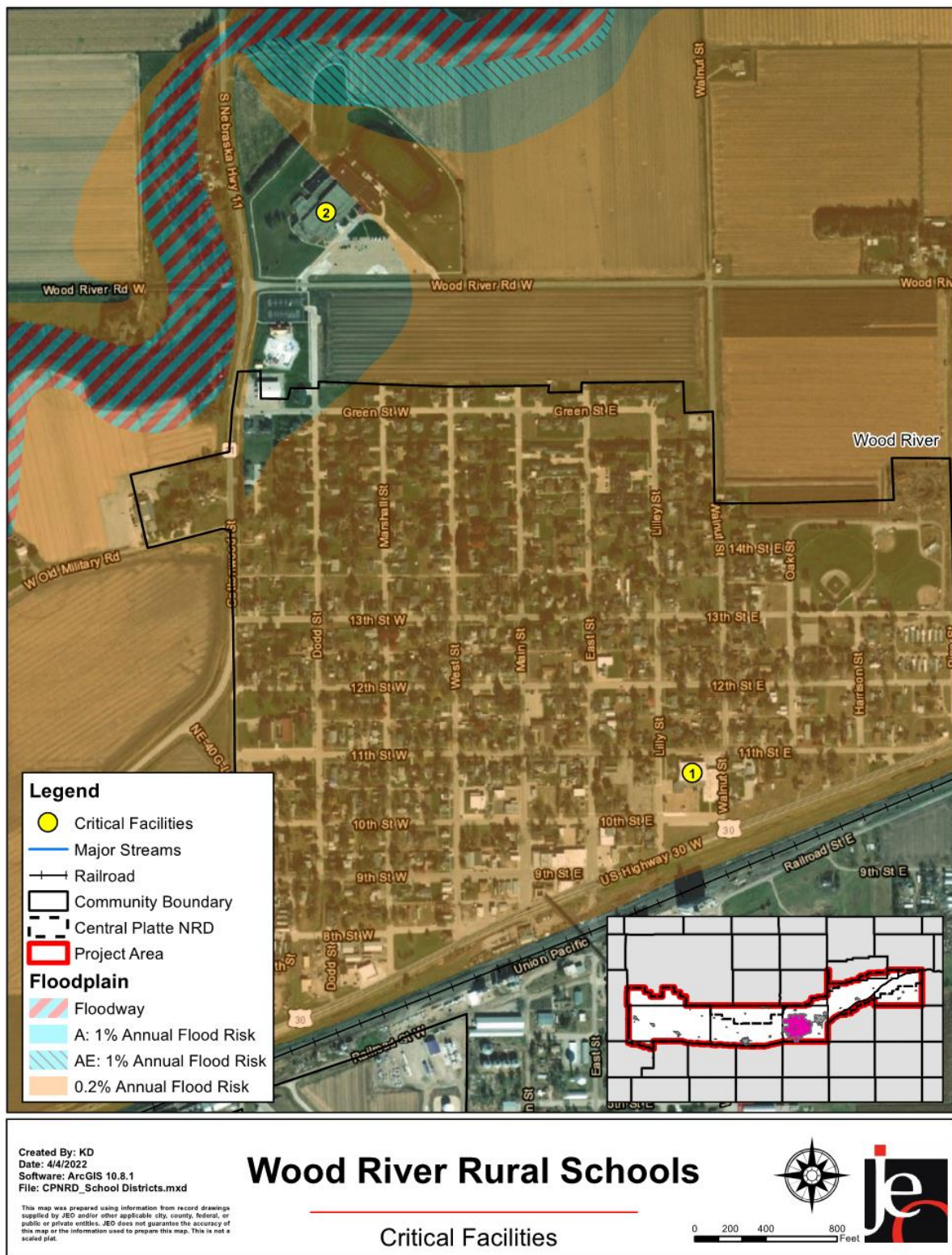
Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction's functions to normal during and after a disaster per the FEMA Community Lifelines guidance. Critical facilities were identified during the original planning process and updated by the local planning team as part of this plan update. The following table and figure provide a summary of the critical facilities for the district.

Although they may not be listed in the table below, critical infrastructure also includes power infrastructure, cell towers, alert sirens, water infrastructure, wastewater infrastructure, and roadways.

**Table WRS.4: Critical Facilities**

CF Number	Name	Mass Shelter (Y/N)	Generator (Y/N)	Floodplain (Y/N)
1	Wood River Elementary	Y	N	Y (0.2%)
2	Wood River MS/HS	N	N	Y (0.2%)

Figure WRS.4: Critical Facilities



## Historical Occurrences

See the Hall County profile for historical hazard events, including the number of events, damage estimates, and any fatalities or injuries. Larger scale and more damaging events that impacted the district are discussed under Hazard Prioritization.

## Hazard Prioritization

The hazards discussed in detail below were either identified in the previous HMP and determined to still be of top concern or were selected by the local planning team from the regional list as relevant hazards for the district. The local planning team prioritized the selected hazards based on historical hazard occurrences, potential impacts, and the district's capabilities. For more information regarding regional hazards, please see *Section Four: Risk Assessment*.

### Flooding

The last large flooding events occurred within a few months of each other in 2019. The high school was the sand bagging location during the floods. It also served as the Red Cross emergency headquarters. The school district housed 60 people during the emergency and stored supplies and food during the relief effort. The district's primary concern during a flood event is trying to keep the school in session while also helping families and individuals. No school property has been damaged from past flood events.

### Hazardous Materials Release

Potential spill sources come from the Ethanol Plant, the Co-op, Highway 30, and rail line. Chemical spills have not impacted the district in the past; however, a large spill could cause an evacuation of a school. In the event of an evacuation, students would be bussed to a school in a neighboring community. Students and staff have evacuation drills at least once a year.

### Public Health Emergency

The primary concern with a public health emergency is keeping both students and staff healthy. As with all schools, Wood River Rural Schools was heavily impacted by the ongoing Covid-19 pandemic. Some of the impacts include student learning loss, increased student and staff absences, and increased cost for building adjustments. To help reduce the spread of the virus, social distancing was implemented, rooms were cleaned more often, and additional technology was purchased to be able to work remotely.

### Severe Winter Storms

Winter storms have the potential to close school for a number of days. In addition, ice and snow on rural bus routes can cause issues getting students bussed to school. The extremely cold temperatures in February 2021 caused the district to have late starts and bus additional students to school. Typically, the district has two-three days a year when school is closed due to poor winter weather conditions. The district works with the National Weather Service for forecasting weather conditions. Students and families are notified of a snow day through a mass text alert, social media, the school's website, and phone calls. Snow removal on school property is contracted out to a local farmer.

### Terrorism

There have been several smaller instances of terrorism and threats to the district. In 2021, a former student walked through the doors at the end of the day and punched a student. Four years ago, the district had two social media threats of people saying they were going to shoot up the school. During these instances local law enforcement was contacted to help with the situation. Safety measures in place include locked doors with electronic unlocks, requiring visitors to check



in and wear identification, procedures in place in the event of a terroristic act, and having architectural drawings of the buildings on hand. In the future, the district would like to locate office staff at the front door in order to check people in, then release them into the building.

### Tornadoes and High Winds

Past high wind events have caused damage to the school roofs. Tornadoes have not damaged school buildings, but school has been released early due to likely high winds and severe weather. Neither school has a FEMA certified shelter but there are designated spots in the building where students and staff can go. Only a few people are able to fit in the basements. If a tornado warning occurred during bus routes, the passengers would use a nearby home or ditch. The district is in regular communication with the Natural Weather Service for any severe weather that may occur. Tornado drills are practiced by students and staff at least twice a year.

## Mitigation Strategy

### New Mitigation Actions

Mitigation Action Name	Backup and Emergency Generators
Description	A backup power generator is needed at both schools.
Hazard(s) Addressed	All Hazards
Estimated Cost	\$100,000
Local Funding	Special Building Fund
Timeline	2-5 Years
Priority	High
Lead Agency	Superintendent
Status	Planning Stage

Mitigation Action Name	Bus Barn
Description	Construct a place for buses to stay warm and out of weather conditions.
Hazard(s) Addressed	Severe Winter Storms, Severe Thunderstorms, Tornadoes and High Winds
Estimated Cost	\$350,000 - \$500,000
Local Funding	Special Building Fund
Timeline	2-5 Years
Priority	Medium
Lead Agency	Superintendent
Status	Not Started

Mitigation Action Name	New Secure Accessible Front Entrances
Description	Both the elementary and high school need new entrances with a secure vestibule. Update the security door access system.
Hazard(s) Addressed	Terrorism
Estimated Cost	\$2,100,000
Local Funding	Special Building Fund, Fundraising, Grant
Timeline	2-5 Years
Priority	High
Lead Agency	Superintendent, Principals
Status	In architectural design.

<b>Mitigation Action Name</b>	<b>Virtualized Servers</b>
<b>Description</b>	Virtualized servers are needed at both schools.
<b>Hazard(s) Addressed</b>	All Hazards
<b>Estimated Cost</b>	\$100,000
<b>Local Funding</b>	Special Building Fund
<b>Timeline</b>	2-5 Years
<b>Priority</b>	High
<b>Lead Agency</b>	Superintendent
<b>Status</b>	Planning Stage

### Plan Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside planning documents, during the fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin including CDBG, Water Sustainability Fund, Revolving State Fund, or other identified funding mechanisms.

The superintendent, middle/high school principal, elementary principal, and the Wood River Safety Team will be responsible for reviewing and updating the plan in the future. These individuals will review the plan on an annual basis.



RESOLUTION 2022-124

WHEREAS, the Federal Disaster Mitigation Act of 2000 was signed in to law on October 30, 2000, placing new emphasis on state and local mitigation planning for natural hazards and requiring communities to adopt a hazard mitigation action plan to be eligible for pre-disaster and post-disaster federal funding for mitigation purposes; and

WHEREAS, a Multi-Jurisdictional Hazard Mitigation Plan was prepared by the Central Platte Natural Resources District, with assistance from JEO Consulting Group, Inc. of Lincoln, NE, which includes City of Grand Island; and

WHEREAS, the purpose of the mitigation plan was to lessen the effects of disasters by increasing the disaster resistance of the Natural Resources District and participating jurisdictions located within the planning boundary by identifying the hazards that affect City of Grand Island and prioritize mitigation strategies to reduce potential loss of life and property damage from those hazards, and

WHEREAS, FEMA regulations require documentation that the plan has been formally adopted by the governing body of City of Grand Island in the form of a resolution and further requesting approval of the plan at the Federal Level.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF GRAND ISLAND, NEBRASKA, the governing body of City of Grand Island does herewith adopt the 2022 Central Platte Natural Resources District Hazard Mitigation Plan in its entirety.

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Adopted by the City Council of the City of Grand Island, Nebraska, May 10, 2022.

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Roger G. Steele, Mayor

Attest:

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RaNae Edwards, City Clerk

Approved as to Form	by _____
May 6, 2022	City Attorney