

1. Introduction

Executive Summary

The updating of the Logan County, N.D. Multi-Jurisdictional Multi-Hazard Mitigation Plan (MHMP) was conducted over a one-year period. It included the review of hazards, risks, vulnerabilities, and capabilities of the county, updating of vulnerable populations and areas, and development of a mitigation strategy for Logan County accurately reflecting plan research and progress. The review of hazard impacts to the county is ongoing by county officials, as are the efforts to mitigate injuries and damages from natural hazards and man-made threats. The planning process and this plan allow the county's residents, businesses, stakeholders, and federal and state agencies to have input and to identify actions to assure the safety and protection of people and property. The mitigation strategy for Logan County consists of 34 projects. Specific mitigation projects were developed for all incorporated cities. See Table 6.1 in Chapter 6, Mitigation Strategy for a breakdown of prioritization for all projects in the plan. **A mitigation survey was administered during the planning process. A total of 66 responses were received.**

The 14 natural hazards and man-made threats profiled in this plan include:

Natural Hazards

- Drought
- Fire (Urban/Structure and Wildland)
- Flood (Overland and Riverine)
- Geologic Hazards
- Infectious Disease – Animal, Human, and Plant
- Severe Summer Weather
- Severe Winter Weather
- Space Weather

Adversarial (Homeland Security) Threats

- Civil Disturbance
- Criminal, Terrorist or Nation-State Attack
- Cyberattack

Technological Threats

- Dam Failure
- Hazardous Material Release
- Transportation Incident

Goal 1: Improve and expand education and outreach programs to improve public awareness of hazards and threats.

Goal 2: Improve and expand administrative and technical capability to mitigate hazards and threats.

Goal 3: Improve and expand financial capability to mitigate hazards and threats.

Goal 4: Improve and expand planning and regulatory capability to mitigate hazards and threats.

Goal 5: Reduce and/or eliminate impacts of hazards and threats.

Goal 6: Improve resiliency of critical facilities and infrastructure.

Goal 7: Provide places of refuge and early warnings for the public and vulnerable populations to take protective action during active hazard and threats.

To assist in the use, implementation, and updating of this document, the plan includes the federal and state plan approval letters and plan review of this update, and the adoption letters from each of the jurisdictions in Appendix 1. The chapters and appendices provide a history of the data reviewed and analyzed in the production process of the plan.

Jurisdictions

Impacts from natural hazards and man-made threats varies between jurisdictions. Problem statements from the 2017 plan were revised based on information gathered at jurisdictional workshops and Steering Committee meetings.

Logan County

Logan County can be impacted by civil disturbance; criminal, terrorist or nation-state attack; cyberattack; dam failure; drought; fire (urban and wildland); flood (overland and riverine); geologic hazard; hazardous material release, infectious disease, severe summer weather, severe winter weather, space weather and transportation incidents. Economic loss to the agriculture and livestock industry, and hunting/recreational industry from natural hazards impacts the county's economy. Poor drainage in rural areas causes overland flooding resulting in blocking of roads and highways limiting access for emergency services and economic activity. Critical facilities and infrastructure lack sources of backup power. Beaver Lake State Park and incorporated jurisdictions lack outdoor emergency sirens and storm shelters. The county is enrolled in the National Flood Insurance Program. Severe summer weather and severe winter weather are frequent and impose property and crop damage. The county has existing mitigation capabilities that need to be expanded and upgraded. The county has integrated small-scale mitigation measures into its existing departments but relies on outside sources for funding and to accomplish large-scale mitigation projects.

Improvement and expansion of existing mitigation capabilities; upgrading of existing and installation of new outdoor emergency sirens, equipment, and communications; installation of generators at critical facilities and infrastructure; conducting of engineering studies to identify and implement improved drainage and drainage maintenance measures; upgrading/retrofitting or construction of storm shelters; and upgrading/expansion of administrative and technical, education and outreach, financial, and planning and regulatory capabilities are a priority for the county.

City of Fredonia

The city of Fredonia lacks sources of backup power at critical facilities and infrastructure. The city's fire hall is inadequate to meet the equipment and personnel needs of the fire department. The city's sanitary sewer lagoons are in a low-lying area and are a risk to overland flooding, in addition to low-lying areas on Railroad Avenue and undersized culverts on Grant St. and Dakota St. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, construction of a new fire hall, engineering to retrofit/upgrade the sanitary sewer and storm water systems, and education and outreach are a priority for the city.

City of Gackle

The city of Gackle lacks sources of backup power at critical facilities and infrastructure. The city's waterway/drainage ditch traversing through the city park lack adequate culverts and results in blockage of Maple St. N.D. Highway 46 east of the city is impacted by frost heaves resulting in loss of transportation accessibility. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, engineering to retrofit/upgrade the storm water system, retrofit/upgrade of N.D. Highway 46 east of the city, and education and outreach are a priority for the city.

City of Lehr

The city of Lehr lacks sources of backup power at critical facilities and infrastructure. The city's fire hall is inadequate to meet the equipment and personnel needs of the fire department. The city's sanitary sewer lagoons are in a low-lying area and are a risk to overland flooding. The city's storm water system is inadequate and results in overland flooding. The city's outdoor emergency siren is manually-activated. The city lacks an official storm shelter. The city does not have zoning ordinances. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, construction of an addition to the fire hall, engineering to retrofit/upgrade the sanitary sewer and storm water systems, installation of an upgraded outdoor emergency siren, and education and outreach and planning and regulatory capabilities are a priority for the city.

City of Napoleon

The city of Napoleon lacks sources of backup power at critical facilities and infrastructure. The city's wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table. The city's storm water system is inadequate and results in overland flooding. The city's outdoor emergency siren is manually-activated. The city lacks an official storm shelter. The city's planning and regulatory capabilities need to be updated. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, engineering to retrofit/upgrade the storm water systems, support for the USACE Section 594 Grant Award, upgrading and expanding of outdoor emergency siren, and education and outreach and planning and regulatory capabilities are a priority for the city.

Background

The Logan County Multi-Jurisdictional Multi-Hazard Mitigation Plan (MHMP) was developed and received approval from the Federal Management Agency (FEMA) in 2022. This plan update is the third update to the mitigation plan for Logan County.

The MHMP Steering Committee understands that the plan must be dynamic and detailed to include the specific risks of threats and hazards to the county and its jurisdictions. Improvements, updates, and

revisions will be made constantly to assure this plan continues to mitigate the potential losses and damages that can impact people and property in Logan County.

Purpose

As defined by the Disaster Mitigation Act of 2000, hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. The Act of 2000 was an amendment to the Robert T. Stafford Disaster Relief and Emergency Assistance to authorize a program for pre-disaster mitigation, to streamline the administration of disaster relief, to control the Federal costs of disaster assistance, and for other purposes.

According to a study by the National Institute for Building Standards, pre-disaster mitigation saves an average of \$6.00 for every \$1.00 spent. Additionally, the Pew Research Center recently identified that North Dakota saves an average of \$6.55 for every \$1.00 spent on mitigation projects. Mitigation can range from infrastructure projects such as raising of roads, burying of power lines, or installation of generators for critical facilities and infrastructure, to public education and outreach programs.

The purpose of this plan is to fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre- and post-disaster mitigation measures, short and/or long range strategies that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the county are exposed; to improve quality of life; and to eliminate or minimize conditions which would have an undesirable impact on our citizens, the economy, environment, and well-being of the county.

Objective

The objective of this plan is to establish a methodical process to assist in hazard and threat identification, impact evaluation, and action plan development to decrease the impacts from hazards where possible and to protect lives and property.

Scope

The scope of the Logan County Multi-Jurisdictional Multi-Hazard Mitigation Plan is countywide. The plan is not necessarily limited to federal, state, or locally declared disasters or emergencies. Any time situations or incidents occur that produce a requirement for mitigation actions, activities, and strategies, etc.; they will be developed and incorporated into the Logan County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

4. Threat and Hazard Identification and Risk Assessment (THIRA)

Logan County has a history of damages to crops, livestock, people and property from natural hazards and man-made threats. In the updating of this plan, the Steering Committee, subject-matter experts (SMEs), jurisdictions, and county and city officials identified 14 natural hazards and man-made threats to be included and analyzed in this plan because risk analysis showed that mitigation, planning, response, and preparedness would assist in limiting injury, loss of life, and loss of property.

The following sections of this chapter detail the risk assessment for Logan County, North Dakota for each of the 14 natural hazards and man-made threats.

The 14 natural hazards and man-made threats are:

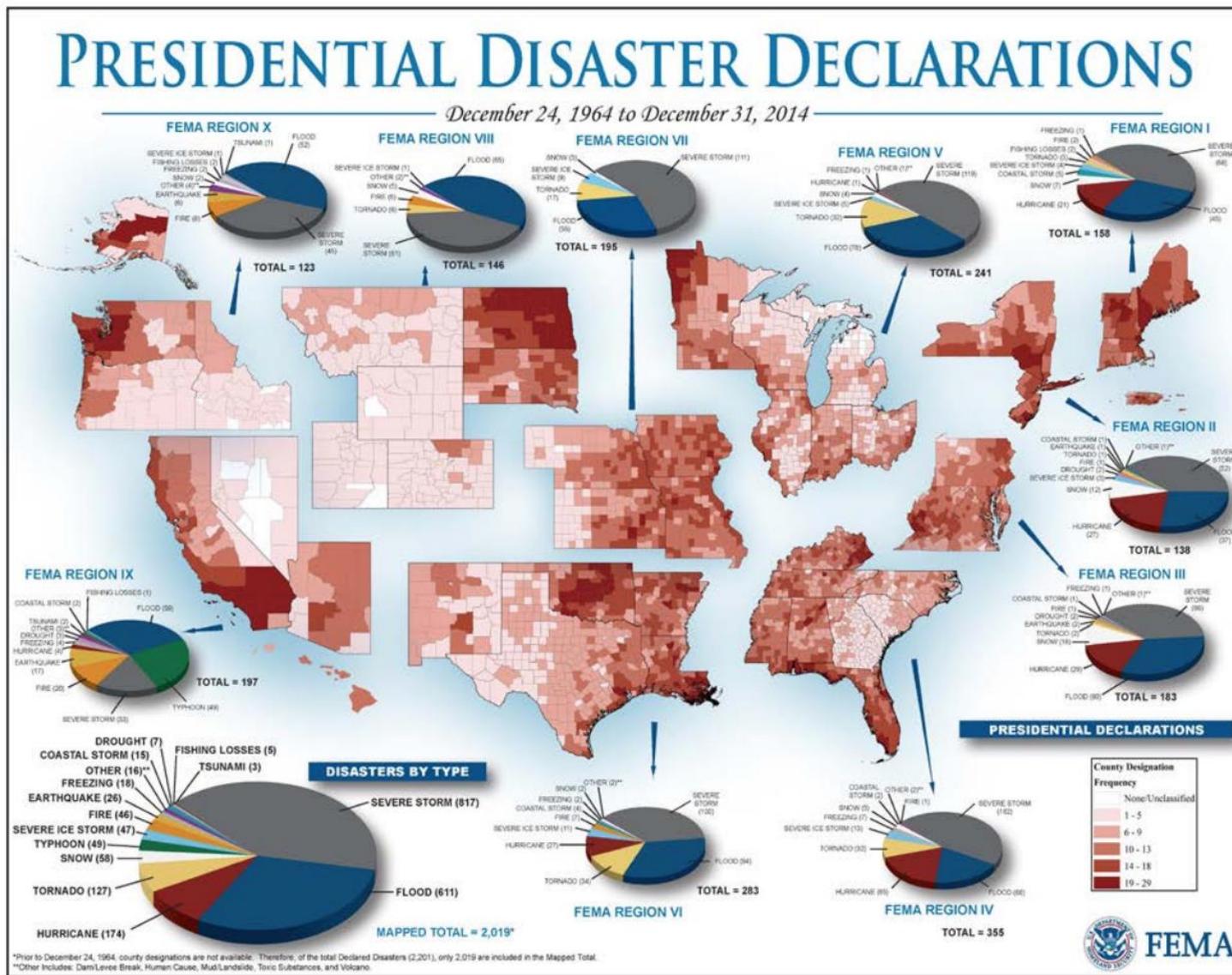
- Civil Disturbance
- Criminal, Terrorist or Nation-State Attack
- Cyberattack
- Dam Failure
- Drought
- Fire (Urban/Structure and Wildland)
- Flood (Overland and Riverine)
- Geologic Hazards
- Hazardous Material Release
- Infectious Disease – Animal, Human & Plant
- Severe Summer Weather
- Severe Winter Weather
- Space Weather
- Transportation Incident

Logan County history illustrates a considerable risk of damage from disasters. The FEMA Presidential Disaster Declaration map in Figure 4.1 shows that North Dakota, particularly counties in eastern and central portions of the state, are among areas in the nation with the most presidential disaster declarations in the past 50+ years. The frequency of declarations for severe summer and winter storms, and flooding, highlight the need for continued mitigation in Logan County pertaining to these disasters.

Since 1953, Logan County has had 21 Presidential Disaster Declarations. Table 4.1 shows that the declarations for Logan County include flooding, snow melt, severe storms, and ground saturation. These declarations highlight the hazards that will result in losses in Logan County, and the value of mitigation to reduce and/or eliminate losses to people and property. The following are key points:

- Logan County has been impacted by seven flood disasters, six severe storm(s) disasters, two biological disasters, and one coastal storm (Hurricane Katrina Evacuation) since 1953 for a total of 21 declared disasters. Flooding accounts for or is a factor in 76.2 percent of disasters declared (16) in Logan County.
- Of the 21 disaster declarations involving Logan County, 71 percent (15 disasters) have occurred between the months of April and July of any given year.
- No disasters declarations in the months of February, August, October, November, and December in Logan County.
- The COVID-19 Pandemic and Flooding were the most recent presidential disaster declarations for Logan County occurring in 2020.

Figure 4.1 – December 24, 1964, to December 31, 2014, Presidential Disaster Declaration Frequency by FEMA Region



Source: Federal Emergency Management Agency

Table 4.1 – 1953 to 2020 Logan County, North Dakota Presidential Disaster Declarations

Year	Disaster Description/Title	Disaster Number
1969	Flooding	256
1974	Heavy Rains, Snowmelt & Flooding	434
1979	Severe Storms, Snowmelt, & Flooding	581
1994	Severe Storms, Flooding	1032
1995	Severe Storms, Flooding, and Ground Saturation	1050
1996	Severe Storms, Flooding, and Ice Jams	1118
1997	Severe Flooding, Severe Winter Storms, Snowmelt, Spring Rains	1174
1997	Severe Winter Storms and Blizzard Conditions	1157
1999	Severe Storms, Flooding, Snow, Ice, Ground Saturation, Landslides, Mudslides, and Tornadoes	1279
2000	Severe Storms, Flooding, and Ground Saturation	1334
2001	Severe Storms, Flooding, and Ground Saturation	1376
2005	Hurricane Katrina Evacuation	3247
2009	Severe Storms and Flooding	1829
2010	Flooding	1907
2010	Flooding	3309
2011	Flooding	1981
2013	Flooding	4118
2020	COVID-19	3477
2020	COVID-19 Pandemic	4509
2020	Flooding	4475
2020	Flooding	4553

Source: FEMA

Threat and Hazard Identification Risk Assessment (THIRA) Methodology

A risk assessment is process that collects information on the risk of natural hazards and man-made threats to incorporated jurisdictions, and assigns values to those risks to assist with:

1. Identifying and/or comparing courses of action
2. Developing priorities for future mitigation
3. Inform decision-making on creating a local mitigation strategy
 - Foundation for mitigation strategy development

The risk assessment provides factual basis for the proposed mitigation actions found in Chapter 6, Mitigation Strategy. An effective risk assessment helps create proposed mitigation actions by focusing resources on greatest potential risk. Table 4.2 on the following pages identifies the general impacts associated with each natural hazard and man-made threat. Impacts specific to incorporated jurisdiction is found in each hazard and threat profile in Chapter 4, Threat and Hazard Identification Risk Assessment and Chapter 8, Jurisdictions.

The risk assessment was conducted using the scoring and ranking process found following Table 4.2. **The resulting risk assessment score for each natural hazard and man-made threat is prioritized as follows: 1 to 5 is low, 6 to 10 is medium, and 11 to 15 is high.**

Table 4.2 – Impacts of Natural Hazards and Man-made Threats

Impact	Civil Disturbance	Criminal, Terrorist or Nation-State Attack	Cyberattack	Dam Failure	Drought	Fire – Urban	Fire – Wildland	Flood	Geologic Hazard	Hazardous Material Release	Infectious Disease	Severe Summer Weather	Severe Winter Weather	Space Weather	Transportation Incident
Blocked Roads	X	X		X		X	X	X	X	X		X	X		X
Building Collapse	X	X		X		X	X	X	X			X	X		
Business Interruptions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Crop Loss	X	X		X	X		X	X		X	X	X	X		
Delayed Emergency Response	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Disease Outbreak/Mass Infections	X	X		X	X			X			X	X	X		X
Downed Power Lines	X	X		X		X	X	X	X	X		X	X		X
Downed Trees	X			X	X	X	X	X	X			X	X		
Environmental Degradation/Reduced Quality of Resources	X	X		X	X		X	X	X	X	X	X	X		X
Evacuation (Full)	X	X	X	X		X	X	X		X	X	X	X		X
Evacuation (Localized)	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Explosion	X	X	X	X		X	X	X		X		X	X	X	X
Financial Hardship (Private)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Financial Hardship (Public)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Flooding (Street)	X			X				X				X	X		
Flooding (Structure)	X			X				X				X	X		
Fuel Outage/Shortage	X	X	X	X	X	X	X	X	X	X		X	X		X
Government Interruptions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZMAT Release	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Human Injury/Death	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Increased Fire Potential	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Increased Public Safety Runs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Infrastructure Degradation	X	X	X	X	X	X	X	X	X	X		X	X	X	X

Table 4.2 – Impacts of Natural Hazards and Man-made Threats – Continued

Impact	Civil Disturbance	Criminal, Terrorist or Nation-State Attack	Cyberattack	Dam Failure	Drought	Fire – Urban	Fire – Wildland	Flood	Geologic Hazard	Hazardous Material Release	Infectious Disease	Severe Summer Weather	Severe Winter Weather	Space Weather	Transportation Incident
Labor Shortages	X	X	X	X		X	X	X		X	X	X	X	X	X
Livestock Injury/Death	X	X		X	X		X	X	X	X	X	X	X		X
Loss of Communication Systems	X	X	X	X		X	X	X		X		X	X	X	X
Loss of Critical Facilities and/or Infrastructure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Loss of Digital/Technological Systems	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Loss of Economy	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Loss/Overcrowded Medical Facilities	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Loss/Overcrowded Veterinarian Facilities	X	X	X	X	X	X	X	X		X	X	X	X	X	
Loss of Potable Water	X	X	X	X	X			X	X	X	X	X	X	X	X
Loss of Power/Electricity Outage	X	X	X	X		X	X	X	X	X		X	X	X	
Loss of Transportation Systems/Accessibility	X	X	X	X			X	X	X	X		X	X	X	X
Loss of Wildlife Habitat	X			X	X		X	X	X	X	X	X	X		
Mass Casualties	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Mass Fatalities	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Property Damage (Equipment and Vehicle)	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Property Damage (Structure)	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Public Distress/Social Discord	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
School Closure	X	X	X	X		X	X	X		X	X	X	X	X	X
Sewer Backup	X	X	X	X				X	X			X	X	X	
Sheltering of Displaced Populations	X	X		X		X	X	X	X	X	X	X	X	X	X
Soil Degradation/Erosion	X	X		X	X		X	X	X	X	X	X	X		X
Utility Outage/Shortage	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Wildlife Injury/Death	X			X	X		X	X	X	X	X	X	X		X

Impact is what damage or losses the hazard causes in a community.

Scored 1	Negligible – less than 10% of the jurisdiction/people affected
Scored 2	Limited – 10% to 25% of jurisdiction/people affected
Scored 3	Critical – 25% to 50% of the jurisdiction/people affected
Scored 4	Catastrophic – More than 50% of the jurisdiction/people affected

Impact per hazard: Ranked _____. Why:

Frequency is how often the hazard occurs.

Scored 1	Unlikely – history of events shows less than 1% annual occurrence
Scored 2	Possible – history of events shows between 1% to 10% annual occurrence
Scored 3	Likely – history of events shows between 10% to 100% annual occurrence
Scored 4	Highly likely – history of events shows 100% annual occurrence

Frequency per hazard: Ranked _____. Why:

Likelihood is how probable it is that the hazard will happen.

Scored 1	Unlikely – less than 1% chance hazard will occur annually
Scored 2	Possible – 1% to 10% chance hazard will occur annually
Scored 3	Likely – 10% to 100% chance hazard will occur annually
Scored 4	Highly likely – Nearly 100% chance hazard will occur annually

Likelihood per hazard: Ranked _____. Why:

Vulnerability is the amount of:

1. Vulnerable areas: trailer courts, building construction, and blocked roads, etc.
2. Vulnerable population(s): individuals with special needs, elderly, day cares, and schools, etc.
3. Resources: equipment, services, or lack thereof that increases or decreases vulnerability

Who and what is affected? When and why? Identify specific areas of vulnerability. What you have or lack: equipment, vehicles, services available, shelters, buildings, and infrastructure.

Scored 1	Low vulnerability: Adequate resources in the jurisdiction to address any hazard
Scored 2	Moderate vulnerability: Various resources in the jurisdiction
Scored 3	High vulnerability: Few resources in the jurisdiction
Scored 4	Very high vulnerability: Little to no resources in the jurisdiction

Capability is the ability to protect itself against the hazard with resources (i.e. buildings, infrastructure, equipment, personnel, plans, technical, financial/tax base)

Scored 1	Low capability: Little to no ability of the jurisdiction for mitigation
Scored 2	Moderate capability: Few abilities of the jurisdiction for mitigation
Scored 3	High capability: Various abilities of the jurisdiction for mitigation
Scored 4	Very high capability: Adequate abilities of the jurisdiction for mitigation

Capability per hazard: Ranked _____. Why:

The formula to determine the total is: Impact plus Frequency plus Likelihood plus Vulnerabilities minus Capabilities equals Total. Higher total scores indicate more vulnerability and lower scores indicate less vulnerability.

Table 4.3 summarizes the risk assessment scoring of the natural hazards and man-made threats for Logan County and incorporated city jurisdictions, and is also shown in Chapter 8, Jurisdictions.

Table 4.3 – Logan County, North Dakota Jurisdiction Risk Assessment Scoring Summary

Risk Assessment		Jurisdiction: Logan County, North Dakota				
<u>Hazard/Threat</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	Total
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Dam Failure						
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (including Rural)						
Flood						
Geologic Hazard						
Hazardous Material Release						
Infectious Disease – Human						
Infectious Disease – Animal & Plant						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Transportation Accident						

Risk Assessment		Jurisdiction: City of Fredonia, North Dakota				
<u>Hazard/Threat</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	Total
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Dam Failure						
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (including Rural)						
Flood						
Geologic Hazard						
Hazardous Material Release						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Transportation Accident						

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.3 – Logan County, North Dakota Jurisdiction Risk Assessment Scoring Summary - Continued

Risk Assessment		Jurisdiction: City of Gackle, North Dakota				
<u>Hazard/Threat</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Dam Failure						
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (including Rural)						
Flood						
Geologic Hazard						
Hazardous Material Release						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Transportation Accident						

Risk Assessment		Jurisdiction: City of Lehr, North Dakota				
<u>Hazard/Threat</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Dam Failure						
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (including Rural)						
Flood						
Geologic Hazard						
Hazardous Material Release						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Transportation Accident						

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.3 – Logan County, North Dakota Jurisdiction Risk Assessment Scoring Summary - Continued

Risk Assessment							Jurisdiction: City of Napoleon, North Dakota					
<u>Hazard/Threat</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>						
Civil Disturbance												
Criminal, Terrorist or Nation-State Attack												
Cyberattack												
Dam Failure												
Drought												
Fire – Urban/Structure Collapse												
Fire – Wildland (including Rural)												
Flood												
Geologic Hazard												
Hazardous Material Release												
Infectious Disease												
Severe Summer Weather												
Severe Winter Weather												
Space Weather												
Transportation Accident												

4.1 Civil Disturbance

Including events arising due to political grievances, economic disputes or social discord, terrorism, or foreign agitators.

Characteristics

A civil disturbance is activity from large groups, organizations, or distraught individuals with potentially disastrous or disruptive results.

Seasonal Pattern	None. Extreme winter weather can limit or eliminate activity altogether.
Duration	Minutes/hours/days/weeks/months/potentially a year or more.
Speed of Onset	Little to no warning or several days/weeks.
Location	Total geographic extent of Logan County – most likely targeting critical facilities such as the Gackle-Streeter Public School, Logan County Courthouse, Napoleon City Hall/Police Station, Napoleon Public School or infrastructure such chemical, energy, or oil and gas. Culturally and environmentally sensitive areas can also be a target.

For more information regarding civil disturbance please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

According to Logan County Emergency Management, Logan County Sheriff's Office, and the Napoleon Police Department, one incident of civil disturbance has occurred in Logan County.

- At 6:00 a.m., Napoleon Ambulance received a call from dispatch about a medical emergency/suicide. The initial report was of a 54-year-old male that was on the phone with his girlfriend. She thinks he committed suicide and the front door is locked. The Logan County Emergency Manager received a call at 10:10 a.m. from the Sheriff with the following details:

Todd Moos, a driver for the Napoleon Ambulance, responded within approximately two minutes after receiving the call. The individual did not shoot himself but was verbally hostile. Brian Jangula with the Napoleon Police Department also responded and tried talking to the individual, who then proceeded to point the gun at Brian and told him to "get the f*ck off his property." Logan County Sheriff Andrew Bartholomaeus also tried talking to the individual but was told the same as Brian. A perimeter was set up around the house located at 408 5th St E in Napoleon. A warrant for felony terrorizing was issued and the Bismarck S.W.A.T. Team was called and is responding. Logan County Emergency Management called the Duty Officer at 10:17 a.m. to verbally report the incident and help with property entry into WebEOC. The PIO was contacted at 10:28 a.m. and a message was left on their phone. The Napoleon Care Center and nursing

home put on lock-down at 6:00 a.m. and the assisted living was put on lock-down at 7:00 a.m. The PIO called back and was briefed on the situation at 10:34 a.m.

The Logan County Emergency Manager officially activated the EOC at the Napoleon Public School at 10:47 a.m. The Logan County PIO, Tax Director (Planning Section Chief) and Auditor (Financial Section Chief) deployed to the EOC. The emergency manager departed Bismarck at 12:06 a.m. and arrived in Napoleon at 1:10 p.m. The EM served managed logistics and assisted with operations. The PIO arrived at 10:30 a.m., the Auditor arrived at 12:06 p.m. and the Tax Director arrived at 1:15 p.m.

At 10:58 a.m., the Logan County Sheriff, PIO and Emergency Manager spoke via conference call to formulate an initial public statement to be released. That statement was posted on social media shortly thereafter and sent to media.

At 1:20 p.m., EOC staff met to be briefed and size-up the incident with the emergency manager.

At 1:40 p.m., the EM met with the Sheriff, ambulance and SWAT for a briefing.

At 1:55 p.m., the suspect's ex-wife and current girlfriend entered the EOC demanding they speak to the press. They were turned away and eventually detained by Napoleon PD.

At 2:30 p.m., the suspect voluntarily surrendered with his hands in the air and was taken into custody. He received medical attention and was taken to Jamestown by the Napoleon Police Department at approximately 3:00 p.m.

A post was made to the Logan County, ND Emergency Management Facebook page announcing the threat was over shortly before 3:00 p.m.

Dakota Access Pipeline

One significant civil disturbance event occurred in North Dakota that garnered national and international attention and activated mutual aid with Logan County law enforcement agencies.

- Dakota Access Pipeline (DAPL). The protest began when a 1,134-mile-long crude oil pipeline was proposed for installation across North Dakota and several other states, traversing under the Missouri River near the Standing Rock-Sioux Tribe Indian Reservation. The protest began as a peaceful and environmental-focused event but transitioned into a seven-month long unlawful protest on August 10, 2016, when individuals attempted to block access to construction activities associated with the pipeline. The protest resulted in acts of trespassing, vandalism, riots, fires set to hay bales and tires, intimidation tactics directed at local landowners as well as law enforcement and their families, poaching, theft, and killing of local livestock and other animals. Approximately 709 protesters were arrested during the event. It is estimated that up to 10,000 people attended the protest at its peak. The Logan County Sheriff's Office provided law enforcement assistance via mutual aid during the protest.

There has been one declared emergency pertaining to a civil disturbance in Logan County.

Probability

The probability of a hazard or threat is how likely it will happen. Civil disturbances are hard to predict but are most probable at or near large venues and locations of significance such as stadiums, public schools, or government facilities like the Logan County Courthouse or the Napoleon City Hall/Police Station. The Napoleon Livestock is a major venue for animal sales in North Dakota and could attract interest from animal rights groups.

Profile meeting participants ranked the probability of civil disturbance as likely meaning that there is between a 10 and 100 percent probability in the next year of an incident. It is likely a civil disturbance will occur at some point in the future in Logan County and/or in North Dakota.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount of damage or losses either caused or could occur in a community. Extent/magnitude of a civil disturbance can vary from a small protest at a government facility or health care clinic to large-scale at industrial sites, state capitols, or culturally sensitive areas and sites.

Profile meeting participants ranked the extent/magnitude of a civil disturbance as catastrophic meaning more than 50 percent of the jurisdiction and its people can be affected.

Risk Assessment

Table 4.1.1 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for civil disturbance. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.1.1 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.1.1 – Logan County, North Dakota Civil Disturbance Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	2	2	2	2	8
City of Fredonia	4	2	2	1	1	8
City of Gackle	4	2	2	2	1	9
City of Lehr	4	2	2	2	1	9
City of Napoleon	4	2	2	2	2	8

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.1.2 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of civil disturbance in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Chapter 4

Table 4.1.2 – Logan County, North Dakota Civil Disturbance Risk Assessment

Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites or transportation vehicles • Human Injury/Death • Increased Public Safety Runs 	<ul style="list-style-type: none"> • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Loss of Power • Mass Casualties/Fatalities • Property Damage (Structure) • Property Damage (Vehicle)
Frequency	<ul style="list-style-type: none"> • Active shooter threat March, 2019 – detailed in the history section at the beginning of this profile 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Increasing hostility and turmoil directed at the energy industry and major corporations • Increasing political turmoil at the federal level • Increase in development of oil and gas infrastructure and the potential for future pipelines in the county/state • Social discord from the COVID-19 and social media • Presence of Tier II Sites 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or significant tourist attraction • Lack of major television station in Logan County • No energy pipelines traversing the county • No interstate highway
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Increasing hostility and turmoil directed at the energy industry and major corporations • Increasing political turmoil at the federal level • Increase in development of oil and gas infrastructure and the potential for future pipelines in the state • Social discord from the COVID-19 and social media • Funding of extreme groups by “Dark Money” from billionaires/crowd-funding websites • Presence of DMV&W railroad • Presence of N.D. Highways 3, 13, 30, 34, 46, and 56 • Limited law enforcement in rural areas of county • Inadequate mental health services in county/state • Napoleon Livestock 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or a significant tourist attraction • Lack of major television station in Logan County • No energy pipelines traversing the county • No interstate highway • Logan County Sheriff’s Office • Napoleon Police Department • N.D. State and Local Intelligence Center (SLIC) • Civic participation by location population in neighborhood watch-like activities reporting suspicious behavior
Capability	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address civil disturbance. 	

Vulnerabilities to Publicly-Owned Buildings and Property

Publicly-owned buildings and property are vulnerable to civil disturbances as any government building can be targeted. Facilities supporting functions key to daily operations of the county and incorporated jurisdictions, such as the Logan County Courthouse, Napoleon City Hall/Police station, public schools, or buildings supporting emergency services such as ambulance and fire halls, would be the most vulnerable to a civil disturbance. **The level of vulnerability depends on the activities performed at a specific facility or level of security at the facility.**

A summary of city and publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, the vulnerability of critical facilities and infrastructure to civil disturbance is imminent. Critical facilities the Logan County Courthouse, Logan County Highway Department shops, Napoleon City Hall/Police Station, ambulance and fire halls, and infrastructure such as electric power, water/wastewater facilities, railroads and Tier II Sites are vulnerable to the threat. In Logan County, the N.D. State Radio Tower, BEK communications infrastructure, MDU substation, South Central Regional Water well heads, and Verizon Cell Towers are critical infrastructure vulnerable to civil disturbance.

Vulnerabilities to New and Future Development

Civil disturbances are nearly impossible to predict and, therefore, vulnerabilities to new and future development cannot be determined. However, large influxes of people in a short period of time into sparsely populated areas can be a source of civil disturbance and impact new development. In addition, new and future development that is located at or adjacent to politically or culturally sensitive areas, or constructed near environmentally sensitive areas, may be targeted by a civil disturbance. In Logan County, the construction of energy pipelines has been proposed in the past but never came to fruition. Construction of any future energy pipelines would increase vulnerability of civil disturbance.

Data Limitations and Other Key Documents

Due to the confidentiality of information pertaining to civil disturbances, law enforcement agencies are limited in the ability to share detailed information about incidents.

This plan incorporates data from the following documents and information herein will be used in future updates.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Logan County Evacuation Plan through Central Valley Health District (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Civil Disturbance Annex

- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.2 Criminal, Terrorist or Nation/State Attack

Including armed assault, biological, chemical, explosive, food/food production, nuclear, radiological, and vehicular attacks.

Characteristics

Any intentional adversarial human-caused incident, domestic or international, that causes mass casualties, large economic losses, or widespread panic. Universities, industry, government officials and buildings, power grids, telecommunication systems, dams, water supplies, and pipelines are potential terrorism targets. Another potential terrorist activity that must be considered is violence in the workplace.

Seasonal Pattern	None. More likely during political unrest or social discord. Extreme winter weather can limit or eliminate activity altogether.
Duration	Minutes/hours/days/weeks/months/potentially a year or more.
Speed of Onset	Little to no warning or several days/weeks.
Location	Total geographic extent of Logan County – most likely targeting critical facilities such as the Gackle-Streeter Public School, Logan County Courthouse, Napoleon City Hall/Police Station, Napoleon Public School or infrastructure such chemical, energy, or oil and gas. Culturally and environmentally sensitive areas can be targeted. The Gackle Care Center and Napoleon Care Center, along with Beaver Lake State Park, could also be targets.

For more information regarding criminal, terrorist, or nation/state attack please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

The following information on incidents of criminal, terrorist, or nation/state attack in Logan County was provided by Logan County Emergency Management, the Logan County Sheriff’s Office, and Napoleon Police Department.

- In response to the terrorist attacks on September 11, 2001, public schools in Logan County implemented controlled access by only allowing all students, staff, and visitors to enter and exit through one entrance.
- High-speed pursuits and domestic assaults are the most commonplace type of crime occurring in Logan County.

2018 N.D. Enhanced Mitigation MAOP

According to the 2018 N.D. Enhanced Mitigation MAOP, the following criminal, terrorist, or nation/state attack events occurred either in Logan County or nearby. Table 4.2.1 shows vandalism and theft claims paid on critical facilities insured by the state in Logan County between 1989 and 2018.

Table 4.2.1 – 1989 to 2018 Logan County, North Dakota Vandalism and Theft Claims Paid on Critical Facilities Insured by State

Jurisdiction	State Agencies	Adjutant General	State Universities	Local Governments	School Districts	Total
Logan County	\$0	\$0	\$0	\$0	\$3,675.00	\$3,675.00

Source(s): 2018 N.D. Enhanced Mitigation MAOP; N.D. Department of Emergency Services

- Vandalism and theft claims paid on state facilities and other critical facilities insured by the state since 1989 resulted in zero paid to state agencies, the adjutant general, state universities, and local governments. Approximately \$3,675.00 had been paid to school districts in Logan County for vandalism and theft claims paid.

There have been no declared disasters or emergencies pertaining to a criminal, terrorist, or nation/state attack in Logan County.

Probability

The probability of a hazard or threat is how likely it will happen. Criminal, terrorist, or nation/state attacks are hard to predict but are most probable at or near jurisdictions with large, dense populations. According to the 2018 N.D. Enhanced Mitigation MAOP, Logan County was 10th least densely county in North Dakota with 2.0 persons per square mile.

During jurisdictional meetings, meeting participants said there is always a chance for an incident to occur at any time and no community is immune to the threat. However, the probability is much lower in jurisdictions without schools since schools in the United States have had numerous incidents involving active shooters over the past three decades.

The Logan County Courthouse implemented controlled access measures through the building in 2016/2017 consisting of a key-card entry system and a security camera surveillance system. A call system was added in 2019 on the outside of the south door. All staff and visitors are required to enter through the main entrance.

Profile meeting participants ranked the probability of criminal, terrorist, or nation/state attack as possible meaning that there is between a one and 10 percent probability in the next year of an incident. It is likely a criminal, terrorist or nation-state attack will occur at some point in the future in Logan County and in North Dakota.

Extent/Magnitude

The extent/magnitude of a hazard or threat is the expressed in the amount of damage or losses either caused or could occur in a community. Extent/magnitude of a criminal, terrorist or nation/state attack can vary from an extreme event such as one that affects the national or agricultural economy or requires deployment of military personnel and drafting of soldiers, or smaller magnitude events such as specialized attacks on schools or businesses involving active-shooters, homemade bombs and/or hostages. An incident at a school could have a large magnitude.

Food. An adversarial threat to food is the potential for interruption within the production and distribution of food, and the potential for adulteration, obstruction of operation, or intentional damage to a facility or

product. If successful, the extent/magnitude of this type of attack could be widespread and result in mass casualties/fatalities. With the economy of Logan County largely based on agriculture, an incident involving the agriculture sector or at a manufacturing facility such as CHS has the potential to be disastrous and large in extent/magnitude if targeting food or hazardous chemicals. However, the likelihood is low, and the impact would be limited based on food inspection practices and other regulations.

Infrastructure. The most likely scenario would be targeting the drinking/potable water systems in incorporated jurisdictions. An attack of this nature could result in widespread illness or even mass casualties/fatalities.

A terrorist attack on existing pipelines, energy-related or agriculture-related infrastructure would likely cause a hazardous material release and/or fire and an explosion. The attack may result in significant environmental damage, depending on where the attack occurred and the overall impact to the existing infrastructure. This type of attack may also cause the shutting down of regional commerce that would have a spill-over effect into intrastate and national economic systems.

Transportation systems. The most likely scenario would be impacts from an interruption of the transportation system. Transportation systems have far less oversight and regulations than food production and supply chains, and water treatment and infrastructure. This type of attack could impact a substantial area and result in the shutting down of regional commerce. With the lack of a major interstate or national highway traversing Logan County, the extent/magnitude would be minor if an incident involving the local road system.

Risk Assessment

Table 4.2.2 shows the risk assessment as determined by individual jurisdictions and the Steering Committee for criminal, terrorist, or nation-state attack. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.2.2 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.2.2 – Logan County, North Dakota Criminal, Terrorist or Nation-State/Attack Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	2	2	2	2	8
City of Fredonia	4	2	2	1	1	8
City of Gackle	4	2	2	2	1	9
City of Lehr	4	2	2	1	1	8
City of Napoleon	4	2	2	3	2	9

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.2.3 provides information on the specific impact, frequency, likelihood, vulnerability and capability of criminal, terrorist, or nation-state attack in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Table 4.2.3 – Logan County, North Dakota Criminal, Terrorist or Nation-State Attack Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response • HAZMAT Release • Human Injury/Death & Mass Casualties/Fatalities • Increased Public Safety Runs • Loss of Economy • Loss/Overcrowded Medical Facilities • Loss of Potable Water 	<ul style="list-style-type: none"> • Loss of Power • Disruption of services to maintain economic activity and daily life • Harm to reputation of the county as a safe place to reside causing damage to economic growth and decline in school enrollments • Potential exodus of people resulting in permanent population loss • Shutting down of regional commerce indefinitely if an attack targets transportation – specifically bridges and railroads • Potential for mass casualties or widespread sickness if water or wastewater infrastructure was targeted
<p>Frequency</p>	<ul style="list-style-type: none"> • Never an occurrence in Logan County 	
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Increasing political turmoil at the federal level • Increasing hostility and turmoil directed at oil and gas industry and major corporations • Social media • County produces commodities for use locally, nationally, and internationally • Presence of DMV&W railroad 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Sparse population • County not located near a major metropolitan population, international airport, stadiums or tourist attractions • N.D. State and Local Intelligence Center (SLIC)
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Increasing political turmoil at the federal level • Increasing hostility and turmoil directed at oil and gas industry and major corporations • Social media • County produces commodities for use locally, nationally, and internationally • Limited law enforcement in rural areas of county • Inadequate mental health services in county/state • Presence of DMV&W railroad • Presence of N.D. Highways 3, 13, 30, 34, 46, and 56 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Sparse population • County not located near a major metropolitan population, international airport, stadiums or tourist attractions • Better security has been implemented at public schools and the Logan County Courthouse (security cameras, door access control systems, classroom barricading mechanisms, etc.) • Logan County Sheriff’s Office • Napoleon Police Department • N.D. State and Local Intelligence Center (SLIC) • No energy pipelines traversing the county • No interstate highway
<p>Capability</p>	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address criminal, terrorist or nation/state attack. 	

Vulnerabilities to Publicly-Owned Buildings and Property

Publicly-owned buildings and property are vulnerable to criminal, terrorist or nation/state attack as any government building can be targeted. Facilities supporting functions key to daily operations of the county and incorporated jurisdictions, such as the Logan County Courthouse, Napoleon City Hall/Police station, public schools, or buildings supporting emergency services such as ambulance and fire halls, would be the most vulnerable to a criminal, terrorist or nation/state attack. **The level of vulnerability depends on the activities performed at a specific facility or level of security at the facility.**

A summary of city and publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, the vulnerability of critical facilities and infrastructure to criminal, terrorist or nation/state attack is imminent. Critical facilities the Logan County Courthouse, Logan County Highway Department shops, Napoleon City Hall/Police Station, ambulance and fire halls, and infrastructure such as electric power, water/wastewater facilities, railroads and Tier II Sites are vulnerable to the threat. In Logan County, the N.D. State Radio Tower, BEK communications infrastructure, MDU substation, South Central Regional Water well heads, and Verizon Cell Towers are critical infrastructure vulnerable to civil disturbance.

Vulnerabilities to New and Future Development

Criminal, terrorist, or nation/state attacks are nearly impossible to predict and, therefore, vulnerabilities to new and future development cannot be determined. However, large influxes of people in a short period of time into sparsely populated areas can be a source of criminal, terrorist, or nation/state attack. In addition, new and future development that is located at or adjacent to politically or culturally sensitive areas, or constructed near environmentally sensitive areas, may cause controversy and be targeted by a criminal, terrorist, or nation-state attack. In Logan County, the construction of energy pipelines has been proposed in the past, and construction of any future pipelines would increase vulnerability of criminal, terrorist, or nation-state attack.

Agriculture. The agricultural industry, with its increasing mechanization and industrialization, is not always located in urban areas, but is at risk to a criminal, terrorist, or nation/state attack.

Energy Development. The anticipated continuation of development of the oil and gas industry in the western portion of the state will result in transportation of energy products/materials, whether by pipeline, rail, or road, will also contribute to an increased risk of a criminal, terrorist, or nation/state attack due to past events and an increasing focus on political intervention and climate change.

Immigration. Illegal immigration to the United States by-way of Canada has increased and there is evidence of ISIS cells infiltrating and influencing people using this method of immigration. Due to the county's proximity to the Canadian border, this method of immigration may contribute to a criminal, terrorist, or nation/state attacks.

Population. The population density of North Dakota's major cities continues to increase as people leave rural areas in favor of urban lifestyles. This trend increases the vulnerability of cities to a criminal, terrorist or nation/state attack as higher density living situations are the primary target for this threat.

Data Limitations and Other Key Documents

The probability and vulnerability of a criminal, terrorist or nation/state attack is hard to quantify given its isolated nature and the little recorded history of its impact to North Dakota, until recent large-scale events such as the Dakota Access Pipeline protest in the western portion of the state.

This plan incorporates data from the following documents and information herein will be used in future updates.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Terrorism Annex
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.3 Cyberattack

An attack or hijack of information technology infrastructure critical to the functions controlled by computer networks such as: operating, financial, communications, and trade systems.

Characteristics

Any cyberattack that creates unrest, instability, or negatively impacts confidence of citizens/consumers can be considered cyber terrorism. According to N.D. Information Technology (NDIT), the seven common types are Advanced Persistent Threats, Distributed Denial of Service, Doxing, Malware, Media Threats, Password Phishing Attacks, and Socially Engineered Malware. The following information details the extent of cyberattack in Logan County.

Seasonal Pattern	None. More frequent during Christmas/holidays and after final testing at schools. Increased activity is experienced during other hazardous events such as a pandemic (COVID-19).
Duration	Varies based on the type of attack method used. Seconds/minutes/hours/days/weeks/months/potentially a year or more.
Speed of Onset	Little to no warning or up to several days/weeks.
Location	Total geographic extent of Logan County – most likely targeting information databases at critical facilities and infrastructure such as the Logan County Courthouse, public school districts, chemical or oil and gas infrastructure, major employers, etc.

For more information regarding cyberattack please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The plan can be accessed by following the link:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

According to information technology support for Logan County, no cyberattacks have been executed on the digital/technological infrastructure at the Logan County Courthouse in Napoleon.

According to the Gackle-Streeter Public School and Napoleon Public School, no cyberattacks have been executed on the digital/technological infrastructure at both public schools.

2018 N.D. Enhanced Mitigation MAOP

According to the 2018 N.D. Enhanced Mitigation MAOP, the following Cyberattack events occurred either in Logan County or the state.

- In December 2017, several North Dakota Counties experienced a Cryptominer Virus that was eating CPU. The virus infected 81 computers. The spread of the virus was stopped at the firewall level and the antivirus vendor performed cleanup and extended monitoring. NDIT assisted with eradication and remediation of the virus. The incident lasted for approximately one day.

- **Dakota Access Pipeline (DAPL).** During the protest, personal information of law enforcement officers across the state who assisted in response to the protest was released with the intent to harass and/or intimidate them and their families. Doxing was the type of cyberattack used. There was also a significant increase in network traffic with intent to access state systems. This increased traffic required the state to increase its capacity with a larger firewall.

United States

- On May 7, 2021, Colonial Pipeline (an American oil pipeline company) was the target of a ransomware cyberattack that impacted computerized equipment responsible for managing the pipeline. The company shut down the pipeline to contain the attack. The company was ordered to pay a requested ransom of \$4.4 million to regain control of its pipeline and did so within hours of the attack. DarkSide was the criminal hacking group responsible for the attack.

The Federal Motor Carrier Safety Administration issued a regional emergency declaration for 17 states and Washington D.C. to keep fuel supply lines open on May 9, 2021. It was the largest cyberattack on oil infrastructure in United States History.

According to EMSISoft, a New Zealand-based blog focusing on malware protection, the following information on ransomware attacks occurred in the United States:

- In 2019, the U.S. was hit by an unprecedented and unrelenting barrage of ransomware attacks that impacted at least 966 government agencies, educational establishments and healthcare providers at a potential cost more than \$7.5 billion. The impacted organizations included 113 state and municipal governments and agencies, 764 healthcare providers, and 89 universities, colleges and school districts, with operations at up to 1,233 individual schools potentially affected.

The incidents were not simply expensive inconveniences; the disruption they caused put people's health, safety and lives at risk.

- Emergency patients had to be redirected to other hospitals;
- Medical records were inaccessible and, in some cases, permanently lost;
- Surgical procedures were canceled, tests were postponed and admissions halted;
- services were interrupted;
- Dispatch centers had to rely on printed maps and paper logs to keep track of emergency responders in the field;
- Police were locked out of background check systems and unable to access details about criminal histories or active warrants;
- Surveillance systems went offline;
- Badge scanners and building access systems ceased to work;
- Jail doors could not be remotely opened, and
- Schools could not access data about students' medications or allergies.

Other effects of the incidents included:

- Property transactions were halted;
- Utility bills could not be issued;
- Grants to nonprofits were delayed by months;
- Websites went offline;
- Online payment portals were inaccessible;
- Email and phone systems ceased to work;
- Driver's licenses could not be issued or renewed;
- Payments to vendors were delayed;
- Schools closed;
- Students' grades were lost, and
- Tax payment deadlines had to be extended.

There have been no declared disasters or emergencies pertaining to cyberattack in Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. Cyberattacks are hard to predict but most probable at all levels of government (federal, local, and state), private businesses employing large numbers of people, and organizations/institutions. According to the 2018 N.D. Enhanced Mitigation MAOP, due to widespread and growing use of technology and the prevalence of ever-changing cyberattack methods, the probability of cyberattacks is very high.

Profile meeting participants ranked the probability of cyberattack as highly likely meaning that there is a 100 percent probability in the next year of an attack, which does not always result in an incident.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. The magnitude of a cyberattack can vary from a loss of personal information such as an individual's pictures and music to high extent/magnitude events such as one that affects the national or agricultural economy, or information systems of critical facilities and infrastructure.

According to the 2018 N.D. Enhanced Mitigation MAOP, loss estimates for cyberattack incidents in North Dakota are not available. However, the following national cyberattacks provide insight into the potential impacts of the threat.

- The 2017 WannaCry ransomware attack caused \$4 billion in financial losses.
- The 2017 NotPetya attack caused an estimated \$300 million in economic losses for FedEx subsidiary TNT Express and another \$300 million in losses for shipping. The attack originated in Ukraine.
- Lloyds of London, an insurance underwriter, developed a scenario for an attack on the Eastern Interconnection, which is one of two major electrical grids in the United States serving half the country. The economic loss of an attack was estimated at \$243 billion. The 2003 Northwest Blackout resulted in economic losses of between \$4 billion and \$10 billion.

Risk Assessment

Table 4.3.1 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and participants at the profile meeting for cyberattack. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.3.1 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.3.1 – Logan County, North Dakota Cyberattack Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	3	3	3	3	10
City of Fredonia	2	1	1	1	1	4
City of Gackle	4	2	2	2	2	8
City of Lehr	3	2	2	1	1	7
City of Napoleon	4	3	2	2	2	9

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.3.2 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of cyberattack in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Vulnerabilities to Publicly-Owned Buildings and Property

Publicly-owned buildings and property are vulnerable to cyberattack as all state and local governments, businesses, and organizations/institutions use digital/technological systems. As day-to-day and extended operations become more reliant on digital infrastructure to operate, the vulnerability to publicly-owned building and property will increase. Facilities supporting functions key to daily operations of the county and incorporated jurisdictions, such as the Logan County Courthouse, Napoleon City Hall, state agencies located in Logan County, and public schools would be the most vulnerable to a cyberattack.

A summary of publicly-owned buildings and property in Logan County is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, the vulnerability of critical facilities and infrastructure to cyberattacks is imminent as all state and local governments, businesses, and organizations/institutions use digital/technological systems. Technological systems used by emergency services and branches of government such as GIS mapping or financial software, and utilities such as electric and natural gas are types of critical facilities and infrastructure most at risk to a cyberattack. In addition, the vulnerability to from the threat to public works infrastructure for the city of Napoleon such as drinking/potable water and wastewater treatment systems will increase as the city is planning to install digital water meters and SCADA systems.

Table 4.3.2 – Logan County, North Dakota Cyberattack Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Delayed Emergency Response • HAZMAT Release • Increased Public Safety Runs • Government Interruptions • Loss of Communication Systems – Loss of 9-1-1 • Loss of Economy • Loss of Potable Water • Loss of Power • Mass Casualties/Fatalities • Loss/Overcrowded Medical Facilities 	<ul style="list-style-type: none"> • Increased and unforeseen public and private costs due to response and recovery requirements • Loss of websites and information for critical facilities • Shutting down of infrastructure systems resulting in loss of economy activity as technological systems are used in nearly all industries, both public and private • Targeting of emergency services personnel • Loss of public confidence in city and county government • Loss of archived data and records
<p>Frequency</p>	<ul style="list-style-type: none"> • Significant increase in network traffic with intent to access state systems This increased traffic required the state to increase its capacity with a larger firewall. 	<ul style="list-style-type: none"> • NDIT indicated an average of 5.7 million cyberattack attempts every month on the state level, but all do not result in an event/incident
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Digital economy with nation-wide banks and other institutions electronically linked to the state and county • Growing automation of daily tasks • Social media • Technological systems used in nearly all industries 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • State installed larger firewall after DAPL protest – has a direct impact on county functions • Increased investment in security measures in private and public sectors (i.e., firewalls) • Ongoing investment in preventative education and enhanced countermeasures • NDIT and NDSLIC • Redundancies in state and county technology and power systems • Logan County is fully migrated over to NDIT’s Cortex XDR security package and replaced switches in 2020 • Logan County installed ESET Endpoint Security which adds another layer of protection on all workstations and servers and renews every year • Gackle-Streeter Public School and Napoleon Public School have firewalls through NDIT

Table 4.3.2 – Logan County, North Dakota Cyberattack Risk Assessment - Continued

Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • All state and local governments, businesses, and organizations/institutions that use digital/technological systems • Growing automation of daily tasks in individual’s lives, and private and public sectors • Social media • Technological systems used in nearly all industries • Elderly population relying largely on landlines for communication purposes, remote medical care and equipment monitoring <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • NDIT has a Cyberattack Incident Response Plan that covers Logan County systems • State installed larger firewall after DAPL protest • Ongoing investment in preventative education and enhanced countermeasures • NDIT and NDSLIC • 66th Legislative Assembly of ND, Senate Bill 2110 to amend and reenact sections 54-50-01 and 54-59-05 of the N.D. Century Code. NDIT setting strategies and advising all branches of government for cyberattack and counter measures – signed on April 12, 2021 • Redundancies in state and county technology and power systems • High regulation of banking and other industries to mitigate cyberattacks • K20W Initiative – training school-aged kids on cyber education • Logan County is fully migrated over to NDIT’s Cortex XDR security package and replaced switches in 2020 • Logan County installed ESET Endpoint Security which adds another layer of protection on all workstations and servers and renews every year • Gackle-Streeter Public School and Napoleon Public School have firewalls through NDIT
Capability	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address cyberattack • Gackle-Streeter Public School Technology Plan (includes a statement on cybersecurity) • Logan County Local Emergency Operations Plan, Cyberattack Response Plan • Napoleon Public School Technology Plan (includes a statement on cybersecurity) • NDIT Cyberattack Incident Response Plan - includes Logan County systems

Vulnerabilities to New and Future Development

Cyberattacks target digital information and technological systems and therefore should have little to no impact on new and future development. However, with the increasing use of internet-connected technological systems in American households and the world economy, the understanding of the vulnerability to new and future development is evolving/expanding.

Data Limitations and Other Key Documents

The probability and vulnerability of a cyberattack are hard to quantify given the multitude of plausible scenarios for an event. The threat has had little recorded history in North Dakota, until DAPL.

This plan incorporates data from the following documents. Information from this plan will be incorporated in the update of said documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Gackle-Streeter Public School Cyberattack Response Plan
- Logan County Cyberattack Response Plan
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- Napoleon Public School Cyberattack Response Plan
- North Dakota Continuity of Operations Plan
- North Dakota Cybersecurity Framework (NDCSF)
- North Dakota Emergency Operations Plan, Cyberattack Annex
- NDIT Cyberattack Incident Response Plan - includes Logan County systems
- NDIT Security Incident Response Plan
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.4 Dam Failure

Characteristics

A dam is any artificial man-made barrier that impounds or diverts water or underground streams. A dam failure is defined as a sudden, rapid, and uncontrolled release of impounded water that will create a potential significant downstream hazard.

Although it is recognized that loss of life is possible with any dam failure, the following categories of dams have been established:

Low Hazard – Dams located in rural or agricultural areas where there is little possibility of future development. Failure of low hazard dams may result in damage to agricultural land, township and county roads, and farm buildings other than residences. No loss of life is expected if the dam fails.

Medium (Significant) Hazard – Dams located in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, railroads, or cause interruption of minor public utilities. The potential for a few lives lost may be expected if the dam fails.

High Hazard – Dams located upstream of developed and urban areas where failure may cause severe damage to homes, industrial and commercial buildings, and major public utilities. There is a potential for the loss of more than a few lives if the dam fails.

All federal dams in North Dakota are required to have an emergency action plan. In addition, per the N.D. Century Code 61-03-25, emergency action plans are required for the nonfederal dams classified as medium/significant-or high-hazard dams in North Dakota.

Seasonal Pattern	None
Duration	Minutes/Hours/Days/Weeks – dependent on respective inundation area
Speed of Onset	Minutes to Hours
Location	Inundation Area specific to each dam and the corresponding geography of the local area and critical facilities and infrastructure

For more information regarding dam failure please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

According to the National Performance of Dams Program-Stanford University, Logan County Emergency Management, and U.S. Army Corps of Engineers (USACE), no incidents have dam failure have occurred in Logan County.

There have been no emergencies or disaster declarations regarding dam failure in Logan County.

List of Dams – Logan County

- Table 4.4.1 lists the high hazards dams and its respective inundation area(s) in Logan County per information provided by the USACE, National Inventory of Dams.
- Based on information provided by the Steering Committee, the Beaver Lake Dam is the only dam in Logan County that would have an impact on buildings, infrastructure, property, people if a failure did occur. The dam was completed in 1934 and is 10 feet in height with a storage of 5,319 acre-feet.
- Per the 2018 N.D. Enhanced Mitigation MAOP, there are no high-hazard or significant hazard dams physically located in Logan County.

Table 4.4.1 – Logan County, North Dakota Dams

Dam	Authorized Purpose	Classification	Location	Area(s) of Inundation
Anderson Dam	Fish and Wildlife Pond	Low Hazard	Near the intersection of 56 th Ave SE and 59 th St. SE	<ul style="list-style-type: none"> • Farmland
Beaver Lake Dam	Recreation	Low Hazard	Beaver Lake State Park	<ul style="list-style-type: none"> • 71st St. SE • Farmland and approximately four farmsteads
Graber Dam	Other	Low Hazard	North of the intersection of 67 th Ave SE and 57 th Ave SE	<ul style="list-style-type: none"> • 57th Ave SE • Farmland
Lehr Dam	Recreation	Low Hazard	East of the intersection of 78 th St. SE and 48 th Ave SE	<ul style="list-style-type: none"> • 78th St. SE • N.D. Highway 13 • Farmland and one farmstead
Sperle Dam	Recreation	Low Hazard	Intersection of 28 th Ave SE and 73 rd St. SE	<ul style="list-style-type: none"> • 28th Ave SE and 73rd St. SE • Farmland and one farmstead
Wold Dam	Fire Protection, Stock, or Small Fishpond	Low Hazard	Intersection of 75 th St. SE and 27 th Ave SE	<ul style="list-style-type: none"> • 75th St. SE • Farmland and one Farmstead

Source(s): National Inventory of Dams (USACE); Logan County Emergency Management

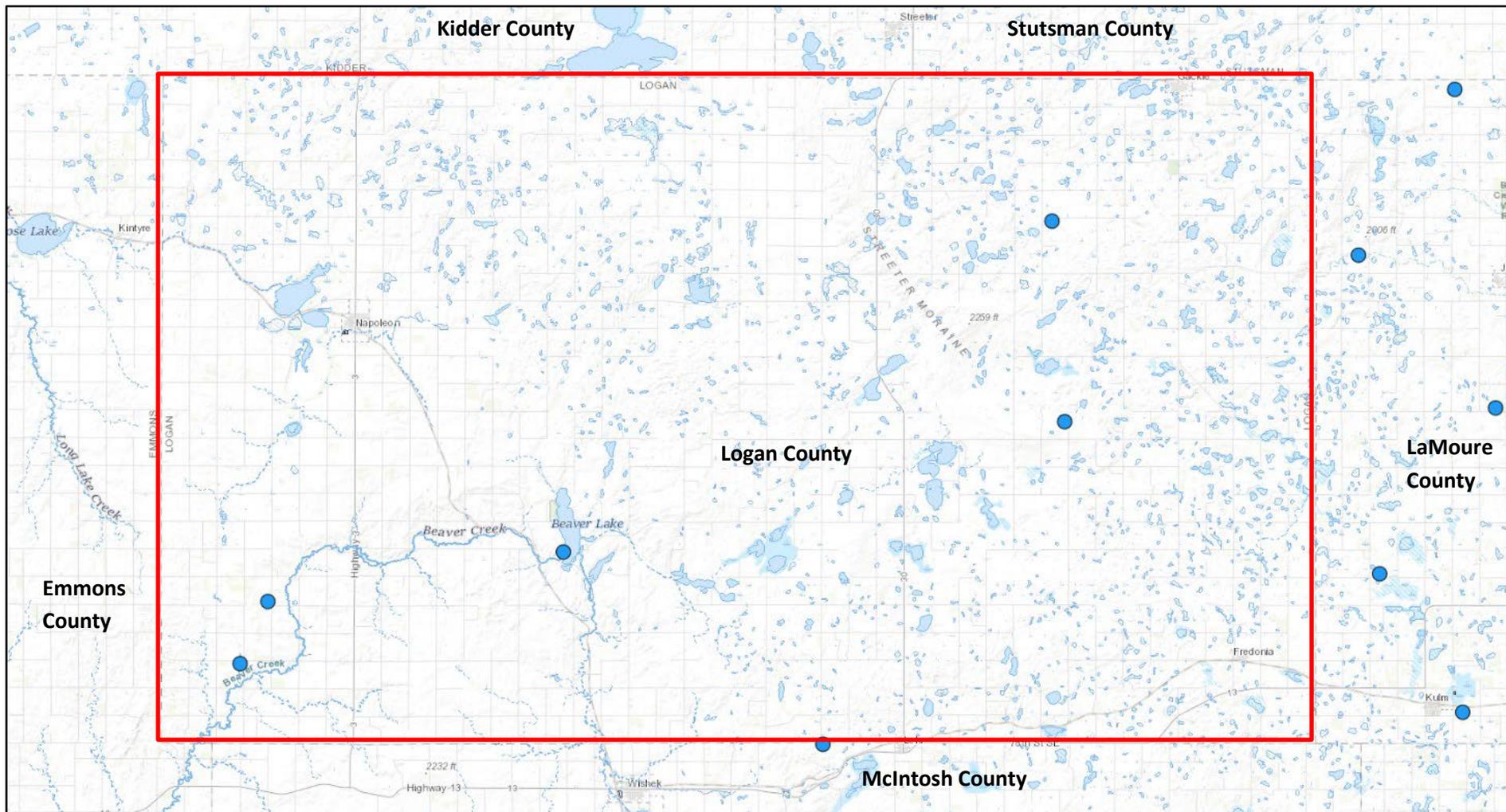
- According to the N.D. Dept. of Water Resources there are approximately 18 dams in Logan County. Detailed information on dams in Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment

Probability

The probability of a hazard or threat is how likely it is it will happen. Based on dam failure history for Logan County and the presence of dams, the probability of dam failure is unlikely. The 2018 N.D. Enhanced Mitigation MAOP lists Logan County as having low vulnerability to dam failure.

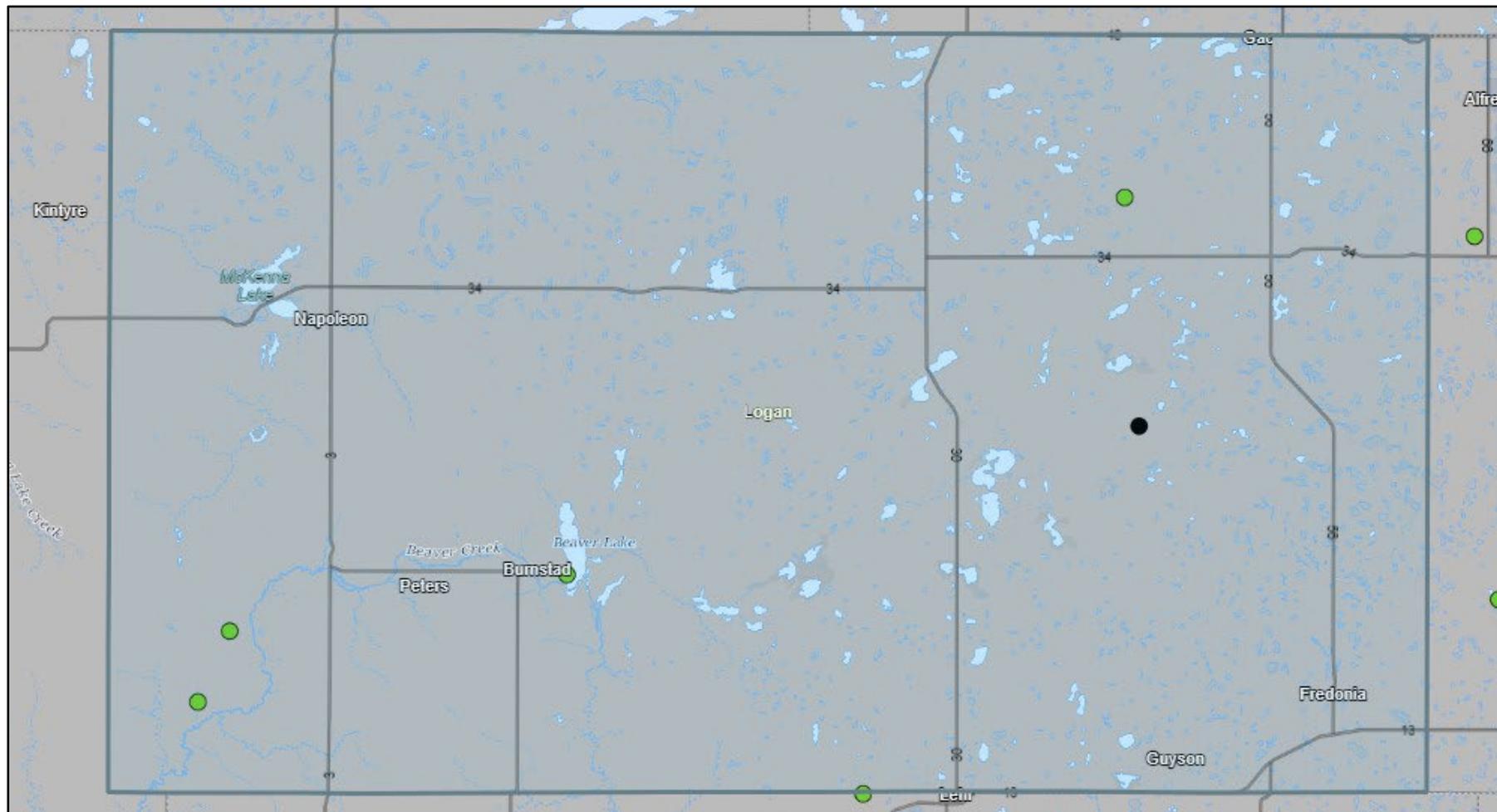
Figure 4.4.1 illustrates the location of dams by hazard potential in Logan County. The information was provided by the USACE, National Inventory of Dams, which highlights six dams in Logan County.

Figure 4.4.1 – 2022 Logan County, North Dakota Dams



Source(s): USACE, National Inventory of Dams

Figure 4.4.2 – 2022 Logan County, North Dakota Dams by Hazard Potential Type



Source(s): USACE, National Inventory of Dams

Legend

Hazard Potential Type

- High
- Significant
- Low
- Undetermined
- Not Available

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. The magnitude of dam failure in Logan County can be determined by the area or areas of inundation for each respective dam. Meeting participants discussed the extent/magnitude of a failure and determined the extent/magnitude of a dam failure in Logan County is limited.

Risk Assessment

Table 4.4.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for dam failure. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.4.2 represents the sum of each jurisdiction's impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction's capabilities to respond to the hazard/threat.

Table 4.4.2 – Logan County, North Dakota Dam Failure Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	2	1	2	2	1	6
City of Fredonia	1	1	1	1	1	3
City of Gackle	1	1	1	1	1	3
City of Lehr	1	1	1	1	1	3
City of Napoleon	1	1	1	1	1	3

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.4.3 provides information on the specific impact, frequency, likelihood, vulnerability and capability of dam failure in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Vulnerabilities of Publicly-Owned Buildings and Property

There are no publicly-owned buildings and property vulnerable to dam failure in Logan County.

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities and infrastructure are vulnerable to dam failures like publicly-owned buildings and property and are highly susceptible to impacts from flood waters resulting from dam failures. Infrastructure such as rail and roads in the transportation network, communication infrastructure, drinking/potable water and wastewater systems, and power lines in the utility network are vulnerable and have the potential to experience complete destruction. N.D. Highway 3 and 71st St. SE are vulnerable to a dam failure from the Beaver Lake Dam.

Chapter 3, Profile and Inventory provides information on publicly-owned buildings and property in Logan County and Chapter 9, Maps provides maps of the transportation network in Logan County.

Table 4.4.3 – Logan County, North Dakota Dam Failure Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Blocked Roads • Crop Loss and Loss of Livestock • Delayed Emergency Response • Evacuation (Localized) • Loss of Critical Facilities and Infrastructure • Loss of Potable/Drinking Water • Loss of Power • Loss of Transportation Systems/Accessibility • Loss of Wildlife Habitat • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Loss of recreational activities and summer-time population resulting in economic loss • Possible temporary homeless population due to lack of facilities to shelter large numbers of people 	
<p>Frequency</p>	<ul style="list-style-type: none"> • Never an occurrence 	
<p>Likelihood</p>	<p><u>More likely</u></p> <ul style="list-style-type: none"> • Heavy rains and/or melting of snowpack may lead to dams becoming overwhelmed • Aging infrastructure – at 50 years the likelihood/probability of a dam failure increases • Climate change will affect the likelihood of dam failures due to significant changes and fluctuations in precipitation frequency and volume 	<p><u>Less likely</u></p> <ul style="list-style-type: none"> • Dry periods of weather with little to no rain or lack of heavy snow fall • State agencies ongoing and continuous maintenance • No significant or high hazard dams in Logan County
<p>Vulnerability</p>	<p><u>More vulnerable</u></p> <ul style="list-style-type: none"> • Tier II sites and pipelines located in inundation areas • Lack of alternative housing or shelters to house displaced residents 	<p><u>Less vulnerable</u></p> <ul style="list-style-type: none"> • Annual and ongoing dam inspections & routine maintenance • Logan County IPAWS • No significant or high hazard dams in Logan County
<p>Capability</p>	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address dam failure. 	

Vulnerabilities to New and Future Development

New and future development geographically located in dam inundation areas are most at risk to dam failure. Vulnerabilities of new and future development in Logan County can be eliminated if prohibited in the small amount of areas dam failure impact potential.

Data Limitations

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

Other Key Documents

An Emergency Action Plan (EAP) specifies actions dam owners should take to moderate or alleviate the problems at the dam. It contains procedures and information such as failure inundation maps to assist emergency management officials with early-warning notification and evacuation plans. As stated in the North Dakota Century Code, dams with a storage capacity greater than 1,000 acre-feet are required to have an EAP. No dams in Logan County have an EAP.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Logan County Comprehensive Plan (1995)
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- Logan County Zoning Ordinance (2006)
- Logan County Evacuation Plan through Central Valley Health District (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- North Dakota Continuity of Operations Plan
- *North Dakota Dam Design Handbook (being updated)*
- North Dakota Emergency Operations Plan, Dam Failure Annex
- North Dakota State Disaster Recovery Plan
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.5 Drought

Including precipitation levels well below normal and heat – temperatures higher than normal.

Characteristics

Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. Drought is a temporary diversion from normal climatic conditions and is different than aridity, which is a permanent feature of climate in regions where low precipitation is the norm, as in a desert. Drought characteristics usually include precipitation levels well below normal and temperatures higher than normal.

According to the National Drought Mitigation Center, the following types of droughts exist.

- **Agricultural drought** occurs when there is not enough soil moisture to meet the needs of a crop at any given time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.
- **Hydrological drought** refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and less water in streams, rivers, lakes, and reservoirs, so hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period, this shortage will be reflected in declining surface and subsurface water levels.
- **Meteorological drought** is usually an expression of precipitation's departure from normal over some period. These definitions are usually region-specific, and presumably based on a thorough understanding of regional climatology.
- **Socioeconomic drought** occurs when physical water shortage starts to affect people, individually and collectively. Or, in more abstract terms, most socioeconomic definitions of drought associate it with the supply and demand of an economic good.

Seasonal Pattern	Primarily summer, but can occur in spring, fall, and winter
Duration	Weeks/months, up to a decade in severe cases
Speed of Onset	Slow and gradual
Location	Total geographic extent of Logan County

For more information regarding drought please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

The U.S. is vulnerable to the social, economic, and environmental impacts of drought. The over 100-year weather record of the U.S. indicates that there were three to four major drought events. Two of these, the 1930s Dust Bowl drought and the 1950s drought, each lasted five to seven years and covered large areas of the continental United States.

Information on the history of drought in Logan County was obtained from the National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC); 2018 N.D. Enhanced Mitigation MAOP; the USDA, Risk Management Agency; Palmer Drought Severity Index (PDSI); U.S. Drought Monitor, and Logan County Emergency Management and profile meeting participants. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

National Climatic Data Center/National Oceanic and Atmospheric Administration

- According to the National Climatic Data Center (NCDC), no occurrences of drought were reported in Logan County between January 1, 1950, and December 31, 2020.

2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)

- Since 1930, North Dakota has suffered drought in the 1930s, 1950s, early 1960s, mid 1970s, early 1980s, 1988 through 1991/1992, 2002 through 2004, 2006, 2008, 2012/2013, and 2017.
- A state-wide drought was declared in 1980, 1981, 1988/1989, 2002, 2005, and 2012 impacting all counties in North Dakota.
- **Typically, presidential declarations pertaining to drought occur before secretarial declarations by the USDA as secretarial declarations are not permitted without a presidential declaration. Since 1976, Logan County has been included in 28 drought declared disasters or emergencies, of which 13 were state declared emergency orders, one was presidential, and 14 were U.S.D.A. Secretarial Declarations.**

U.S. Dept. of Agriculture

- USDA Secretarial Disaster Designations S4840 and S4939 were approved on October 16, 2020, and April 29, 2021, respectively. Both disaster designations include Logan County.

U.S. Dept. of Agriculture, Risk Management Agency

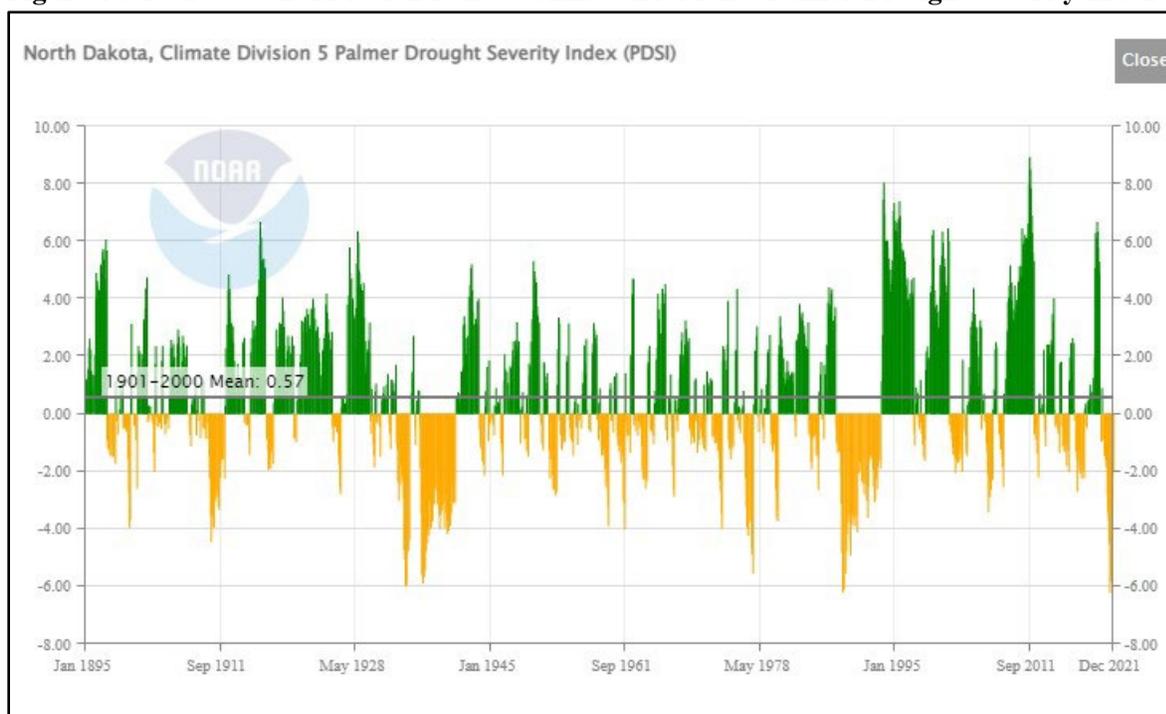
- Crop loss from drought is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres, and indemnity amount. The damage-cause description identifies the cause of damage and the number of acres lost due to damage, and the indemnity amount identifies the total amount of the loss for the designated peril. **Between January 1, 2001, and December 31, 2020, Logan County experienced 343 incidents of crop loss due to drought impacting approximately 636,853.79 acres of crops totaling \$59,912,884.28 in losses.**

Palmer Drought Severity Index (PDSI)

The Palmer Drought Severity Index (PDSI) is an estimated measurement of dryness based on temperature and precipitation based available. It is a standardized index that generally spans -10 (dry) to +10 (wet). Maps of operational agencies like NOAA typically show a range of -4 to +4, but more extreme values are possible. The PDSI has been reasonably successful at quantifying long-term drought. As it uses temperature data and a physical water balance model, it can capture the basic effect of global warming on drought through changes in potential evapotranspiration. Monthly PDSI values do not capture droughts on time scales less than about 12 months; more pros and cons are discussed in the Expert Guidance.

- Figure 4.5.1 is the PDSI and was provided by the North Dakota State Climatologist at North Dakota State University.
- According to PDSI, between 1895 and 2020 Logan County experienced multi-year droughts in the 1930s, 1950s, 1980s, and 2000s, and 2020/2021.

Figure 4.5.1 – 1895 to 2021 North Dakota Climate Division 8 Palmer Drought Severity Index



Source(s): Palmer Drought Severity Index (PDSI); North Dakota State University

Logan County Emergency Management

The Logan County Commission signed a drought declaration on July 25, 2017.

Information gathered from the drought profile meeting and Steering Committee meetings indicated that while dryer periods have come and gone, the most recent droughts of significant occurred in 1988/1989 and lasted until 1991/1992, and the summer/fall of 2021. Participants also noted a five-to 10-year cyclical pattern where dry conditions will persist for that period, then transition to more wet conditions.

Probability

The probability of a hazard or threat is how likely it will happen. The probability of drought varies annually and is highly dependent on seasonal weather patterns. According to profile meeting participants, the probability of drought in Logan County is highly likely meaning that there is a 100 percent probability in the next year of a drought to a varying degree of severity. Drought is a naturally occurring phenomenon and, therefore, it is indisputable that a drought of significance will occur based on climatic patterns at some point in the future.

- **Based on 13 state declared emergency orders, one was presidential, and 14 were U.S.D.A. Secretarial Declarations pertaining to drought between 1976 and 2017, the probability of drought is 67 percent in any given year.**
- With the local economy of small, incorporated cities in the county heavily reliant on the agriculture industry, the probability of drought can be measured by crop loss. According to crop loss data from the USDA-RMA, Logan County experienced \$2,995,644.21 in annualized crop damage impacting 31,884.61 acres resulting in approximately 17 annual claims of indemnity between 2001 and 2020. **Therefore, based on data available, the probability of crop loss from drought is calculated to be 100 percent annually.**

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. Profile meeting participants indicated the magnitude or impact of drought in Logan County as catastrophic meaning that more than 50 percent of the county, its people and property are affected if a drought of significance occurred. The following are key points from the state risk assessment in the 2018 N.D. Enhanced Mitigation MAOP.

- Logan County has a high overall vulnerability from drought based on \$52,744,465.00 in crop insurance paid between 2003 and 2017 due to impacts of drought resulting in annualized payments of \$3,516,297.67 in the same time frame.
- Annualized crop damage of \$3,950,896.00 between 2003 and 2017.

U.S. Drought Monitor (USDM). The USDM is a drought communication system managed by the National Drought Mitigation Center at the University of Nebraska-Lincoln updated every Thursday to show the location and intensity of drought across the United States. The USDM uses the following five-category system, labeled:

- Abnormally Dry or D0, (a precursor to drought, not actually drought);
- Moderate (D1);
- Severe (D2);
- Extreme (D3), and
- Exceptional (D4) Drought.

Drought categories show experts' assessments of conditions related to dryness and drought including observations of how much water is available in streams, lakes, and soils compared to usual amounts for the same time of year. U.S. Drought Monitor data go back to 2000. Figure 4.5.2 shows the status of drought conditions in North Dakota as of August 17, 2021. All of Logan County was classified as D3 or Extreme Drought.

Risk Assessment

Table 4.5.1 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for drought. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.5.1 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.5.1 – Logan County Drought Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	3	4	4	3	12
City of Fredonia	4	3	4	4	2	13
City of Gackle	4	3	4	3	2	12
City of Lehr	4	3	4	3	2	12
City of Napoleon	4	3	4	3	3	11

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). Table 4.5.2 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of drought in Logan County.

Vulnerabilities to Publicly-Owned Buildings and Property

Drought has not had a direct impact on publicly-owned buildings and property in Logan County. Loss of water supply would influence the function of publicly-owned buildings. Disruptions in service and extended periods of closure may occur. Drought would threaten publicly-owned buildings and property from the increase in fire threat and the potential decrease in available water for fire suppression.

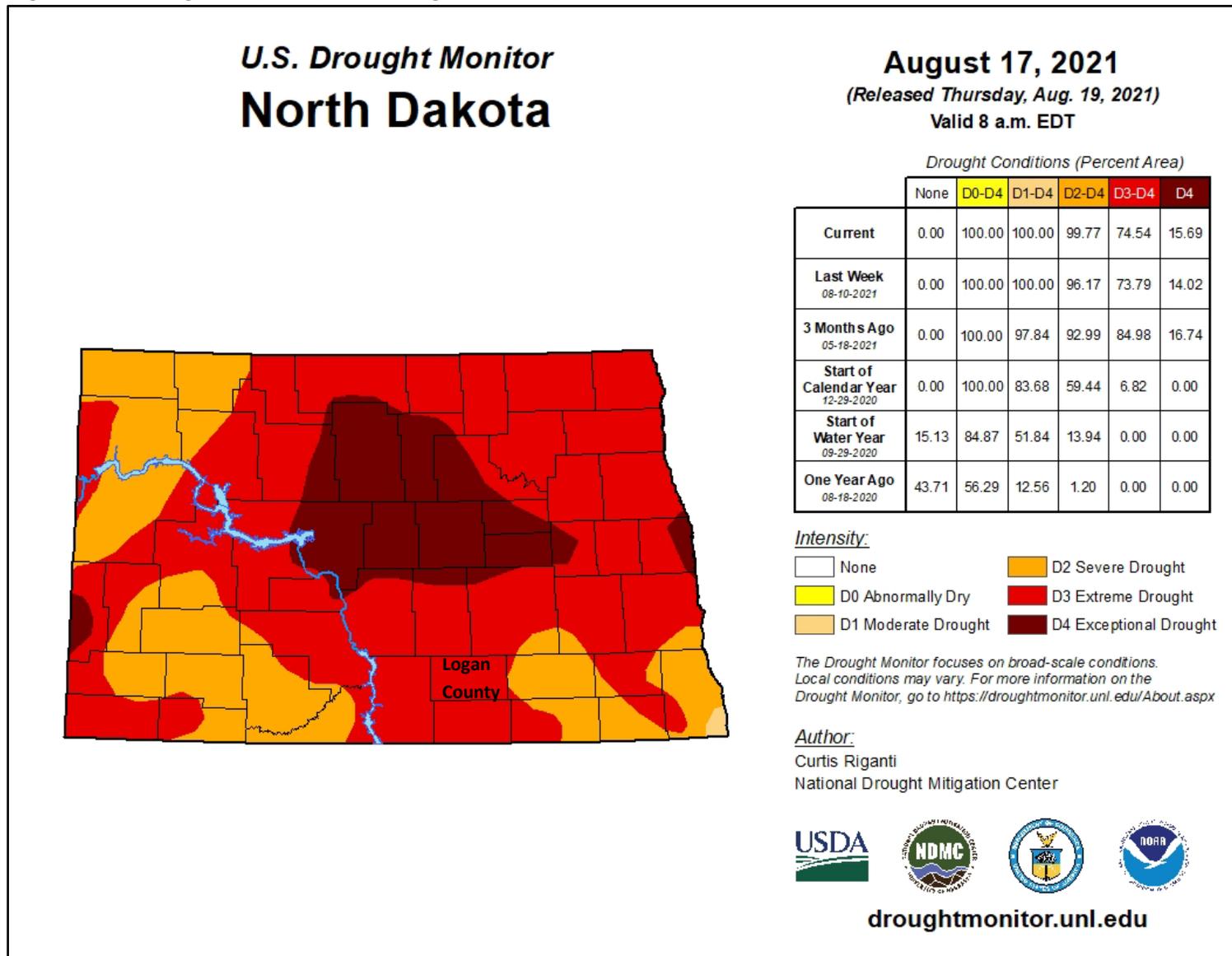
A summary of publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities that rely on water for operation and continued use are most vulnerable to drought. Large employers in the agriculture sector and manufacturing can be negatively affected by drought and are viewed as critical facilities, depending on the number of people they employ and the impact they have on local economies.

According to the 2018 ND Enhanced Mitigation MAOP, the largest water user in Logan County in 2016 by reported use was irrigation utilizing ground water resources consuming 272.2 acre-feet of water annually.

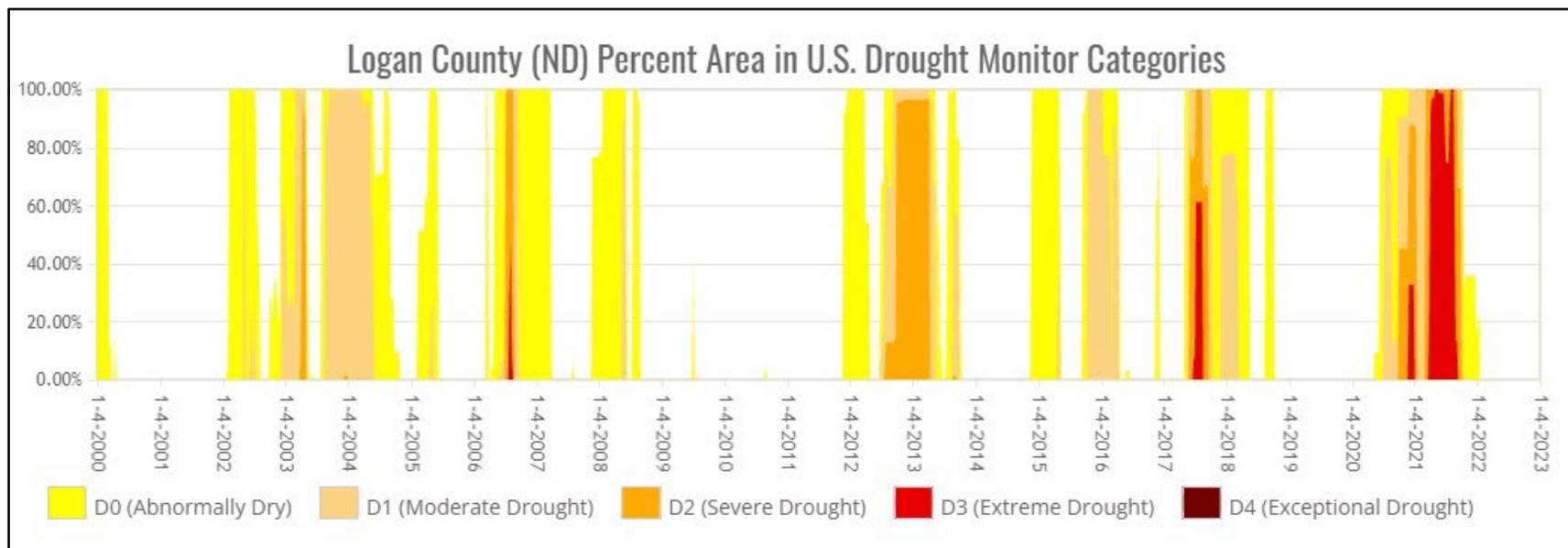
Figure 4.5.2 – August 17, 2021, U.S. Drought Monitor, North Dakota



Source(s): U.S. Drought Monitor

Figure 4.5.3 shows the time series of drought for Logan County from January 4, 2000, to January 4, 2023, and the percent of the county and its respective drought classification. The figure is shown to assist Logan County in understanding the characteristics of local drought impacts. As seen in the figure, Logan County has had a majority of abnormally dry conditions every year with brief periods of moderate drought mixed with small instances of severe and extreme drought between 2006 and 2007, 2012 and 2013, the summer of 2017, and 2021.

Figure 4.5.3 – January 4, 2000, to January 4, 2023, Logan County Drought Time Series



Source(s): U.S. Drought Monitor



Table 4.5.2 – Logan County, North Dakota Area Drought Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Crop Loss • Loss of Economy • Loss of Livestock • Loss of Wildlife Habitat • Increase in Wildland Fire Potential • Water quality compromised from lakes and stock dams • Diminished soil health • Negative impact on mental health of producers and first responders – “community impact” • Soil erosion 	<ul style="list-style-type: none"> • Local producers forced to reduce herd sizes and restructuring of harvest usage • Population decline due to loss of jobs/economy • Annualized crop damage of \$3,950,896.00 between 2003 and 2017 (2018 State Enhanced Mitigation MAOP) • Between January 1, 2001, and December 31, 2020, Logan County experienced 343 incidents of crop loss due to drought impacting approximately 636,853.79 acres of crops totaling \$59,912,884.28 in losses.
<p>Frequency</p>	<ul style="list-style-type: none"> • Severe Drought of 1961/1962, 1988/1989 through 1991/1992, 2012/2013, 2017, 2021 • Summer of 2017 and 2021 local producers forced to sell off portions of their herds • End of July through winter of 2017 – county reached severe drought status • Severe drought conditions winter 2020/2021 and summer/fall 2021 • CRP was released from haying during severe years 	<ul style="list-style-type: none"> • According to the 2018 N.D. Enhanced Mitigation MAOP, Logan County experienced \$3,516,297.67 in annualized crop damage between 2001 and 2017 • FSA activated the Livestock Forage Program in 2012, 2017, and 2021 • Based on 13 state declared emergency orders, one was presidential, and 14 were U.S.D.A. Secretarial Declarations pertaining to drought between 1976 and 2017, the probability of drought is 67 percent in any given year. • According to crop loss data from the USDA-RMA, Logan County experienced \$2,995,644.21 in annualized crop damage impacting 31,884.61 acres resulting in approximately 17 annual claims of indemnity between 2001 and 2020.

Table 4.5.2 – Logan County, North Dakota Area Drought Risk Assessment – Continued

<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Dry/wet cycle every five to 10 years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation • Weather patterns becoming more irregular and extreme • Timing of rain impacts likelihood in any given year • Lack of subsoil moisture • High temperature and high winds 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Heavy precipitation • Producers work with state to develop irrigation measures • Timing of rain impacts likelihood in any given year • Low temperatures and low winds
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Loss of economy from decreased wildlife & hunting • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • Lack of water sources for drought relief and for suppression of fires resulting from drought in some jurisdictions • Lack of irrigation systems throughout the county • Tillage systems for crops • Presence of lighter soil (sand and gravel) in Logan County • Presence of aquifers, which are used for livestock and municipal water sources, can be depleted during droughts of significance <p><u>Municipal Water Sources</u></p> <ul style="list-style-type: none"> • Fredonia: City-owned well • Lehr: Two city-owned wells • Napoleon: Three city-owned wells; two primary and one secondary 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn bans • Fire Index monitoring and mapping from NDDDES • Drought Monitor updating drought conditions on a weekly basis (every Thursday) • Advanced communications such as internet and TV • Incorporated jurisdictions with water towers • Regional water systems • No-till farming practices in use across the county • Presence of CRP • Presence of aquifers for water supplies • N.D. Agriculture Weather Network <p><u>Municipal Water Sources</u></p> <ul style="list-style-type: none"> • Gackle: 50,000-gallon capacity water tower • Napoleon: 60,000-gallon capacity (50,000-gallon bulb and 10,000-gallon stem), gravity-fed water tower. <i>The city is in the process of installing a new water tower on the southwest side of the city that will have a 300,000-gallon capacity scheduled for installation spring 2023.</i>

Table 4.5.2 – Logan County, North Dakota Area Drought Risk Assessment - Continued

<p>Capability</p>	<p>See Chapter 7 for a list of capabilities to address drought.</p> <p><u>Administrative and Technical</u></p> <ul style="list-style-type: none"> • Active county commission and part-time emergency manager • NDSU Extension/Logan County • Farm Service Agency (FSA) and Natural Resource Conservation Service (NRCS) • Contracts for engineering, planning and grant writing • GIS services provided through state • County-wide mutual aid agreements • U.S.D.A. Emergency Board • Logan County Soil Conservation District (SCD) • N.D. Agriculture Weather Network • North Dakota State University Climatologist • Stockmen’s Association <p><u>Education and outreach</u></p> <ul style="list-style-type: none"> • NDSU Extension/Logan County • Farm Service Agency (FSA) • Active emergency management department with education and outreach on the department’s website and social media <p><u>Financial</u></p> <ul style="list-style-type: none"> • FSA has programs designed to financially assist farmers in times of need (FLP, LIP, LFAP – all cattle) • N.D. Dept. of Agriculture • National Resources Conservation Service (ECP – all cattle) • U.S.D.A., Risk Management Agency crop insurance subsidized by federal government • U.S.D.A. Rural Development-REAP grants • Rural water district <p><u>Planning and Regulatory</u></p> <ul style="list-style-type: none"> • Burn bans • State implements burn bans – needs updating/improvement • Farmers receiving USDA benefits required to have a highly erodible plan of operation in place • Drought management and water conservation plans at the county and city level • Rural Water Districts – have drought management and water conservation plans in place
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Vulnerabilities to New and Future Development

The greatest vulnerability from drought to new and future development would be underground water sources, the agriculture industry, and energy development. New development has the potential to diminish underground sources with increases in population and economic activity as municipal water is sourced from aquifers. Incorporated jurisdictions with and individuals with wells and septic systems are not regulated and are more susceptible to drought.

The agriculture sector is becoming increasingly precision-based with advanced technological systems, which can simultaneously increase and decrease the demand for water and the vulnerability of drought in Logan County.

With the possibility of climate change, the state can expect drought conditions affecting certain counties and regions to occur more frequently. Drought will impact Logan County with more frequency and increased severity in the future.

The city of Napoleon is in the process of installing a new water tower on the southwest side of the city. The new water tower will have a 300,000-gallon capacity and is scheduled for installation spring 2023. The increase capacity will reduce the city's vulnerability to drought.

Data Limitations

A data limitation for understanding impacts from drought is the difficulty in identifying the true extent of the drought in terms of time, or when a drought begins and when a drought concludes. Characteristics of drought are hard to distinguish between periods of dryer than normal conditions and cyclical weather patterns. Droughts tend to impact areas slowly and is not sudden like other hazards such as severe winter weather or flooding. In addition, impacts of drought are far reaching and tend to have a trickle-down effect on many sectors of the economy. Therefore, a process to determine near accurate loss estimates for drought is challenging, at best.

National Climatic Data Center/National Oceanic and Atmospheric Administration

The hazard history provided in terms of property damage and crop damage (which are only estimates) is calculated based on what the National Weather Service received from insurance companies and individual property owners upon request. Both sources have been reluctant to share that information. Therefore, both practices were discontinued. Because of this, the National Weather Service makes a best guess using all available data at the time of the publication. The damage amounts are received from a variety of sources. Property and crop damage should be considered as a broad estimate.

The hazard history provided through the National Climatic Data Center/National Oceanic Atmospheric Administration's Storm Events Database contains data as entered by NOAA's National Weather Service (NWS). Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures. **Drought was not recorded as a separate incident until 1996. Therefore, the drought of 1988/1989 through 1991/1992, which was a significant event in recent North Dakota history, was not listed as impacting Logan County when hazard history was taken from the National Climatic Data Center.**

- 1. Tornado:** From 1950 through 1954, only tornado events were recorded.
- 2. Tornado, Thunderstorm Wind and Hail:** From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.
- 3. All Event Types (48 from Directive 10-1605):** From 1996 to present, 48 event types are recorded as defined in [NWS Directive 10-1605](#).

U.S. Dept. of Agriculture, Farm Services Agency

According to the Farm Services Agency, crop loss due to drought is calculated at harvest time due to planted acres determined at the beginning of the season. Therefore, the data could be skewed due to prior impacts from other hazards.

Other Key Documents

This plan incorporates data from the following documents and information herein will be used in future updates.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Burn Bans
- Logan County Comprehensive Plan (1995)
- Logan County Commercial Animal Feed Operation Ordinance
- Logan County Evacuation Plan through Central Valley Health District (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- National Agricultural Statistics Service's (NASS) Crop Progress and Condition Report
- National Drought Mitigation Center's Drought Condition monitoring Observations Report (CMOR)
- North Dakota Continuity of Operations Plan
- North Dakota Drought Response Plan
- North Dakota Emergency Operations Plan, Drought Annex
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.6 Fire

Including urban fire/structure collapse, rural fire, and wildland fire.

Characteristics

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light, and various reaction products.

Structure-Urban Fire. Structure fire is the result of three components: a heat source, a fuel source, and an oxygen source per the U.S. Fire Administration. When combined, these three sustaining factors will allow a fire to ignite and spread. Within a structure, a small flame can get completely out of control and turn into a major fire within seconds. Thick black smoke can fill a structure within minutes. The heat from a fire can be 100 degrees Fahrenheit at floor level and rise to 600 degrees at eye level. In five minutes, a room can get so hot that everything in it ignites at once; this is called flashover.

Structure Collapse. Structure collapse occurs when the forces of gravity or other external forces overcome the structural integrity of a building. The reasons for structure collapse can vary from poor construction to explosions to extreme winds to heavy snow loads. Structure collapse can trap occupants and damage property. In Logan County, numerous commercial, private elevators and large storage bins could be subject to structure collapse. Cattle operations have large cattle confinement structures that are also at risk of collapse. Urban fire/structure collapse can happen independently from other incidents.

Rural Fire. Rural fires result from farming activities whereby farm equipment may ignite a fire while haying, harvesting and other farming activities.

Wildland Fire. A wildland fire is an uncontrolled fire in a vegetated area. Wildland fires are a natural part of the ecosystem. They have a purpose in nature and following years of fire suppression, many areas have built up fuels that can lead to larger, more intense fires.

Seasonal Pattern	Urban Fire/Structure Collapse – None. Probability is always more prevalent in urban areas due to large concentrations of structures . Rural and Wildland Fire – More prevalent during summer months
Duration	Rural and Urban Fire/Structure Collapse – Minutes/hours/days Wildland Fire – Minutes/hours/days, up to weeks in exceptional cases
Speed of Onset	Little to no warning. Wildland onset is quicker during drought/low humidity, high winds, etc.
Location	Urban Fire/Structure Collapse – incorporated jurisdictions Rural and Wildland Fire – rural areas of the county but may spread to incorporated jurisdictions

For more information regarding urban fire/structure collapse and wildland fire please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan
https://www.des.nd.gov/planning](https://www.des.nd.gov/planning)

Chapter 4.6.1 profiles urban fire/structure collapse and Chapter 4.6.2 profiles wildland fire.

4.6.1 Urban Fire/Structure Collapse

History

Statistical information on incidents of urban fire/structure collapse is provided by the National Fire Incident Reporting System (NFIRS); Logan County Emergency Management; and the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP).

National Fire Incident Reporting System

Table 4.6.1.1 illustrates the history of urban fire/structure collapse in Logan County between January 1, 2000, and December 31, 2020. The following are key points.

- There were 32 structure fires, 37 vehicle fires, and 173 other fires, for a total of 242 fire calls in Logan County.
- Local fire agencies responded to 35 rescue calls (18 medical and 17 other). Approximately 80.0 percent of all medical calls were received by Napoleon Fire Department. Fire departments are included on medical calls when they are in response to an accident, lift assistance or a specialized rescue.
- Fire losses from fire only totaled \$2,764,665.00 while combined with other losses totaled \$2,859,965.00 during the same period.

Table 4.6.1.1 – January 1, 2000, to December 31, 2020, Logan County, North Dakota Urban Fire/Structure Collapse Hazard History Summary

Fire Protection Agency	Fires				Rescue Calls			Hazardous Condition/ Special Incident	Losses		
	Struc.	Vehicle	Other	Total	Med.	Other	Total		Fire Only	Other	Total
Fredonia Fire Prot. Dist.	0	0	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00
Gackle Fire Prot. Dist.	5	9	32	46	0	0	0	0	\$79,720.00	\$0.00	\$79,720.00
Lehr Fire District	0	4	12	16	1	6	7	0	\$61,440.00	\$0.00	\$61,440.00
Napoleon Fire Prot. Dist.	27	24	129	180	17	11	28	23	\$2,623,505.00	\$95,300.00	\$2,718,805.00
TOTAL	32	37	173	242	18	17	35	23	\$2,764,665.00	\$95,300.00	\$2,859,965.00

Note: All fires, rescue calls and loss statistics are from January 1, 2000 to December 31, 2020.

Source(s): National Fire Incident Reporting System (NFIRS), Summary By Incident Type

The National Fire Incident Reporting System (NFIRS) data is summarized by fire department and district and the number of structure fires, vehicle fires, and unclassified (other) fires from January 1, 2000, through December 31, 2020. This information is used to help better understand the risk of urban fire/structure collapse in Logan County. The data was provided by the N.D. State Fire Marshal's Office. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

Logan County Emergency Management

The history of urban fire/structure collapse from the Napoleon Fire Department is summarized in the following section.

- **October 20, 2008.** The Napoleon Drug Store caught on fire around 9:30 a.m. after the owner turned on the fuel oil furnace to heat the back of the store. Firefighters got the blaze under control around noon, approximately 2.5 hours after the fire call. Estimated losses included \$120,000 in inventory, \$80,000 in drugs, and the value of the two buildings, which were a total loss. No injuries were reported.
- **April 22, 2019.** A two-story single-family home sustained extensive smoke damage from a fire. The fire was first reported at 3:57 p.m. When firefighters entered the home, they found a smoldering couch in the basement and the entire house was filled with smoke. The Napoleon Fire Department Fire Chief said an overloaded extension cord is what started the couch on fire. The fire department responded with four firefighting units and 13 firemen. One firefighter was taken to a Bismarck hospital by the Napoleon Ambulance after suffering a cut on his wrist after breaking out a basement window. The fire department spent about two hours at the house placing fans, opening doors and windows to eject the smoke. The family of five was temporarily displaced and is staying with friends until repairs are complete.
- **May 6, 2019.** A garage attached to a single-family residence on the 600 Block of 3rd St West in Napoleon caught fire. The initial call came in at 3:35 p.m. and by the time the fire department was on scene the entire building was engulfed in flames. The large garage was a good structure covered by metal. Neighbor Ed Piatz assisted with a telehandler to push down the standing charred walls. Inside the building were many flammables including oil pails and old tires.

The fire department dispatched five units and 16 firefighters assisted on the call. The Napoleon Ambulance, Napoleon Police Department and Logan County Sheriff's Office also responded to the incident. Firefighters said the water used to distinguish the fire had an oily sheen, which washed down the storm drain.

Fire departments from neighboring counties have coverage over parts of Logan County either through mutual aid agreements or their respective fire district extends into the county. Total number of fires reported may be more than what occurred in the county. As such, data from departments in neighboring counties was excluded to avoid skewing of data history and is shown for supportive purposes of the continued need for investment of funding into fire departments and districts in Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. Per Tables 4.6.1.1, the probability of urban fire/structure collapse in Logan County is 100 percent.

Profile meeting participants indicated the probability of urban fire/structure collapse in Logan County as possible meaning there is between a one and 10 percent chance of an incident in the next year.

National Fire Incident Reporting System (NFIRS)

- Fire departments in Logan County respond to an average of 11.5 fire calls per year between January 1, 2000, and December 31, 2020, or approximately 1.5 structure fires, two vehicle fires, and eight other fires annually. Logan County experiences, on average, \$131,640.71 in fire losses and \$4,538.10 in other losses annually.

Extent/Magnitude

The extent/magnitude of a structure fire can range anywhere from negligible for small exterior or interior fires extinguished without professional help to catastrophic for fires threatening structural integrity of critical facilities and infrastructure, sometimes resulting in loss of service or demolition. A catastrophic incident would be the total loss of the Logan County Courthouse, an emergency services building such as a fire or ambulance hall, public schools, churches serving storm shelters, care centers, major employers, or transportation infrastructure. In addition, if an incident were to occur at an industrial subdivision, pipeline, or Tier II site, a catastrophic hazardous material release may occur with the potential to result in tens of millions of dollars in property damage, lost economic activity, shutting down of major transportation infrastructure, or mass casualties/fatalities.

- Profile meeting participants indicated the extent/magnitude or impact of urban fire/structure collapse as catastrophic meaning more than 50 percent of the jurisdiction and its people could be affected, depending on the structure. The extent/magnitude for structure fires in terms of human life can be categorized as catastrophic as any loss of life would have a significant impact on a community.

National Fire Incident Reporting System (NFIRS)

- Fire losses from fire only totaled \$2,764,665.00 between January 1, 2000, and December 31, 2020, while combined with other losses totaled \$2,859,965.00 during the same period.

Risk Assessment

Table 4.6.1.4 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for urban fire/structure collapse. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in the table represents the sum of each jurisdiction’s impact, frequency, likelihood and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.6.1.4 – Logan County, North Dakota Urban Fire/Structure Collapse Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	3	3	3	2	11
City of Fredonia	4	2	2	2	1	9
City of Gackle	4	2	2	3	2	9
City of Lehr	4	2	2	2	2	8
City of Napoleon	4	3	3	3	2	11

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.6.1.5 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of urban fire/structure collapse in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Table 4.6.1.5 – Logan County, North Dakota Urban Fire/Structure Collapse Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> Blocked Roads Building Collapse Business Interruptions/Loss of Economy Delayed Emergency Response Evacuation (Localized) Explosion 	<ul style="list-style-type: none"> Human Injury/Death Increased Fire Potential Mass Casualties/Fatalities Loss of Power/Downed Power Lines Level of impact depends on the structure
<p>Frequency</p>	<ul style="list-style-type: none"> Annual occurrences of structures/vehicle fires Significant fire once every 5 to 10 years 	<ul style="list-style-type: none"> Local fire agencies based in Logan County responded to 32 structure fires, 37 vehicle fires, and 173 other fires for a total of 242 fire calls in Logan County for an average of 11.5 fire calls per year between January 1, 2000, and December 31, 2020, or approximately 1.5 structure fires, two vehicle fires, and eight other fires annually.
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> Close spacing and age of some structures Increased use of electric heaters and devices Outdated electric wiring and heating systems in older homes/buildings Older trees and unkept vegetation in incorporated jurisdictions Agriculture-related industries based in county 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> Better building standards and maintenance of buildings Smoke detectors required by code Adequately-equipped fire departments with trained volunteers Annual inspections of commercial properties by the state Updated furnaces and/or heating spaces Logan County Burn Bans
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> Close spacing and age of some structures Increased use of electric heaters and devices Outdated electric wiring and heating systems in older homes/buildings Older trees and unkept vegetation in incorporated jurisdictions Agriculture-related industries based in county Growing population Shrinking volunteerism for fire protection 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> Better building standards and maintenance of buildings Smoke detectors required by code Adequately-equipped fire departments with trained volunteers Annual inspections of commercial properties by the state Less people burn wood in fireplaces in their homes for heating Updated furnaces and/or heating spaces Logan County Burn Bans
<p>Capability</p>	<ul style="list-style-type: none"> See Chapter 7 for a list of capabilities to address urban fire/structure collapse. 	

Vulnerabilities to Publicly-Owned Buildings and Property

All publicly-owned buildings and property are vulnerable to urban fire/structure collapse. The risk to the hazard depends on the location of the building and if it is equipped with fire suppression mechanisms, such as sprinkler systems and smoke detectors, among others. Risk to publicly-owned buildings and property also depends on the proximity of fire suppression equipment and response times from fire departments/districts. Older publicly-owned buildings may be more susceptible to fire being built prior to building and electrical codes. Publicly-owned buildings with flat roofs are more at risk to building collapse from snow loads. Flat-roofed buildings, whether publicly-owned or privately owned, are typically located in the downtown area or older and/or more established neighborhoods of incorporated jurisdictions.

A summary of publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, critical facilities and infrastructure are vulnerable to urban fire/structure collapse. If an incident were to occur, the critical facility or infrastructure impacted could result in loss of or delay in services. A fire affecting critical infrastructure such as power lines or lift stations could leave residents without power, potable water, or sanitary sewer, depending on the severity of the incident. Loss of communications from fire can also occur and result in a complete shutdown of daily operations of critical facilities and infrastructure. Communication infrastructure suspended in the air and not buried underground is most vulnerable.

Vulnerabilities to New and Future Development

New and future development could be more vulnerable in communities that lack building codes. Buildings in jurisdictions that lack building codes could be more susceptible to snow loads, structural instability, and may lack fire suppression systems. Logan County has adopted the state building codes, which covers new and future development in the county. Adoption and enforcement of building codes should reduce the risk and vulnerability to new and future development. However, no incorporated jurisdictions in Logan County have building inspection services. **A regional building inspector program has been discussed by the South Central Dakota Regional Council in Jamestown.**

An inventory of household units by type by jurisdiction in Logan County is shown in Chapter 3, Profile and Inventory.

Strengthening of buildings codes would mitigate impacts from the hazard as populations grow and more people are at risk of injury and potential death. This mitigation project for the county can be found in Chapter 6, Mitigation Strategy.

Data Limitations and Other Key Documents

The NFIRS data does not distinguish between an urban fire and structure collapse. As a result, there is difficulty in determining the true probability and overall impact of structure collapse. Fire department and district boundaries also cross county lines as fire departments/districts from neighboring counties have coverage over parts of Logan County through mutual aid agreements. As a result, the total number

of fires reported may be more than what occurred in the county. Smaller and rural fire departments/districts do not tabulate history and therefore, it is difficult to determine impact, frequency, likelihood and overall probability. Also, the lack of a definition of the 'Other Fires' category in data from NFIRS limits the understanding of the hazard to develop appropriate mitigation strategies.

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Annual Reports – local fire departments
- Logan County Comprehensive Plan (1996)
- Logan County Commercial Animal Feed Operation Ordinance
- Logan County Evacuation Plan through Central Valley District Health (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Fire Annex
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.6.2 Wildland Fire (including Rural)

History

Statistical information on incidents of wildland fire is provided by Logan County Emergency Management; USDA, Risk Management Agency, and the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP).

Logan County Emergency Management

- **October 2, 2012.** An estimated 2,000 acres of pasture and hayland was burned in a fast-moving prairie fire southwest of the city of Napoleon. The fire covered an area two and one-half miles long and a mile-wide. Responding departments were Braddock, Hazelton, Linton, Napoleon, and Wishek. Fire suppression efforts were hampered by the area's rugged terrain.
- **September 10, 2018.** A grass fire was started from a baler approximately five miles west-northwest of the city of Napoleon. The location of the fire was a quarter-mile south of the Dakota Missouri Valley & Western railroad. The fire burned approximately 10 acres and losses totaled \$150.00.
- **May 22, 2019.** A resident attempted to burn an old out-building on their property located at 5562 44th Ave SE, but the fire became out of control when flames spread to grass in a nearby flat area. The fire was reported at 1:24 p.m. The Streeter Fire Department was the first to respond but requested mutual aid assistance an hour later from Medina, Gackle and Napoleon Fire Departments. The Jamestown Rural Fire Department was on standby and the Napoleon Ambulance Service was summoned to the scene as a precautionary measure. The fire was difficult to fight as the area was swampy and full of cattails. Firefighters let the fire come to them as they used roads as barriers to assist controlling the fire. The area received some light rain later that afternoon, which helped in gaining control of the fire. Roughly 200+ acres burned, along with the old out-building, a barn and two other small structures. The fire was completely contained at 7:00 p.m. No injuries were reported.
- **March 7, 2021.** The Napoleon Fire Department responded to a wildland fire two miles north and 3/4 miles west of the city of Napoleon around 12 p.m. (noon) on Sunday, March 7, 2021, near the Rick and Dawns Marquart residence. The farmsteads of Ken and Deb Bedette is located to the south and the Steve Silbernagel home was located to the east. Fire Chief Marvin Lang said burning of trash was the cause of the fire. The department used all four grass units and the tank truck and pump truck on the scene. In addition, three tractors with diggers/discs assisted in turning the ground black to create fire breaks. Winds were in the mid 20 m.p.h. range out of the northeast and pushed flames 20+ feet or higher. The department did some back burning in an attempt to head-off the flames so it wouldn't jump the gravel road on the south side.

The fire burned 100 acres that includes lake bottom grasses and cattails. No property damage or injuries were reported. There were 25 volunteer fire fighters who responded and were on scene about 5 hours.

- **March 14, 2021.** The Napoleon Fire Department (NFD) responded to a wildland fire 13 miles north and 4 miles east of the city of Napoleon on Sunday, March 14, 2021. The fire started when someone was cutting up old scrap iron with a grinder, which produced sparks that ignited nearby grass. The fire spread quickly due to dry conditions and winds. The winds were gusting up to 30 m.p.h. that day. The NFD had four brush trucks and a tanker on scene along with 25 fire fighters. Mutual aid was requested from Steele, Dawson, and Tappen, which brought another 25 fire fighters, four brush trucks, one tanker truck, one pumper, and one side-by-side. A tractor and tillage tool was also used to stop the fire. The fire burned east-to-west about 3.5 miles and impacted 750 acres. No structures were lost in the fire. Fire fighters were on scene from 3 to 6 p.m., then returned from 6:30 to 7:30 p.m. because they were called back.

Although the fire was in Kidder County, the fire occurred in the Napoleon Fire Protection District.

U.S. Dept. of Agriculture, Risk Management Agency

- Crop loss from wildland fire is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres and indemnity amount. The damage cause description identifies the cause of damage, determines acres identifies the number of acres lost due to damage, and the indemnity amount identifies the total amount of the loss for the designated peril. **Between January 1, 2001, and December 31, 2020, Logan County experienced once incident of crop loss due to wildland fire impacting approximately 29.28 acres of crops totaling \$2,997.00 in losses.**

2018 N.D. Enhanced Mitigation MAOP

A statewide fire emergency declaration and burn ban are issued in response to extremely dry conditions, local/tribal burn bans and fire restrictions declared throughout the state, Fire Weather Watches, and Red Flag Warnings issued by the National Weather Service, unseasonably warm temperatures, low humidity, and high winds. Table 4.6.2.1 shows the history of statewide fire emergency declarations in North Dakota. The following are key points.

- According to the 2018 N.D. Enhanced Mitigation MAOP, between 1980 and June 26, 2017, the state of North Dakota had declared 17 fire emergencies.

There have been no locally declared disasters or emergencies pertaining to wildland fire in Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. Profile meeting participants indicated the probability of wildland fire in Logan County is highly likely meaning there is a 100 percent chance in the next year of an occurrence of the hazard.

The probability of a wildland occurrence can be measured by the presence and extend of the wildland-urban interface. The population living and/or number of housing units in rural residential areas in Logan County has increased over the last five years.

2013 West Side Wildfire Risk Assessment (WWA)

- The 2013 West Side Wildfire Risk Assessment (WWA) is a wildfire risk assessment and report for 17 western states and is developed by the Oregon Dept. of Forestry. Figure 4.6.1 is the fire risk index based on the WWA. The probability of a wildland fire is high to moderate across Logan County.

Table 4.6.2.1 – 1980 to June 26, 2017, North Dakota Statewide Fire Emergency Declarations

Declaration	Location	Date	Magnitude
State EO	North Dakota	1980	State Declared Fire Disaster
State EO	North Dakota	1981	State Declared Fire Disaster
State EO	North Dakota	1988	State Declared Fire Disaster
State EO	North Dakota	1990	State Declared Fire Disaster
State EO	North Dakota	1999	State Declared Fire Disaster
State Request	North Dakota	2000	Governor's Request for USDA assistance for Montana Wildfires
State EO	North Dakota	2000	State Declared Fire Disaster
State EO	North Dakota	2002	State Declared Fire Disaster
State EO	North Dakota	2004	State Declared Drought Disaster/Fire Danger Emergency
State EO	North Dakota	2005	State Declared Fire Disaster
State EO 2005-01	North Dakota	3/10/2005	State declared drought disaster and fire danger emergency
State EO 2006-06	North Dakota	6/28/2006	State declared rural fire emergency potential
State EO 2008-01	North Dakota	4/25/2008	State declared fire emergency
State EO 2012-02	North Dakota	3/30/2012	State declared fire emergency
State EO 2012-09	North Dakota	9/5/2012	State declared fire emergency
State EO	North Dakota	4/1/2015	State declared fire emergency
State EO 2017-07	North Dakota	6/26/2017	Statewide fire and drought emergency

Source(s): 2018 N.D. Enhanced Mitigation MAOP

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. Profile meeting participants indicated the magnitude or impact of wildland fire as catastrophic meaning more 50 percent of people and property in Logan County could be affected. In terms of extent/magnitude, smaller and less severe fires are more frequent with larger and more severe fires happening sparingly. The probability of wildland fires fluctuates based on season, local weather patterns, traffic conditions, among other variables. The chance of wildland fires increases during summer months when the agriculture sector is in full force and natural vegetation can become dry due to extreme heat. Larger fires can skew averages as one large incident can offset many smaller incidents.

The extent/magnitude of wildland fire in Logan County can also be determined by using data provided by the 2018 N.D. Enhanced Mitigation MAOP. The following are key points.

2018 N.D. Enhanced Mitigation MAOP

- Logan County has \$3,926,300.00 (2013 dollars) in housing unit values in high and moderate wildfire risk areas.
- Logan County has 91 people and 71 housing units in the High and Moderate Wildland Urban Interface Threat Zones; 37 people and 30 housing units in high-risk areas, and 54 people and 41 housing units in moderate risk areas.

Logan County Emergency Management

- **March 14, 2021.** The Napoleon Fire Department (NFD) responded to a wildland fire 13 miles north and 4 miles east of the city of Napoleon on Sunday, March 14, 2021. The fire burned east-to-west about 3.5 miles and impacted 750 acres. No structures were lost in the fire.
- **October 2, 2012.** An estimated 2,000 acres of pasture and hayland was burned in a fast-moving prairie fire southwest of the city of Napoleon. The fire covered an area two and one-half miles long and a mile-wide. Responding departments were Braddock, Hazelton, Linton, Napoleon, and Wishek. Fire suppression efforts were hampered by the area’s rugged terrain.

Risk Assessment

Table 4.6.2.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for wildland fire. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in the table represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.6.2.2 – Logan County, North Dakota Wildland Fire Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	3	4	4	2	13
City of Fredonia	4	2	4	2	1	11
City of Gackle	4	3	4	3	2	12
City of Lehr	4	2	4	2	2	10
City of Napoleon	4	3	4	4	2	13

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.6.2.3 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of wildland fire in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Table 4.6.2.3 – Logan County, North Dakota Wildland Fire Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Building Collapse • Crop Loss • Delayed Emergency Response • Evacuation (Localized) • Explosion • Increase Fire Potential 	<ul style="list-style-type: none"> • Loss of Power/Downed Power Lines • Mass Casualties/Fatalities • Property damage on a significant scale if becoming urban and transforming into a large-scale urban fire/structure collapse incident • Loss of farm equipment or buildings
<p>Frequency</p>	<ul style="list-style-type: none"> • Controlled burns becoming out of control between 25 and 50 percent of the time • March 14, 2021, Wildland fire impacting 750 acres • October 2, 2012, Wildland fire impacting 2,000 acres in neighboring Emmons County. 	<ul style="list-style-type: none"> • 90 percent of wildland fires responded to by local departments are wildland from hay land or CRP
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Agricultural burn-off • High winds in conjunction with dry conditions • CRP adjacent to structures/city limits • Pastureland adjacent to structures/city limits • Changing climates and weather patterns • Human activity – smoking and glass bottles) • County motor-graders striking rocks producing sparks causing fires in ditches along roads • Sparks for railroad infrastructure • The new care center is built in an area with wildland urban intermix 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Logan County Burn ban • Removal of CRP • Summer and winter weather with heavy precipitation

Table 4.6.2.3 – Logan County, North Dakota Wildland Fire Risk Assessment

Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Agricultural burn-off • High winds in conjunction with dry conditions • CRP adjacent to structures/city limits • Pastureland adjacent to structures/city limits • Large fire districts – strained coverage/resources • Lack of reliable water sources in rural areas • Lack of fire breaks around incorporated cities • Shrinking volunteerism for fire protection • Lack of permanent generators at fire halls • Lack of fire index signs in the cities of Fredonia, Gackle, and Lehr • Logan County has 91 people and 71 housing units in the High and Moderate Wildland Urban Interface Threat Zones • County motor-graders strike rocks producing sparks causing fires in ditches along roads • Sparks for railroad infrastructure • The new care center is built in an area with wildland urban intermix 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Logan County Burn Ban • Removal of CRP • Heavier precipitation than other parts of the state • MOUs with neighboring fire departments – maintaining good working relationships on a personal basis – Linton, Steele, Wishek, and N.D. Forest Service • Fire index sign at the Logan County Courthouse, Napoleon Fire Hall, and Beaver Lake State Park • Incorporated jurisdictions with limited wildland-urban interface • Investments in equipment for local fire departments • The non-Wildland-Urban Interface (WUI), both intermix and interface, consists of 98.6 percent of the total land area of Logan County. • Local fire agencies have access to rural water lines in the county
	<p>Capability</p> <ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address wildland fire (including rural). 	

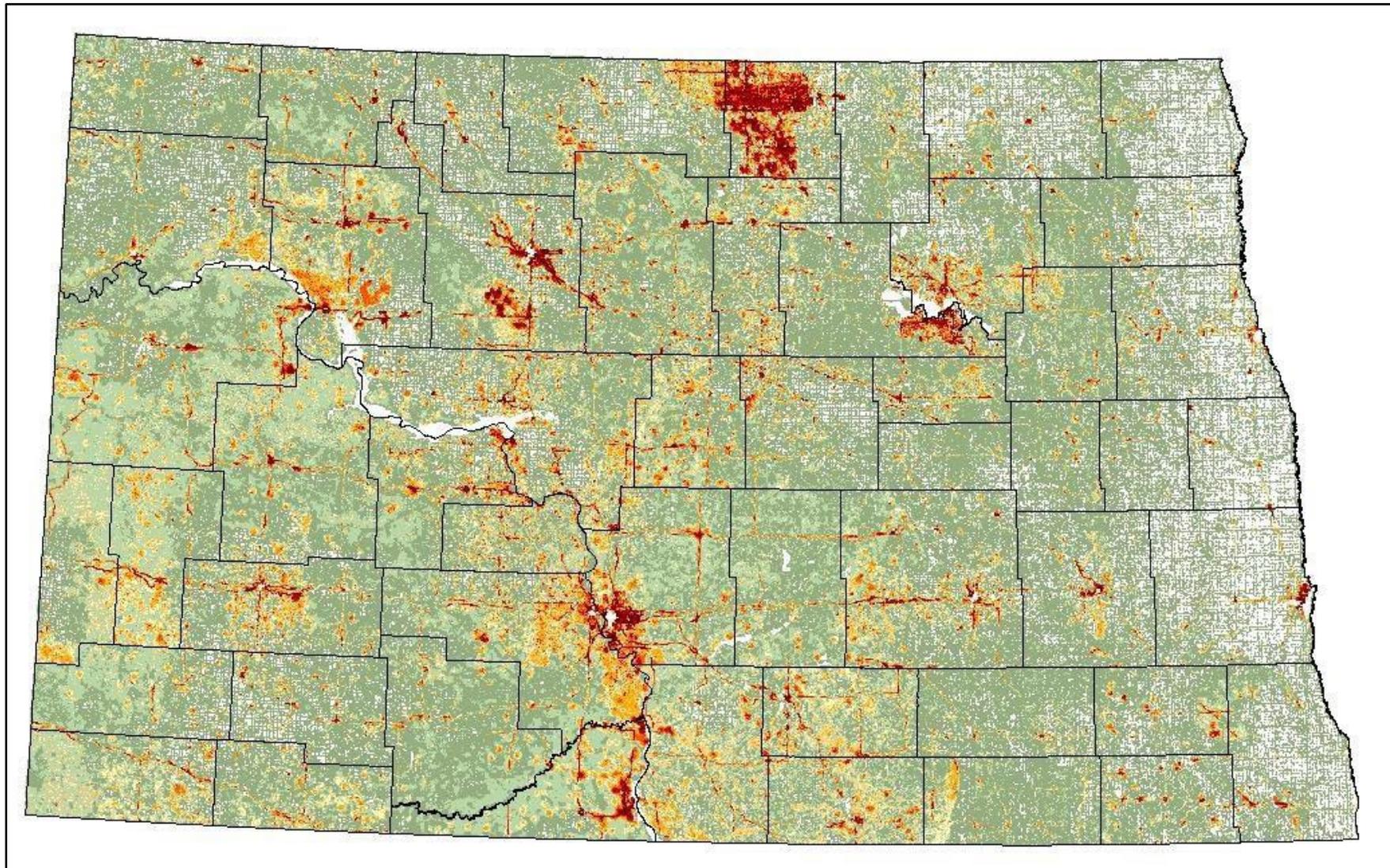
Wildland-Urban Interface (WUI)

The probability of wildland fire impacting people and property depends on the Wildland-Urban Interface (WUI). WUI is the zone of transition between unoccupied land and human development. Communities that are within 0.5 miles of the zone may also be included. These lands and communities adjacent to and surrounded by wildlands are at risk to wildland fires. There are two types of WUI: intermix and interface.

- **Intermix** refers to areas where housing and vegetation intermingle.
- **Interface** refers to areas with housing near contiguous wildland vegetation.

Figures 4.6.1.2 to 4.6.1.5 show the WUI for Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon. The areas colored in orange indicate areas where housing and vegetation intermingle.

Figure 4.6.2.1 – North Dakota Fire Risk Index Based on 2013 WWA



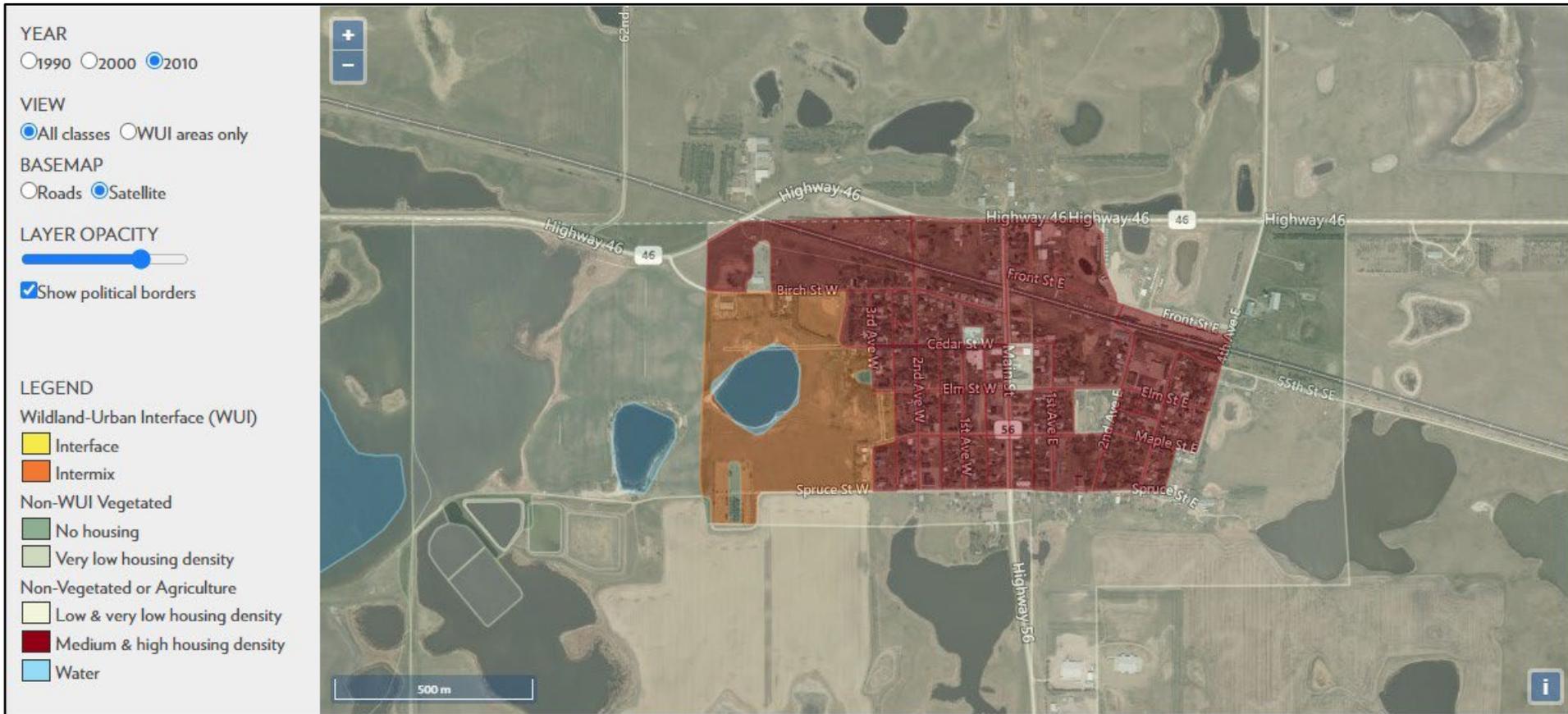
Source(s): 2018 N.D. Enhanced Mitigation MAOP; 2013 West Wide Wildfire Risk Assessment (WWA)

Figure 4.6.2.2 – 2010 City of Fredonia, North Dakota Wildland-Urban Interface



Source: University of Wisconsin, Silvis Lab – Spatial Analysis for Conservation and Sustainability

Figure 4.6.2.3 – 2010 City of Gackle, North Dakota Wildland-Urban Interface



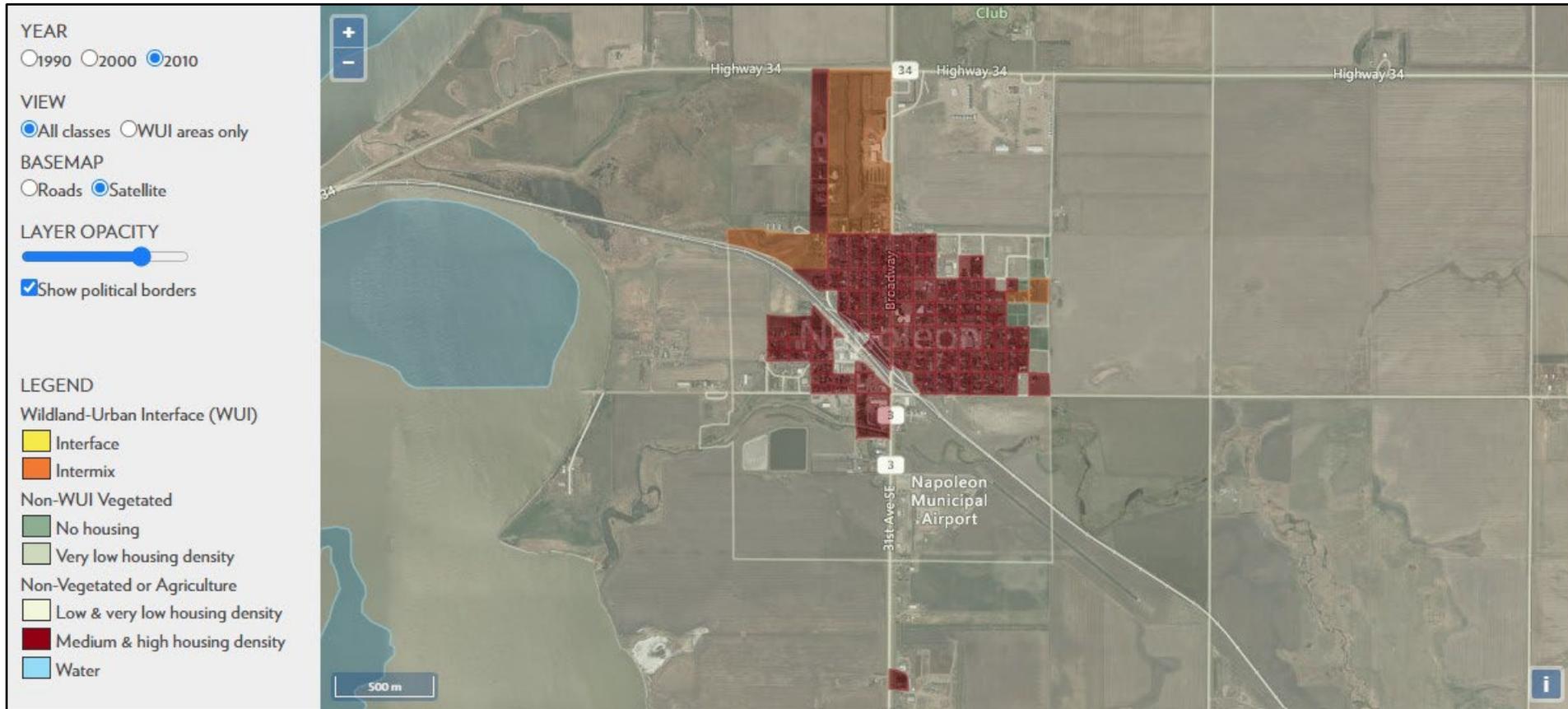
Source: University of Wisconsin, Silvis Lab – Spatial Analysis for Conservation and Sustainability

Figure 4.6.2.4 – 2010 City of Lehr, North Dakota Wildland-Urban Interface



Source: University of Wisconsin, Silvics Lab – Spatial Analysis for Conservation and Sustainability

Figure 4.6.2.5 – 2010 City of Napoleon, North Dakota Wildland-Urban Interface



Source: University of Wisconsin, Silvis Lab – Spatial Analysis for Conservation and Sustainability

Vulnerabilities to Publicly-Owned Buildings and Property

Publicly-owned buildings and property located in the Wildland-Urban Interface (WUI) or in remote areas are vulnerable to wildland fire. The risk of the hazard depends on building and property location, and if emergency services can reach the property in a timely manner.

An inventory of publicly-owned buildings and property is shown in Chapter 3, Profile and Inventory.

The lack of firebreaks around all incorporated cities in Logan County increases the vulnerability to publicly-owned buildings and properties. If a wildland fire were to grow and become uncontrollable, buildings and properties would be at risk from the spread of the fire. Firebreaks can and should be implemented where the WUI poses the greatest threat to people and property. Maps of the WUI shown in this chapter illustrate where measures should be implemented to mitigate wildland fires. **The WUI Intermix, areas where housing and vegetation intermingle, declined between 1990 and 2010 from 1.2 percent to 1.1 percent of the total area of Logan County.**

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, critical facilities and infrastructure are vulnerable to wildland fire. The vulnerability will vary depending on location from the wildland-urban interface. If an incident were to occur, depending on the facility or infrastructure impacted, a loss of or delay in emergency or utility services could be the result. Maps of the WUI shown in this chapter illustrate where measures should be implemented to mitigate wildland fires.

A summary of critical facilities and infrastructure is shown in Chapter 3, Profile and Inventory.

Vulnerabilities to New and Future Development

Rural homesteads on large parcels of land in remote areas are a trend in residential development in areas of North Dakota surrounding larger cities like Bismarck, Jamestown, and Minot. Logan County should strengthen planning and zoning regulations limiting where new residential development can occur, specifically large rural lots. The vulnerability of new and future development to wildland fire also increases as the distance from fire departments and emergency services increases. Residential development in remote areas increases the opportunity for human-induced wildland fires. In addition, the lack of man-camp ordinances at the county level increases the risk to human-induced wildland fires. **The non-Wildland-Urban Interface (WUI), both intermix and interface, consists of 98.6 percent of the total land area of Logan County.**

Data Limitations and Other Key Documents

Logan County fire department and district boundaries cross county lines, and therefore, provide coverage in neighboring counties. This cross-over may provide challenges to data tracking purposes.

National Association of State Foresters

- The history data provided by the National Association of State Foresters did not indicate the county where the fire occurred prior to 2009.

National Fire and Aviation Management

- Information from the National Fire and Aviation Management did not provide crop or property loss, cause of the fire or the responding fire departments/districts but did include the final fire acre quantity and latitude and longitude coordinates.

National Fire Incident Management System (NFIRS)

- Information from NFIRS does not distinguish which fires were wildland in nature.

NDSU/N.D. Forest Service

- In addition to unavailable hazard data at the local level, wildland fire data was not available after 2008 from the NDSU/N.D. Forest Service. The NDSU/N.D. Forest Service reported that due to database system errors, the history of wildland fires in North Dakota was lost.

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Burn Bans
- Logan County Comprehensive Plan (1996)
- Logan County Evacuation Plan through Central Valley Health District (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- Fire Management Plans for federal lands
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Fire Annex
- North Dakota Forest Service, Building Sustainable Communities Through Forestry
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Statewide Assessment of Forest Resources and Forest Resource Strategy
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.7 Flood

Including closed basin, flash floods, groundwater saturation and seepage, high dam release, ice jams, levee/floodwall failure, overland flooding, and river flooding.

Characteristics

Flooding, as a natural hazard, has been a part of the county's conflict with nature throughout history and is defined as an overflow of water on land not normally covered by water. Floods are a natural phenomenon; however, flood hazards are often both intensified and mitigated by man-made interference with nature.

Flooding, as a natural hazard, has been a part of the county's conflict with nature throughout history and is defined as an overflow of water on land not normally covered by water. Floods are a natural phenomenon; however, flood hazards are often intensified by man-made interference with nature.

A brief description of the types of flooding are as follows and was provided by the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP):

- **Closed Basin:** Flooding in a closed basin occurs when surface water cannot flow naturally out of the basin as a river does (until a natural overflow elevation is reached), and therefore, normally dry locations can fill in with water during wet periods.
- **Flash Floods:** Flash flooding occurs when heavy rain falls in such a short time that the soil cannot absorb it and/or drainage systems (natural or human-made) cannot carry the volume of water away as quickly as it accumulates.

A flash flood is usually caused by severe thunderstorms, heavy rains on snowpack, slow moving storms, dam, dike, or levee failures, or ice jam releases. Flash floods can occur anywhere when a large volume of water inundates an area over a short time-period. Because of the localized nature of flash floods and variables in rainfall amounts and duration, clearly defined areas prone to flash flooding are difficult to identify.

- **Groundwater Seepage:** Groundwater seepage occurs when water (originating from rainwater and soaks into the ground filling available space in the soil) flows or collets beneath the ground and makes its way back to the surface.
- **High Dam Release:** High dam release flooding is caused by intentional water release from dams to prevent water from breaching a spillway or the ends of the dam. A high dam release is typically a slow release of water from the dam over time but can cause flooding in surrounding areas.
- **Ice Jams:** Flooding can also result from ice jamming or blockage along streams. Ice breaking up into pieces, called flows, move along with the flowing rivers or streams. The ice floes can jam at curves, narrow places in the channel, structures, river/stream confluences, or where there is a sharp decrease in riverbed gradient, creating an effective dam that produces water backup and

overflow. Ice jams can cause considerable increases in upstream water levels, while at the same time downstream water levels may drop.

- **Levee/Floodwall Failure:** Levees are earth embankments constructed along rivers and coastlines to protect adjacent lands from flooding. Floodwalls are concrete structures, often components of levee systems, designed for urban areas where there is insufficient room for earthen levees. Levees are usually engineered to withstand a flood with a computed risk of occurrence. When a larger flood occurs and/or levees and floodwalls and their appurtenant structures are stressed beyond their capabilities to withstand floods, levee failure can result in loss of life and injuries as well as damage to property, the environment, and the economy.
- **Overland Flooding:** Overland Flooding occurs when flood waters flow overland from an outside source or body of water onto dry land and seeps into buildings and/or infrastructure.
- **Riverine Flooding:** Riverine flooding originates from a body of water, typically a river, creek, or stream, as water levels rise onto normally dry land. Most riverine floods are slow developing events with a natural, predictable source of water or moisture, such as snowmelt, slow rain, or a controlled dam release. This type of flood can often be forecast based on the amount of moisture or water available. The timing and location of flood conditions can often be calculated to a reasonable degree. If implemented in a timely manner, protective measures can sometimes mitigate the potential damage and loss.

Seasonal Pattern	More frequent during spring and summer. Fall flooding occurs on very rare occasions. Spring and winter flooding can occur from ice jams in culverts and local bodies of water.
Duration	Several hours for flash flooding; up to 2 weeks or several months depending on severity for major overland flooding.
Speed of Onset	Minutes for flash flooding. Between 12 and 24 hours warning for closed basin and overland flooding.
Location	<u>Logan County.</u> Beaver Creek. Road infrastructure near Beaver Lake State Park. Beer Can Alley east of the city of Napoleon along 32 nd Ave SE. Low-lying areas near or adjacent to bodies of water, or with inadequate drainage. Closed basins. See Figures 4.7.1, 4.7.2 and 4.7.3 for locations of sites impacted by overland flooding that are included in Presidential Disaster Declarations. No riverine flooding in Logan County due to absence of a river. <u>Incorporated Jurisdictions.</u> See Chapter 8, Jurisdictions. Intersection of Main St., Lake Ave, and N.D Highway 3 in the city of Napoleon; south side of the Napoleon City Park near the lift station and on the north side of the park. City Park area in the city of Gackle. Western sections of the city of Fredonia.

For more information regarding flooding please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](https://www.des.nd.gov/planning)

<https://www.des.nd.gov/planning>

History

Information on the history of flooding in Logan County was obtained from the Federal Emergency Management Agency (FEMA); National Climatic Data Center (NCDC); National Oceanic and Atmospheric Administration (NOAA); Logan County Auditor’s Office; Logan County Highway Department; Logan County Office of Emergency Management; U.S. Dept. of Agriculture, Risk Management Agency (RMA); and the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP).

Federal Emergency Management Agency

- Since 1953, Logan County has had 21 Presidential Disaster Declarations, of which 12 were for flooding. Flooding accounts for or is a factor in approximately 76.2 percent of disasters declared in Logan County.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Table 4.7.1 summarizes the history of flooding in Logan County between January 1, 1996, and December 31, 2021. Data was not available between January 1, 1950, to December 31, 1995, as only occurrences of tornado, thunderstorm wind, and hail were recorded. Starting January 1, 1996, all event types (48) are recorded. This data does not include recent instances of flooding, which were included in presidential disaster declarations in 2019 and 2020. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment. The following are key points.

- Logan County experienced six occurrences of flooding resulting in approximately one incident of significance approximately every four years.
- Approximately \$440,000.00 in property damage and \$100,000.00 in crop damage was reported.
- No injuries or fatalities were reported.

Table 4.7.1 – 1996 to 2021 Logan County, North Dakota Flood Hazard History Summary

Flood				
Occurrences	Fatalities	Injuries	Property Damage	Crop Damage
6	0	0	\$440,000.00	\$100,000.00

Source(s): National Climatic Data Center (NCDC), National Oceanic and Atmospheric Administration (NOAA)

Logan County Auditor’s Office and Logan County Highway Department

Table 4.7.2 illustrates public infrastructure damage information from presidential disaster declarations from flooding in Logan County between 2009 and 2020. The following are key points.

- **DR-1829.** The 2009 flood declaration totaled \$594,230.24. The number of sites and the cost share was not available.
- **DR-1907.** The 2010 flood declaration totaled \$508,329.15. The number of sites and the cost share was not available.

- **DR-1981.** The 2011 flood declaration totaled \$1,116,724.41. The number of sites and the cost share was not available. Logan County secured a general obligation bond/loan from the Bank of North Dakota for \$6,000,000.00 to fund payment of repairs caused by impacts from the 2011 Flood on the farm-to-market and federal aid roads through the county.
- **DR-4444.** A total of 95 damaged sites were identified from the Spring 2019 flood declaration totaling \$155,285.76. The cost share was approximately 15.0 percent local, 10.0 percent state, and 75.0 percent federal. The average cost per damaged site was \$1,634.59.
- **DR-4475.** A total of 41 damaged sites were identified and approved from the Fall 2019 flood declaration totaling \$172,470.56. The cost share was approximately 15.0 percent local, 10.0 percent state, and 75.0 percent federal. The average cost per damaged site was \$4,206.60.
- **DR-4553.** A total of 90 damaged sites were identified and approved from the Spring 2020 flood declaration totaling \$349,215.06. The cost share was approximately 15.0 percent local, 10.0 percent state, and 75.0 percent federal. The average cost per damaged site was \$3,880.17.

Table 4.7.2 2019 to 2020 Logan County, North Dakota Public Infrastructure Damages from Presidentially Declared Disaster – Flooding Events

Disaster No.	Year	Damaged Sites	Local Share	State Share	Federal Share	Total Cost
DR-1829	2009	NA	--	--	--	\$594,230.24
DR-1907	2010	NA	--	--	--	\$508,329.15
DR-1981	2011	NA	--	--	--	\$1,116,724.41
DR-4553	Spring 2020	90	\$52,382.26	\$34,921.51	\$261,911.29	\$349,215.06
DR-4475	Fall 2019	41	\$25,870.58	\$17,247.06	\$129,352.93	\$172,470.56
DR-4444	Spring 2019	95	\$23,292.86	\$15,528.58	\$116,464.32	\$155,285.76

Source(s): Logan County Auditor’s Office; Logan County Commission; Logan County Emergency Management

U.S. Dept. of Agriculture, Risk Management Agency

- Crop loss from flood is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres and indemnity amount. The damage cause description identifies the cause of damage, determines acres identifies the number of acres lost due to damage, and the indemnity amount identifies the total amount of the loss for the designated peril. **Between January 1, 2001, and December 31, 2020, Logan County did not experience incidents of crop loss due to flooding.**

2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)

According to the 2018 N.D. Enhanced Mitigation MAOP, the following historical information was obtained on flooding events in Logan County.

- **According to the National Centers for Environmental Information, as of 2018, Logan County experienced three flash flood events resulting in \$269,000.00 in property damage, \$100,000.00 crop damage, and no injuries or fatalities. In addition, as of 2018, Logan County experienced three flood events resulting in \$171,000.00 in property damage and no crop damage. No injuries or fatalities were reported.**

Probability

The probability of a hazard or threat is how likely it is it will happen. Profile meeting participants and the Steering Committee indicated the probability of a flood in Logan County as likely meaning that there is between a 10 and 100 percent probability in the next year of an incident. The probability of flood in Logan County can be determined through data provided by the National Climatic Data Center/National Oceanic and Atmospheric Administration; Logan County Auditor's Office and Logan County Highway Department; the U.S. Dept. of Agriculture, Risk Management Agency; the 2018 N.D. Enhanced Mitigation MAOP, and Logan County Emergency Management.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Per Table 4.7.1, the following statistics on the probability of flooding in Logan County is as follows:

- Probability of flooding in Logan County is approximately 25 percent based on six flood occurrences between January 1, 1996, and December 31, 2021, resulting in approximately one incident of significance every four years.
- Logan County experiences approximately \$16,923.08 in property damage and \$3,846.15 crop damage annually between January 1, 1996, and December 31, 2021.
- No injuries or fatalities were reported between January 1, 1996, and December 31, 2021.

U.S. Dept. of Agriculture, Risk Management Agency

- According to information obtained from the U.S. Dept. of Agriculture, Risk Management Agency (RMA), no crop loss due to flooding occurred in Logan County between January 1, 2001, and December 31 2020.

Logan County Auditor's Office and Logan County Highway Department

- Figures 4.7.1 and 4.7.3 illustrate infrastructure impacted from the Spring, 2019, Fall 2019, and Spring 2020 flooding events in Logan County, which were included in the respective presidential disaster declaration.

2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)

- Figure 4.7.4 is from the 2018 N.D. Enhanced Mitigation MAOP and shows the one-percent annual chance floodplain in North Dakota based on FEMA's NFHL, which only shows areas with DFIRM data available. The One-Percent Annual Chance (100-Year) Floodplain is not present in Logan County.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. Profile meeting participants and the Steering Committee indicated the extent/magnitude of a flood in Logan County as catastrophic meaning that more than 50 percent of the jurisdiction, its people and property can be

impacted. Based on history of flooding in Table 4.7.1 (National Climatic Data Center), Table 4.7.2, and crop loss information from the USDA-RMA, the following extent/magnitude of flooding in Logan County is determined.

- Per Table 4.7.1, approximately \$250,000.00 in property damage and \$100,000.00 in crop damage occurred from a flash flood event on August 16, 2014, in the city of Napoleon.
- Per Table 4.7.2, the largest flooding event in terms of total monetary damage was DR-4553 with \$349,215.06 and the largest in terms of average cost per damaged site was DR-4475 with \$4,206.60 per site. The largest flooding event in terms of total damaged sites was DR-4444 with 95 damaged sites.
- High water on Beaver Lake at Beaver Lake State Park causes flooding on 71st St. SE in central Logan County. – look at WebEOC

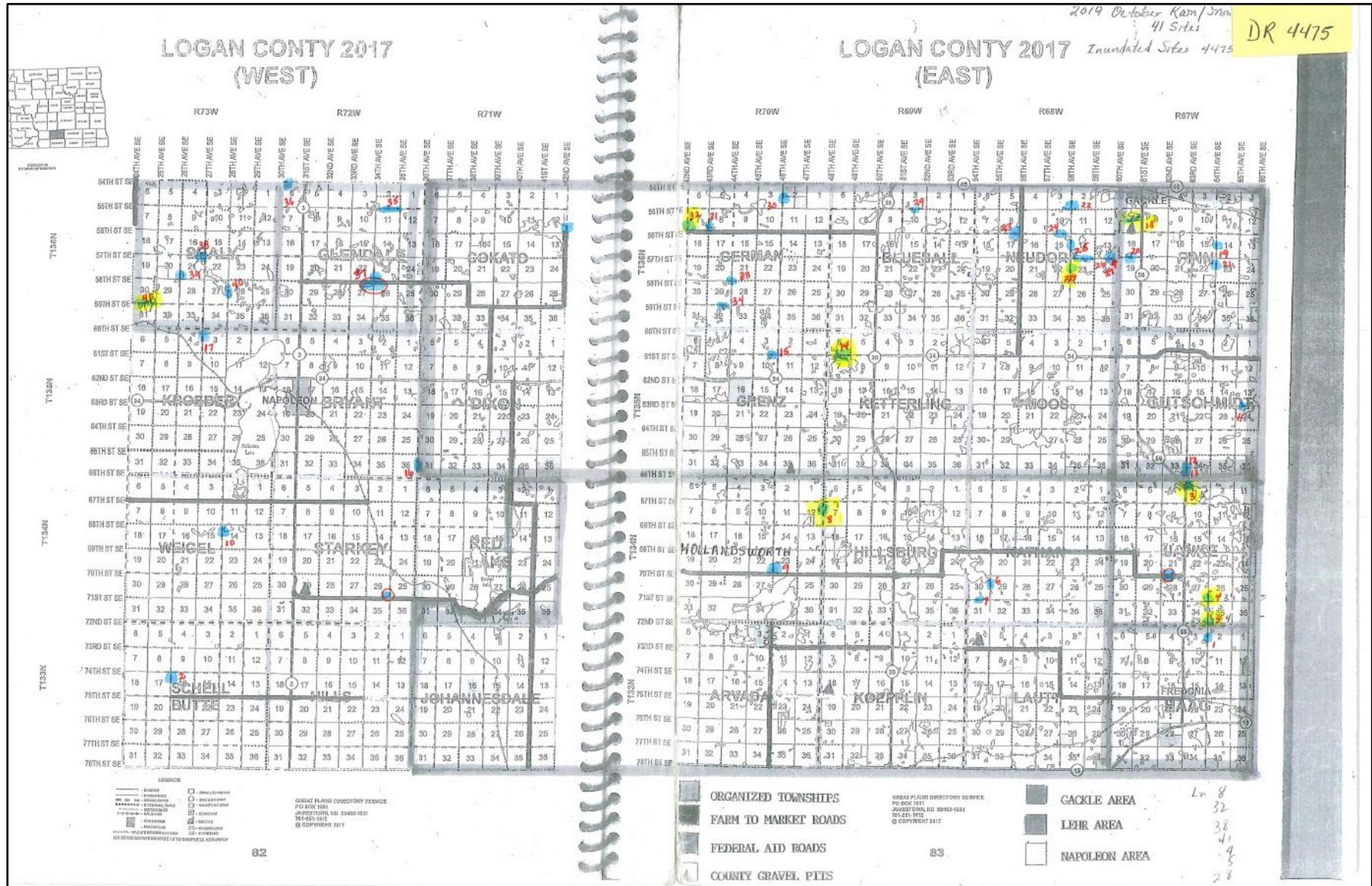
Logan County Auditor's Office and Logan County Highway Department

- Logan County secured a general obligation bond/loan from the Bank of North Dakota for \$6,000,000.00 to fund payment of repairs caused by impacts from the 2011 Flood on the farm-to-market and federal aid roads through the county.

U.S. Dept. of Agriculture, Risk Management Agency

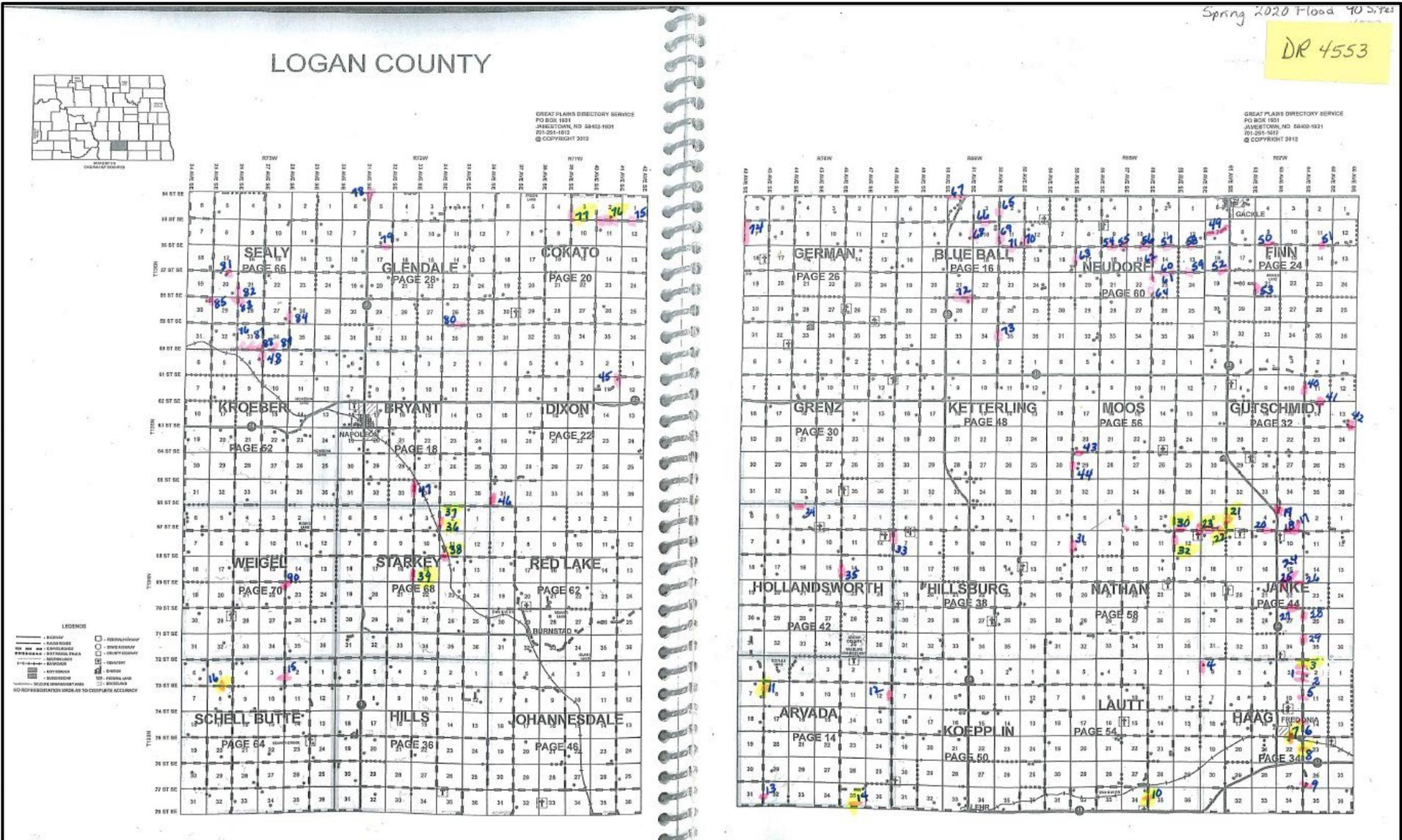
- Crop loss data from the USDA, RMA shows that prior to 2001, approximately 18,389 acres of wheat were impacted by flooding in 1993.

Figure 4.7.2 – DR-4475 Logan County, North Dakota Public Infrastructure Sites Impacted by Flooding



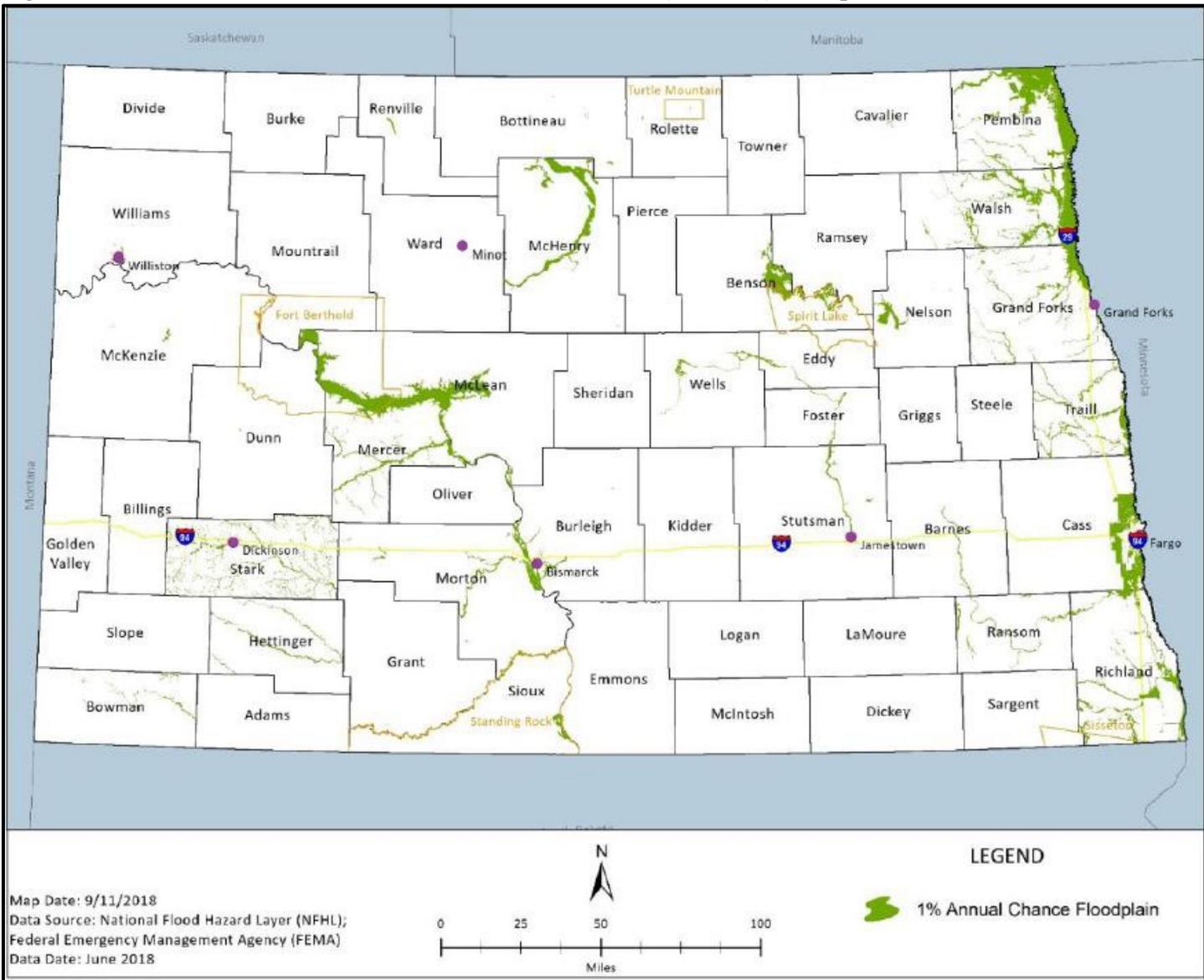
Source(s): Logan County Auditor's Office; Logan County Commission; Logan County Emergency Management

Figure 4.7.3 – DR-4453 Logan County, North Dakota Public Infrastructure Sites Impacted by Flooding



Source(s): Logan County Auditor's Office; Logan County Commission; Logan County Emergency Management

Figure 4.7.4 – 2019 North Dakota One-Percent Annual Chance (100-Year) Floodplain



Source(s): 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)

National Flood Insurance Program (NFIP)

The National Flood Insurance Program (NFIP), managed by the Federal Emergency Management Agency (FEMA), enables homeowners, business owners, and renters in participating communities to purchase federally backed flood insurance. The NFIP provides affordable insurance to property owners and encourages communities to adopt and enforce floodplain management regulations. This insurance offers an insurance alternative to disaster assistance to meet the escalating costs of repairing flood damage to buildings and their contents.

Participating communities agree to adopt and enforce floodplain management ordinances to reduce future flood damage. There are now more than 20,600 participating communities across the United States and its territories.

Federal flood insurance is available for residents and business owners in both high-risk and moderate-to-low risk areas. The insurance is required for buildings in high-risk areas that have loans from federally regulated or insured lenders. This requirement extends to disaster assistance loans from the Small Business Administration. However, it is not a requirement of the NFIP to have a mortgage or SBA loan or live in a high-risk area to obtain flood insurance. It is available community-wide, with premiums that vary according to the level of risk.

Table 4.7.3 shows the communities participating in the National Flood Insurance Program. Communities that participate in the National Flood Insurance Program (NFIP) are required to adopt flood plain regulations that meet NFIP objectives:

- New buildings must be protected from flooding damages because of a 1-percent chance flood.
- New development must not cause an increase in flood damages to other property.
- The DFIRMs for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.
- Chapter 6, Mitigation Strategy includes mitigation projects to enroll jurisdictions and encourage participation in the National Flood Insurance Program (NFIP). Mitigation Project PR-3 encourages enrollment and participation in the NFIP. Mitigation Project PR-4 encourages review of local ordinances to meet or exceed minimum federal and state requirements, comply with NFIP, and enroll in the Community Rating System.
- The current effective map date for the city of Napoleon is February 2, 1987, and Reg. Emer. Date is May 15, 1980.

Table 4.7.3 – Participation in National Flood Insurance Program (NFIP) – Logan County, ND

Jurisdiction Name	CID #	Initial FHBM Identified	Initial FIRM Identified	Mapped
Logan, County of	380691	--	--	(NSFHA)
Napoleon, City of	380044	03/14/78	05/15/80	(NSFHA)

Source: FEMA Community Status Book Report, North Dakota

NFIP Program Policies, Claims and Loss Payments

According to the N.D. Dept. of Water Resources, as of March 24, 2022, there are zero NFIP policies in Logan County. One claim has been made since 1978 in Logan County with \$252,290.000 paid on that claim.

NFIP Repetitive Loss Properties

Per FEMA, a repetitive loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. The losses must be within 10 years of each other and be at least 10 days apart. A RL property may or may not be currently insured by the NFIP.

As November 18, 2021, there are no repetitive loss properties were in Logan County.

NFIP Severe Repetitive Loss Properties

A Severe Repetitive Loss (SRL) property is a residential property that has had at least four NFIP claim payments over \$5,000 each with two such claims occurring within any ten-year period, or residential property that has had at least two separate claim payments within any ten-year period that have cumulatively exceeded the value of the property.

As November 18, 2021, there are no severe repetitive loss properties were in Logan County.

Risk Assessment

Table 4.7.3 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for flood. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.7.3 represents the sum of each jurisdiction's impact, frequency, likelihood and vulnerability to a hazard/threat less the jurisdiction's capabilities to respond to the hazard/threat.

Table 4.7.3 – Logan County, North Dakota Flood Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	3	4	4	3	12
City of Fredonia	3	2	4	2	1	10
City of Gackle	3	3	4	3	1	12
City of Lehr	3	2	4	2	1	10
City of Napoleon	4	3	4	4	3	12

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.7.4 provides information on the specific impact, frequency, likelihood, vulnerability and capability of flood in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Table 4.7.4 – Logan County, North Dakota Flood Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Roads can become washed out and limit access for emergency services and economy activity • Loss of economy resulting from crop damage • Increased mosquitos-may transmit disease due to lots of grass and standing water • Large property loss, equipment/vehicles, personal property • Can impact lift stations and cause sewer backups contributing to infectious disease • Power outages, sometimes prolonged • Damage to critical facilities and infrastructure • Potential loss of life from fast moving water • Homes with basements can become flooded from ground saturation/seepage • Temporary displaced populations • Temporary relocation of medical services would decrease range of services offered • Increased crime as emergency services are limited in access and mobility • Increase in infectious disease from overland flooding and standing water (mold and blue/green algae) • Cause of secondary hazards such as shortage or outage of critical materials or infrastructure, or transportation incidents • Increase in traveling distances for residents commuting to work, school buses, emergency response vehicles, general economic activity, and agriculture-related activity due to blocked roads from flooding • Potential for permanent closure of county and township roads • Compromised/diminished water quality from agricultural runoff carried by flood waters <ul style="list-style-type: none"> • \$252,290.00 in losses paid on one claim through the NFIP since 1978 in Logan County. • Between January 1, 2001, and December 31, 2020, Logan County did not experience incidents of crop loss due to flooding. • Per Table 4.7.2, the largest flooding event in terms of total monetary damage was DR-4553 with \$349,215.06 and the largest in terms of average cost per damaged site was DR-4475 with \$4,206.60 per site. The largest flooding event in terms of damaged sites was DR-4444 with 95 damaged sites. <p><u>Blocked Roads</u></p> <ul style="list-style-type: none"> • 27th Ave SE between Sections in 9 and 10 Kroeber Township • 25th Ave SE at 60th St. in Sections 6 and 5 in Kroeber Township • Intersection of 71st St. and 39th Ave Se in Sections 27 and 34 in Red Lake Township • Intersection of 71st St. SE and 35th Ave SE in Sections 25 and 26 in Starkey Township • Intersection of 34th Ave SE and 71st St. SE Sections 26 and 27 in Starkey Township • Intersection of 77th St. SE and 28th Ave SE in Sections 28 and 33 in Shell Butte Township • Intersection of 73rd St. SE and 29th Ave SE in Sections 2 and 11 in Shell Butte Township • Wentz Hills east of Napoleon along N.D. Highway 34
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Table 4.7.4 – Logan County, North Dakota Flood Risk Assessment – Continued

<p>Frequency</p>	<ul style="list-style-type: none"> • Annual occurrences of localized flooding of streets in incorporated cities, and bi-annual flooding of county and township roads • Periodic flash flooding from heavy rains in the summer • Overland flooding from increased heavy rains in the summer and snow melt in the spring occurring each year to varying degrees of severity • Increasing irregularity in precipitation patterns • Increase in number of wet closed basins • Agricultural land management practices to maximize production can impact the severity flooding • Overland flooding started in 1993 in Haag and Janke Townships and has occurred on a 10-year cycle since 	<ul style="list-style-type: none"> • Presidential Disaster Declarations in Logan County in 2007, 2009, 2010, 2011, 2019 and 2020. • Per Table 4.7.1, probability of flooding in Logan County is approximately 25 percent based on six flood occurrences between January 1, 1996, and December 31, 2021, resulting in approximately one incident of significance every four years.
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Beaver Creek – tributary of Missouri River • Rapid change of seasons = excessive snow melt/drainage • Low spots on county and township roads • Presence of closed basins at capacity and not allowing new drainage • Overland flooding likely due to lack of storm water systems in smaller incorporated cities and rural areas • High water table • Increased impervious surface and pavement increases runoff and decreases water absorbed naturally • Farm and field drain tile and dewatering systems • The drain in the basement/parking area of the new Napoleon Care Center collects runoff and is expelled into the city’s sanitary sewer system, which can overwhelm the system and therefore increase the vulnerability to overland flooding from heavy precipitation 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Likelihood dependent local weather and climate patterns • Structure-specific drain tile and dewatering systems • Farm and field drain tile and dewatering systems • The far northwestern quadrant of Logan County has sandy soil which contributes to rapid drainage of runoff • Upgraded culverts installed from federal funding received during presidential disaster declarations • City of Napoleon has a storm water system and installation of the Napoleon Drainage Ditch in the 1980s

Table 4.7.4 – Logan County, North Dakota Flood Risk Assessment – Continued

Vulnerability	<u>More Vulnerable</u>	<u>Less Vulnerable</u>
	<ul style="list-style-type: none"> • Beaver Creek – tributary of Missouri River • Lack of storm water system in smaller jurisdictions – • Smaller jurisdictions and rural areas with agriculture-based economies are vulnerable to crop and livestock losses from flooding impacts • Low-lying roads in rural areas of the county and townships • Multiple severe weather systems occurring close together further inundating existing flooding impacts • Limited local financial resources to accomplish projects independently during Presidential Disaster Declarations • The drain in the basement/parking area of the new Napoleon Care Center collects runoff and is expelled into the city’s sanitary sewer system, which can overwhelm the system and therefore increase the vulnerability to overland flooding from heavy precipitation 	<ul style="list-style-type: none"> • LiDAR and constant improvements in technology is available for flood mapping. The DWR is currently updating all DFIRMS through a FEMA grant. • Advanced warning systems such as IPAWS, cell phones, internet, and TV for flash flooding events • Road raises have been completed and properties have been removed from flood prone areas – ongoing based on current conditions and impacts • Upgraded culverts installed from federal funding received during presidential disaster declarations • City of Napoleon has a storm water system and installation of the Napoleon Drainage Ditch in the 1980s • Rip-rap installed on N.D. Highway 34 at Wentz Lake approximately 13 miles east of the city of Napoleon • N.D. Highway 34 raised by an estimated 18 feet by the N.D. Dept. of Transportation approximately 3.5 miles east of the highway’s junction with N.D. Highway 30

Table 4.7.4 – Logan County, North Dakota Flood Risk Assessment – Continued

Capability	<p><u>Administrative and Technical</u></p> <ul style="list-style-type: none"> • FEMA Flood Maps – being updated through a federal grant managed by the N.D. Dept. of Water Resources to include enhanced aerial imagery and the base level engineering data • Active County Commission and City Council(s) • Contracts for engineering, planning, and grant writing • GIS services are provided by county engineering contract • City of Napoleon with GIS capabilities through their engineering contract • Logan County Water Resource District Board • ND Dept. of Water Resources - ND Risk Assessment Mapping (NDRAM) • Administration of Public Assistance (PA) funding through FEMA from Presidential Disaster Declarations <p><u>Education and Outreach</u></p> <ul style="list-style-type: none"> • Active emergency management department with education and outreach capabilities • Social media accounts – Napoleon News, Logan County Emergency Management, Sheriff’s Office • Logan County Water Resource District Board provides regulation to land-owners for issues pertaining to water <p><u>Financial</u></p> <ul style="list-style-type: none"> • Relies on federal and state entities for assistance with major projects • Public Assistance (PA) funding through FEMA from Presidential Disaster Declarations <p><u>Planning and Regulatory</u></p> <ul style="list-style-type: none"> • City of Napoleon adopted NFIP and has flood plain ordinances • Logan County Water Resource District Board • Logan County Planning and Zoning Committee and Administrator • Logan County Floodplain Administrator • Logan County adopted NFIP and has flood plain ordinances • ND Dept. of Water Resources - ND Risk Assessment Mapping (NDRAM) • ND Dept. of Water Resources also has regulations in place for surface water • USDA, Natural Resource Conservation Service (NRCS) • USDA, Farm Services Agency (FSA)
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Vulnerabilities to Publicly-Owned Buildings and Property

Vulnerabilities to publicly-owned buildings and property from floods are always present whether flooding is due to flash flooding, overland, ground seepage, river channel, or closed basin, whether a direct impact to the structure or through secondary affects. The Logan County High Department shops are located on high points throughout the county and are not vulnerable to flooding. In the city of Napoleon, the city hall/police station/public works building is vulnerable to overland flooding and could result in a disruption of city services.

A summary of publicly-owned buildings and property is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Damage to critical facilities and infrastructure such as drinking/potable water and sewer systems, roadways, and electric power lines can happen when flooding occurs. Drinking/potable water and sewer systems can be shut down when power to lift stations and water treatment facilities are suspended, or the systems become overwhelmed. Roads can be washed out or blocked from overland flooding, which limits access for emergency services. In the city of Napoleon, the sanitary sewer lift station at the city park is inundated by overland flooding which can result in suspension of service and sewer backups in residential and commercial properties.

City of Fredonia. The sanitary sewer lagoons for the city of Fredonia are vulnerable to overland flooding.

City of Gackle. The water way/drainage path through the city park is inundated by overland flooding, which blocks Maple Street and, in with less frequency, Elm St. Elm St. provides direct access to the Gackle-Streeter Public School.

City of Lehr. The culvert at the intersection of Main St. North and 2nd Ave North is plugged and needs to be upgraded to eliminate occurrences of overland flooding. There are also no culverts on the east side of Main St. north of the county line.

City of Napoleon. Overland flooding occurs at the intersection of 4th St. West and G Ave W, north of G Ave E near its intersection with N.D. Highway 3 and continues east to 8th St. E before turning west and impacting residential areas near 6th St E and C Ave E, near intersection of Lake Ave E and 7th St. E and flows westward along A Ave E, and from Lake Ave E between 4th St. E and 5th St. E flowing north toward A Ave E.

An inventory of critical facilities and infrastructure is provided in Chapter 3, Profile and Inventory.

Vulnerabilities to New and Future Development

New and future development in Logan County is at high risk to flooding if allowed in a floodplain. With projected local populations stable in Logan County through 2030, the vulnerability to flooding will not change if development is restricted from flood-prone areas.

The drain in the basement/parking area of the new Napoleon Care Center (anticipated to open 2023) collects runoff and is expelled into the city's sanitary sewer system. This runoff can overwhelm the

system and, therefore, increases the vulnerability to overland flooding from heavy precipitation in the city of Napoleon.

Data Limitations

The lack of digitized records of public assistance provided to local governments from flood events makes collection and analysis of impacts from the hazard difficult to comprehend during mitigation planning processes.

National Climatic Data Center/National Oceanic and Atmospheric Administration

The hazard history provided in terms of property damage and crop damage (which are only estimates) is calculated based on what the National Weather Service received from insurance companies and individual property owners upon request. Both sources have been reluctant to share that information. Therefore, both practices were discontinued. Because of this, the National Weather Service makes a best guess using all available data at the time of the publication. The damage amounts are received from a variety of sources. Property and crop damage should be considered as a broad estimate.

In addition, the hazard history provided through the National Climatic Data Center/National Oceanic Atmospheric Administration's Storm Events Database contains data from **1950 to 2021**, as entered by NOAA's National Weather Service (NWS). Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures. **Flooding was not recorded as a separate incident until 1996.**

1. **Tornado:** From 1950 through 1954, only tornado events were recorded.
2. **Tornado, Thunderstorm Wind and Hail:** From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.
3. **All Event Types (48 from Directive 10-1605):** From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

Other Key Documents

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Logan County Comprehensive Plan (1995)
- Logan County Evacuation Plan through Central Valley Health District (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)

- Logan County Zoning Ordinance (2006)
- National Flood Insurance Program (and required flood ordinances)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Flood Annex
- North Dakota Dept. of Water Resources Risk Assessment Mapping (RAM) Service (flood mapping software)
- North Dakota League of Cities: Planning and Zoning Handbook
- North Dakota State Building Code
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.8 Geologic Hazard

Including abandoned mine lands, earthquakes, environmental minerals (erionite, uranium, arsenic), environmental minerals (radon), expansive/unstable soils, landslides, meteorite falls, and volcanic hazards.

Characteristics

A geologic hazard, and the different classifications of the hazard, are described as follows:

- **Abandoned Mine Lands (AMLs):** AMLs are hazardous mine subsidence and are caused by the collapse of abandoned underground mines.
- **Earthquake:** An Earthquake is a sudden movement of the earth caused by the abrupt release of strain that has accumulated over a long time.
- **Environmental Minerals (Erionite, Uranium, Arsenic):** These minerals, and the rocks that host them, are hazardous with localized and prolonged exposure.
- **Environmental Minerals (Radon):** Radon is a colorless, odorless, and tasteless gas that originates from the radioactive decay of uranium minerals found in soils and in igneous rock and their derivative mineral weathering products.
- **Expansive/Unstable Soils:** Expansive/unstable soils are soils that expand when water is added and shrink when they dry out.
- **Landslides:** Landslides are the movement of rock, soil, artificial fill, or a combination thereof on that moves down-slope.
- **Meteorite Falls:** Meteorite Falls are samples of early solar system materials.
- **Volcanic Hazards:** Geologic impacts from volcanic activity.

Seasonal Pattern	None. Can occur at any time throughout the year. Most prevalent after heavy precipitation events such as severe summer or winter weather.
Duration	Seconds/Hours/Days/Weeks/Months/Years
Speed of Onset	Seconds/Hours/Days/Weeks/Months/Years
Location	Depends on the extent/magnitude of each specific geologic hazard characteristic but can county-wide across all jurisdictions (incorporated and/or unincorporated) for Expansive/Unstable Soils in river valley areas or ubiquitous risk of Environmental Minerals (Radon) across the county. According to the N.D. Public Service Commission (PSC), there are no records of abandoned mine lands in Logan County.

For more information regarding geologic hazard please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

The history of geologic hazard is summarized on the following pages. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

- **Abandoned Mine Lands (AMLs).** There are no AMLs located in Logan County.
- **Earthquake.** There is not a history of earthquakes in Logan County. Figure 4.8.1 illustrates the locations of earthquakes in North Dakota as of 2015.
- **Environmental Minerals (Erionite, Uranium, Arsenic).** There is not a history of environmental minerals (erionite, uranium, arsenic) soils events in Logan County.
- **Environmental Minerals (Radon).** According to the N.D. Dept. of Environmental Quality, between December 19, 2008, and February 25, 2022, there were approximately 45 positive tests for radon in residential homes in Logan County.
- **Expansive/Unstable Soils.** Four frost heaves on N.D. Highway 46 just east of the city of Gackle were reported and documented by the N.D. Dept. of Transportation on March 1, 2017. See Figures 4.8.2 and 4.8.3.
- **Landslides.** According to the N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP, North Dakota has only had one disaster declaration due to a geologic hazard: DR-1279 was declared for severe storms, tornadoes, snow and ice, flooding, ground saturation, and landslides/mudslides. The event occurred from March 1, 1999, to July 19, 1999, and impacted 42 counties and four reservations. Over \$100 million in disaster assistance was provided. Logan County was included in this disaster declaration. Figure 4.8.2 illustrates areas of the state of North Dakota mapped by the N.D. Geological Survey to show landslide susceptibility.
- **Meteorite Falls.** There is not a history of meteorite falls in Logan County.
- **Volcanic Hazards.** There is not a history of volcanic hazards in Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. The 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP) classifies each type of geologic hazard's probability below.

Common Occurrence	Abandoned Mine Lands (AMLs), Expansive/Unstable Soils, Environmental Minerals (Radon) and Landslides
Limited Occurrence	Environmental Minerals (Erionite, Uranium, Arsenic), Earthquake
Remote Occurrence	Meteorite Falls and Volcanic Hazards

Note: Due to their classification as remote occurrences, detailed information on meteorite falls and volcanic hazards is not available.

The Steering Committee identified the state's definitions for probability of geologic hazard as applicable to Logan County. The following probability for geologic hazard in Logan County is as follows:

- **Abandoned Mine Lands (AMLs).** According to the N.D. Public Service Commission (PSC), there are no Abandoned Mine Lands in Logan County. The probability of this type of geologic hazard is zero.
- **Earthquake.** The likelihood of earthquake occurrence in North Dakota is low. However, small magnitude earthquakes, commonly in the range of magnitude 3, which are not felt at the surface, have occurred in the state at the rate of approximately one event per decade (N.D. Geologic Survey). The locations of these earthquakes vary but has never occurred in Logan County. The probability of earthquake in Logan County is low.
- **Environmental Minerals (Erionite, Uranium, Arsenic).** This type of geologic hazard is localized to its area of geologic origination. They are not expansive or extensive and not found in Logan County at high concentrations based on available information. Gravel mining in western North Dakota excavated deposits of these minerals to be used in surfacing of roads, parking lots and other infrastructure surfaces throughout the state. The probability of an exposure incident is unknown in Logan County. Therefore, the probability of this geologic hazard would be low to unknown in Logan County.
- **Environmental Minerals (Radon).** All of North Dakota is in EPA Radon Zone 1. Therefore, all counties in the state are vulnerable to this hazard and all homes have a high potential to test for elevated levels of radon. **According to the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), there is greater than a 90 percent chance of this type of geologic hazard occurring each year anywhere in the state. Based on radon testing statistics provided by the N.D. Dept. of Environmental Quality, Logan County experiences approximately three-to-four positive tests annually.**
- **Expansive/Unstable Soils.** This type of geologic hazard can be found across North Dakota and is exacerbated by drought and periods of high precipitation. Therefore, the probability of expansive/unstable soils can be tied to the severity of other natural hazards that can occur at any time throughout the year. The probability of frost heaves is likely on N.D. Highway 46 east of the city of Gackle in the future if mitigation measures are not implemented.
- **Landslides.** Landslide events are indicative of moisture conditions as they occur more frequent during wet years and are even more probably if the wet years were preceded by dry years. According to the N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), the probability of future occurrences of landslides is low in Logan County as no areas of high susceptibility are identified.

- **Meteorite Falls.** This type of geologic hazard is classified as a remote occurrence and, therefore, the probability is very low.
- **Volcanic Hazards.** This type of geologic hazard is classified as a remote occurrence and, therefore, the probability is very low.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount of damage or losses either caused or could occur in a community. Jurisdictions with the highest number of abandoned mine lands, hydrologic corridors, locations with expansive/unstable soils or other geologically active areas are at the greatest risk to impacts from occurrences of geologic hazards.

- **Abandoned Mine Lands (AMLs).** The extent/magnitude of the collapse of an AML is specific to the location and size of the AML. Therefore, the extent/magnitude can range from no damage at the surface and small in geographic expanse to extensive damage if impacting structures or infrastructure.
- **Earthquake.** A HAZUS Analysis was completed in the N.D. 2018 Enhanced Mitigation Mission Area Operations Plan (MAOP) to estimate losses from a magnitude 5 earthquake. The total economic losses to Logan County are estimated to be between \$250,000 to \$500,000 from this type of event.
- **Environmental Minerals (Erionite, Uranium, Arsenic).** This type of geologic hazard is localized to its area of geologic origination. They are not expansive or extensive and not found in Logan County at high concentrations based on available information. Therefore, the extent/magnitude of this geologic hazard would be low or unknown in Logan County.
- **Environmental Minerals (Radon).** Based on information provided by the N.D. Dept. of Environmental Quality, prolonged exposure to radon can cause lung cancer. Based on a U.S. Environmental Protection Agency (EPA) assessment of risk for radon in homes, radon in indoor air is estimated to cause about 21,000 lung cancer deaths each year in the United States. Radon-induced lung cancer typically develops 5-25 years after exposure. There is no evidence that other respiratory diseases, such as asthma, are caused by radon exposure.
- **Expansive/Unstable Soils.** The extent/magnitude of expansive/unstable soils event could render a structure or infrastructure uninhabitable or unusable. Damage from this type of geologic event could also result in either short-term or prolonged loss of service of transportation or energy infrastructure. The four frost heaves on N.D. Highway 46 east of the city of Gackle in neighboring Logan County on March 1, 2017. Therefore, the extent/magnitude of expansive/unstable soils impacts state highways and could result in the loss of transportation accessibility in Logan County.
- **Landslides.** The extent/magnitude of a landslide event could render a structure uninhabitable or unusable. Damage from this type of geologic event could also result in either short-term or prolonged loss of service of transportation, communication, or energy infrastructure.

- **Meteorite Falls.** The extent/magnitude of a meteorite fall is unknown as it has never occurred in Logan County.
- **Volcanic Hazards.** There are no volcanoes in Logan County.

Risk Assessment

Table 4.8.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for geologic hazard. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.8.2 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

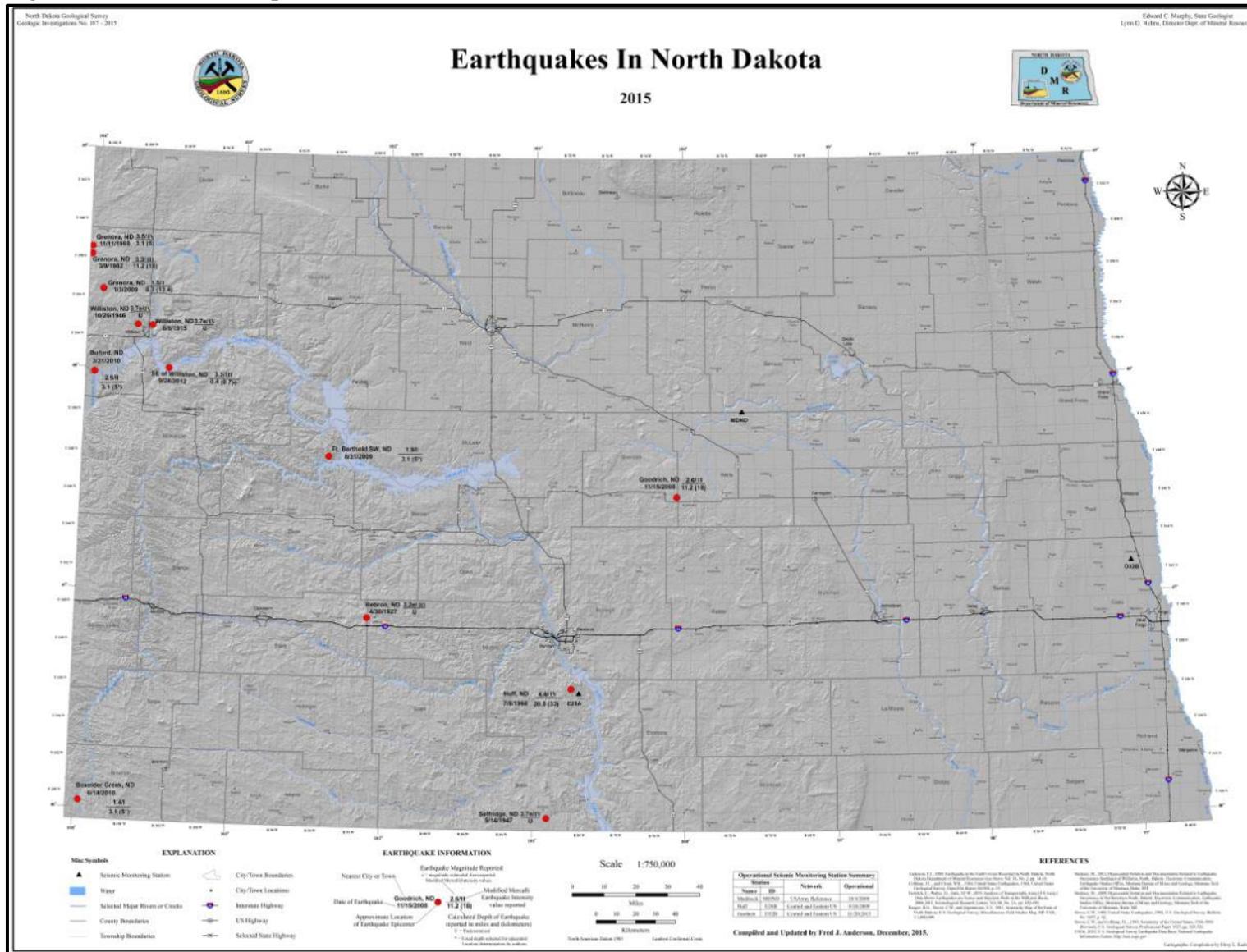
Table 4.8.2 – Logan County, North Dakota Geologic Hazard Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	1	1	2	1	2	3
City of Carrington	1	1	2	1	2	3
City of Glenfield	1	1	2	1	2	3
City of Grace City	1	1	2	1	2	3
City of McHenry	1	1	2	1	2	3

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

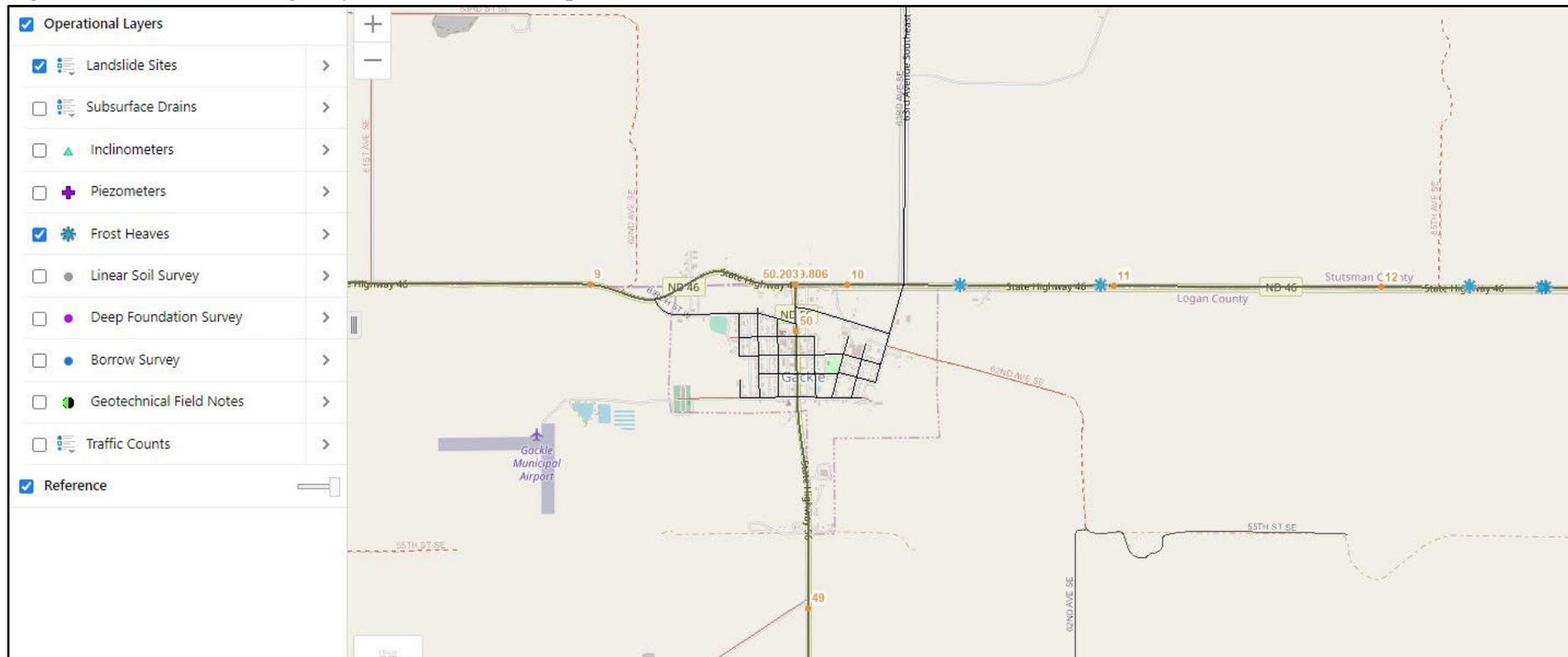
Tables 4.8.3 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of geologic hazard in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Figure 4.8.1 – 2015 Earthquakes in North Dakota



Source(s): 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP); N.D. Geological Survey

Figure 4.8.2 – 2017 N.D. Highway 46 Frost Heaves Map



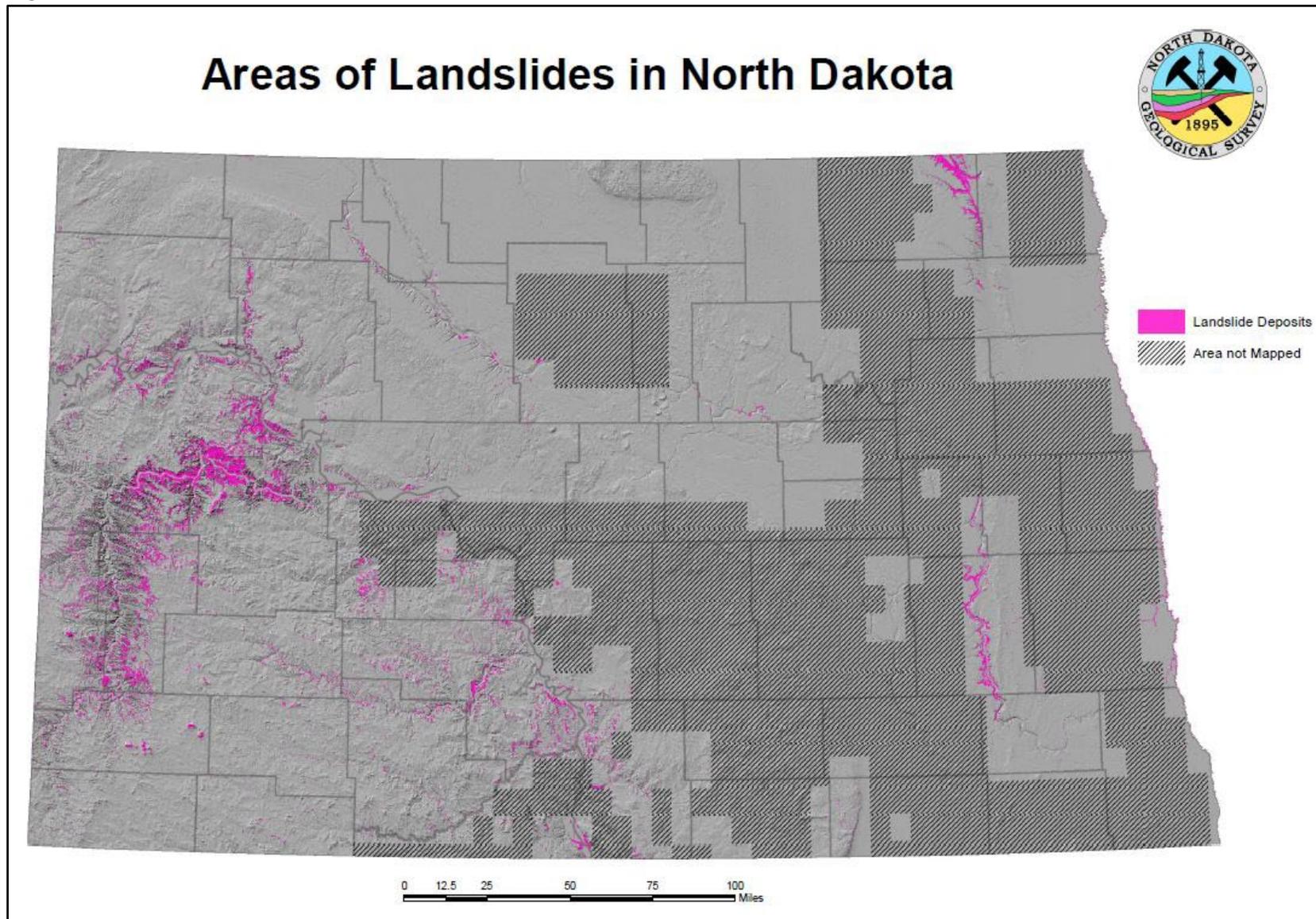
Source(s): N.D. Dept. of Transportation; N.D. GIS

Figure 4.8.3 – 2017 N.D. Highway 46 Frost Heave East of the City of Gackle



N.D. Dept. of Transportation

Figure 4.8.4 – 2021 Landslides in North Dakota



Source(s): N.D. Geological Survey

Table 4.8.3 – Logan County, North Dakota Geologic Hazard Risk Assessment

Impact	<ul style="list-style-type: none"> Blocked Roads & Delayed Emergency Response Business & Government Interruptions Infrastructure Degradation Loss of Power/Electricity Outage Soil Degradation/Erosion 	<ul style="list-style-type: none"> Short-term or prolonged loss of service of transportation, communication, or energy infrastructure. Structures could become uninhabitable or unusable.
Frequency	<ul style="list-style-type: none"> DR-1279 from March 1, 1999, to July 19, 1999, and impacted 42 counties and four reservations. Over \$100 million in disaster assistance was provided. Logan County was included in this disaster declaration. 	<ul style="list-style-type: none"> According to the N.D. Dept. of Environmental Quality, between December 19, 2008, and February 25, 2022, there were approximately 45 positive tests for radon in residential homes in Logan County. Four frost heaves on N.D. Highway 46 just east of the city of Gackle were reported and documented by the N.D. Dept. of Transportation on March 1, 2017. N.D. Highway 46 is on the county line with neighboring Stutsman County.
Likelihood	<p><u>More likely</u></p> <ul style="list-style-type: none"> All North Dakota counties are in EPA Radon Zone 1 Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less likely</u></p> <ul style="list-style-type: none"> Abandoned mine reclamation projects by the N.D. Public Service Commission No AMLs in Logan County
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> All North Dakota counties are in EPA Radon Zone 1 Drought and periods of heavy precipitation exacerbate expansive/unstable soils Logan County not mapped for landslide susceptibility by the N.D. Geological Survey 	<p><u>Less vulnerable</u></p> <ul style="list-style-type: none"> Building codes and zoning Landslide mapping by N.D. Geological Survey Abandoned mine reclamation projects by the N.D. Public Service Commission No AMLs in Logan County
Capability	<ul style="list-style-type: none"> The federal reclamation fee on coal that has been mined in the United States since the 1970s funds the N.D. Public Service Commission abandoned mine reclamation projects. The landslide mapping done by the N.D. Geological Survey identifies the location and extent/magnitude of existing landslides and provides context to direct future development. 	

Vulnerabilities to Publicly-Owned Buildings and Property

According to the 2018 N.D. Enhanced Mitigation (MAOP), the following vulnerabilities exist to publicly-owned buildings and property from the following geologic hazards:

- **Abandoned Mine Lands (AMLs).** According to the PSC, no known publicly owned buildings or infrastructure are believed to be affected.
- **Environmental Minerals (Erionite, Uranium, Arsenic).** This type of geologic hazard is localized to its area of geologic origination. They are not expansive or extensive and not found in Logan County at high concentrations based on available information. Therefore, publicly-owned buildings and property in Logan County are not vulnerable.
- **Environmental Minerals (Radon).** Radon poses a risk to all publicly-owned buildings and infrastructure as all North Dakota counties are in the EPA Zone I. Radon could cause economic impacts or impacts to the functioning of government services through prolonged exposure to employees that may develop lung cancer.
- **Expansive/Unstable Soils.** Most structures remain unaffected by known impacts from expansive/unstable soils. However, if damage were to occur, the continuity of publicly-owned buildings and property could be disrupted.
- **Landslides.** Most structures remain unaffected by known impacts from landslides. However, if damage were to occur, the continuity of publicly owned buildings and property could be disrupted.
- **Meteorite Falls.** No known vulnerability to publicly-owned buildings and property.
- **Volcanic Hazards.** No known vulnerability to publicly-owned buildings and property.

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, critical facilities and infrastructure could be impacted by geologic hazards. The primary threats to critical facilities and infrastructure from geologic hazards are to county, city and township road systems, and transportation, communication, and energy infrastructure. Electrical grid facilities and transportation infrastructure are the most likely to be impacted if a geologic hazard event occurred. The delivery of goods and services could be disrupted if damage occurred to transportation infrastructure. Medical care facilities and emergency response capabilities would be impacted by power outages (whether prolonged or brief) occurring from geologic hazards. A summary of publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

- **Abandoned Mine Lands (AMLs).** According to the PSC, No known publicly owned buildings or infrastructure are believed to be affected.
- **Environmental Minerals (Erionite, Uranium, Arsenic).** Critical facilities and infrastructure are not at risk to Environmental Minerals.

- **Environmental Minerals (Radon).** Radon poses a risk to all publicly-owned buildings and infrastructure as all North Dakota counties are in the EPA Zone I. Radon could cause economic impacts or impacts to the functioning of government services through prolonged exposure to employees that may develop lung cancer.
- **Expansive/Unstable Soils.** Most critical facilities remain unaffected by known impacts from expansive/unstable soils. However, if damage were to occur, the services provided by the impacted critical facility or infrastructure could be disrupted resulting in either temporary or prolonged shortages or outages. N.D. Highway 46 is anticipated to be vulnerable to frost heaves east of the city of Gackle in neighboring Logan County.
- **Landslides.** Most critical facilities remain unaffected by known impacts from landslides. However, if damage were to occur, the services provided by the impacted critical facility or infrastructure could be disrupted resulting in either temporary or prolonged shortages or outages.
- **Meteorite Falls.** No known vulnerability to critical facilities and infrastructure.
- **Volcanic Hazards.** No known vulnerability to critical facilities and infrastructure.

Vulnerabilities to New and Future Development

New development would largely avoid physical impact from geologic hazards and are not vulnerable if located away from AMLs or area susceptible to expansive/unstable soils or landslides. However, incorporated jurisdictions lacking zoning and building codes and/or enforcement can be more vulnerable to geologic hazards as this oversight in development is lacking.

- **Abandoned Mine Lands (AMLs).** No vulnerability to new and future development in Logan County.
- **Environmental Minerals (erionite, uranium, arsenic).** No vulnerability to new and future development in Logan County.
- **Environmental Minerals (radon).** New and future development will be vulnerable to Radon as all counties in North Dakota are in the EPA Zone I.
- **Expansive/Unstable Soils.** New and future development should be directed to areas not prone or susceptible to expansive/unstable soils ensure vulnerabilities are reduced and/or eliminated.
- **Landslides.** New and future development should be directed to areas not prone or susceptible to landslides to ensure vulnerabilities are reduced and/or eliminated.
- **Meteorite Falls.** No known vulnerability to publicly-owned buildings and property.
- **Volcanic Hazards.** No known vulnerability to publicly-owned buildings and property.

Data Limitations and Other Key Documents

The N.D. Geological Survey's landslide mapping identifies areas that have failed, which can be suggestive of an increased likelihood of future events. However, the landslide mapping completed-to-date is not predictive.

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Logan County Commercial Animal Feed Operation Ordinance
- Logan County Comprehensive Plan (1996)
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Geologic Hazard Annex
- North Dakota Geological Survey 1:24,000 Landslide Area Map Series
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.9 Hazardous Material Release

Characteristics

Hazardous materials are any substance in any quantity or form that may pose an unreasonable risk to the safety, health, environment, and property of citizens. The term “hazardous material” covers a wide array of products, from relatively innocuous ones such as hair spray in aerosol dispensers and wash preservatives such as creosote to highly toxic or poisonous material such as polychlorinated biphenyl (PCB’s) and phosgene gas. The potential severity of hazards of these materials is varied but the primary reason for their designation is their risk to public safety. The Federal Motor Carrier Safety Administration has nine categories of hazardous materials that are:

- Explosives (Class 1)
- Gases (Class 2)
- Flammable and combustible liquids (Class 3)
- Flammable solids, spontaneously combustible, and dangerous when wet (Class 4)
- Oxidizing substances and organic peroxides (Class 5)
- Toxic/poisonous substances poison inhalation (Class 6)
- Radioactive materials (Class 7)
- Corrosive substances (Class 8)
- Miscellaneous hazardous materials/products, substances, or organisms (Class 9)

Hazardous material incidents can be categorized into two distinct groups – incidents of a transportation nature and those that occur at a stationary or fixed facility (Tier II).

Seasonal Pattern	None. Anhydrous Ammonia is more likely in the spring.
Duration	Minutes/hours/days/weeks
Speed of Onset	No warning
Location	Along major transportation routes. Tier II and agricultural and/or industrial storage sites, and roads: N.D. Highways 3, 13, 30, 34, 46, and 56; and local/township roads. No Level 1 railroad infrastructure in Logan County. Summit Carbon Solutions pipeline opening October 1, 2024, traversing the extreme southwest 1.8 miles of Logan County.

For more information regarding hazardous material release please reference **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

Information on the history of hazardous material release in Logan County was provided by the N.D. Dept. of Health and Logan County Emergency Management. Table 4.9.2 summarizes the history of hazardous material release in Logan County from the N.D. Dept. of Health. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

N.D. Dept. of Health

- Per table 4.9.1, a total of 12 releases/spills were reported in Logan County from 1975 to 2020. Of the 12 incidents, six reported the volume and units of the contaminant released, equating to 2,043.00 gallons of diesel, used motor oil, and anhydrous ammonia.

Table 4.9.1 – 1975 to 2020 Logan County, North Dakota Hazardous Material Release History

Incident ID	Date Reported	Date of Incident	County	TwtnRngSec	Latitude	Longitude	Contaminant	Volume	Units	Contained
EIR9432	3/10/2020	6/1/1996	Logan	13306933	46.28421	-99.35455	Diesel	200	gallons	Yes
EIR5872	10/4/2018	10/3/2018	Logan	13507217	46.50331	-99.76604	Diesel			No
EIR5686	4/20/2018	3/30/2018	Logan	13306715	46.32685	-99.09523	Arsenic			Yes
EIR5687	4/20/2018	3/30/2018	Logan	13306715	46.32684	-99.0955	Arsenic			Yes
EIR5688	4/20/2018	3/30/2018	Logan	13306715	46.32679	-99.09482	Arsenic			Yes
EIR5689	4/20/2018	3/30/2018	Logan	13306715	46.32679	-99.09485	1,2 Dichloroethane			Yes
EIR5690	4/20/2018	3/30/2018	Logan	13306722	46.3265	-99.0921	Arsenic			Yes
EIR4039	3/14/2016	3/14/2016	Logan	13507217	46.50391	-99.76841	USED OIL	10	gallons	Yes
EIR3649	2/10/2015	2/11/2015	Logan	13507217	46.50615	-99.76617	Used Motor Oil	20	gallons	No
EIR3338	6/5/2014	6/4/2014	Logan	13506928	46.47492	-99.3689	Diesel Fuel	3	gallons	Yes
EIR1269	7/15/2010	7/15/2010	Logan	13407221	46.40704	-99.73792	2.23 gals of Section 2EC, 2.5 gals of Super B (crop oil), .8 gals of Interlock, 355 gals water	360	gallons	
EIR999	4/30/2008	4/30/2008	Logan	13607306	46.62528	-99.90505	anhydrous ammonia	1,450.00	gallons	
TOTAL								2,043.00	gallons	

Source(s): N.D. Dept. of Health

Logan County Emergency Management

- May 8, 2018.** At 2:13 p.m., the Logan County Sheriff's Office received a call from Gackle-Streeter Public School about a bottle of magnesium powder breaking in the science classroom. After speaking with the emergency manager and referencing the ERG, it was decided to evacuate the school. Evacuations began around 2:20 p.m. The Jamestown Fire Department and Fargo Fire Department/HAZMAT Operations Team responded to the incident.

At 5:03 p.m., Fargo Fire Dept/HAZMAT Operations Team suited up and entered the building to begin recovery of the substance. The Jamestown Fire Department also suited up in case of a fire or explosion, and the Gackle Fire Department was on standby with water for fire suppression and decontamination, if necessary.

At 5:35 p.m., the substance was recovered and placed into a silver paint can and sealed. The substance was left at the southeast entrance to the school on the exterior.

- **September 21, 2018.** A plane crashed into a field after striking a power line in rural Logan County 10 miles southwest of the city of Napoleon. A crop sprayer flown by an employee of Mattern Spray Service crashed when the right wing struck the top of a power pole. The plane lost control and crashed into a field on a nearby farmstead. The wreckage was scattered throughout a quarter-mile area. If the plane traversed another 20 feet in its path of destruction it would have entered a slough and the pilot could have drowned. Conversely, if the plane did not veer in the direction it did, it could have struck a house. The National Transportation Safety Board (NTSB) released the wreckage to the owner and cleared KEM Electric to begin power line repair. The N.D. Dept. of Health is investigating the crash as it resulted in the release of jet fuel into the environment. The pilot was air-lifted to Sanford Medical Center in Bismarck and survived the crash. **The crash had the potential to release hazardous materials into the environment.**
- **June 29, 2018.** A resident of the city of Napoleon reported a chemical spill on their property coming from Dakota Frontier Cooperative mid-June 2018. The resident stated they were experienced respiratory problems and could see puddles of chemicals on the ground, in addition to trees dying on their property. A call was made by the Logan County Emergency Manager to the N.D. Dept. of Health to report the problem. The Napoleon Police Department's Chief of Police, the Napoleon Fire Department's Fire Chief and the NDSU/Logan County Extension Agent all visited the site. The following information was given to Logan County Emergency Management during a conference call with the N.D. Dept. of Health on June 29, 2018.

The N.D. Dept. of Health said there are three different incidents currently going on, which are summarized below. One point to note specifically, there is no indication any of these incidents are directly connected.

Incident 1: Napoleon Oil – Hydrocarbon contamination from either gas or diesel in the drinking water system in their tap at the facility. It is suspected it is getting into the service line coming from the city system. Testing on city system indicates there is no contamination, for now. It is an isolated incident at Napoleon Oil. Soil borings will be done to determine extent of contamination. N.D. Dept. of Health gave Napoleon Oil 30 days to supply a plan for cleanup, and 60 days to complete the plan.

Incident 2: Dakota Frontier Cooperative – samples have been taken there and at Janet's house. Well samples from her residence did not detect hydrocarbon contamination, but still waiting on fertilizer/pesticide results. They also did testing in storm water puddles on the DFC property and detected high levels of pesticides/fertilizer. Their drinking water line was also tested but results showed levels below anything of concern and the drinking water is safe. The investigation is still ongoing. Spills from this facility in the past have been reported and not reported. Investigation is ongoing at this site.

Incident 3: A couple residences to the north and west of DFC. One resident complained about issues with hydrocarbon/fuel smells. Readings were high on city manholes – the city is working with them on this. A second residence still needs to be accessed to determine the source of the smells.

There has been no determination on a remediation system plan or cleanup strategy for these issues. The investigation is both horizontal and vertical and needs to be complete, beginning with Napoleon Oil. The N.D. Dept. of Health has been to the sites nine times with staff to do testing since the initial report in mid-June, 2018. More testing will be done the week of July 2, 2018, to gather remaining samples, and then another two weeks to get final results.

National Pipeline Mapping System

- The National Pipeline Mapping System website provides mapping services to illustrate where pipeline infrastructure geographically traverses political subdivisions. The website shows there are no pipelines traversing Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. Per Table 4.9.1, the probability of a hazardous material release is one incident every three and-a-half to four years based on 12 occurrences from 1975 and 2020. Meeting participants also indicated the probability of a hazardous material release likely, meaning that there is between a 10 and 100 percent probability in the next year of an occurrence. The following are key points regarding hazardous material release probability in Logan County:

- **Airports.** Hazardous materials are not transported via plane to and from Logan County using the Napoleon Municipal Airport. However, crop sprayers use the Napoleon Municipal Airport for commercial applications. There is one reported incidents of a plane crash carrying hazardous materials in Logan County.
- **Fixed Facilities (Tier II and Extremely Hazardous Substance).**

Tier II. Tier II refers to facilities covered by the Emergency Planning and Community Right-to-Know Act (EPCRA). These facilities are required to maintain a material safety data sheet and submit an inventory of chemicals used to their Local Emergency Plan Update Committee (LEPC), the state emergency response commission and local fire departments each year. **According to the N.D. Dept. of Emergency Services, HAZ Connect, Logan County has 17 Tier II facilities.**

Anhydrous Ammonia operations have closed in Logan County in the last five years due to new federal requirements and the business no longer being cost-effective. However, there are two anhydrous bulk plants in the city of Napoleon as of 2022.

Pipelines. According to the 2018 N.D. Enhanced Mitigation MAOP, there are no miles of gas transmission or hazardous liquid pipelines traversing Logan County. **However, with the opening of the Summit Carbon Solutions pipeline, the probability of a hazardous material release involving a pipeline will go from unlikely to possible.**

Figures 4.9.1 and 4.9.2, and 4.9.3 illustrate the locations of crude oil pipelines and natural gas pipelines in the state of North Dakota.

- **Rail.** Dakota, Missouri Valley & Western operates railroad infrastructure through Logan County. The railroad is Level II and therefore transports grain, not hazardous materials.
- **Road.** It is unknown if the reported incidents in Table 4.9.1 were the result of a transportation accident or a leak from a storage site. The N.D. Dept. of Health provided the data but did not specify the cause of each release. However, according to Logan County Emergency Management and meeting participants, releases/spills do occur from road transportation incidents. Large quantities of hazardous materials are transported via N.D. Highway 3.

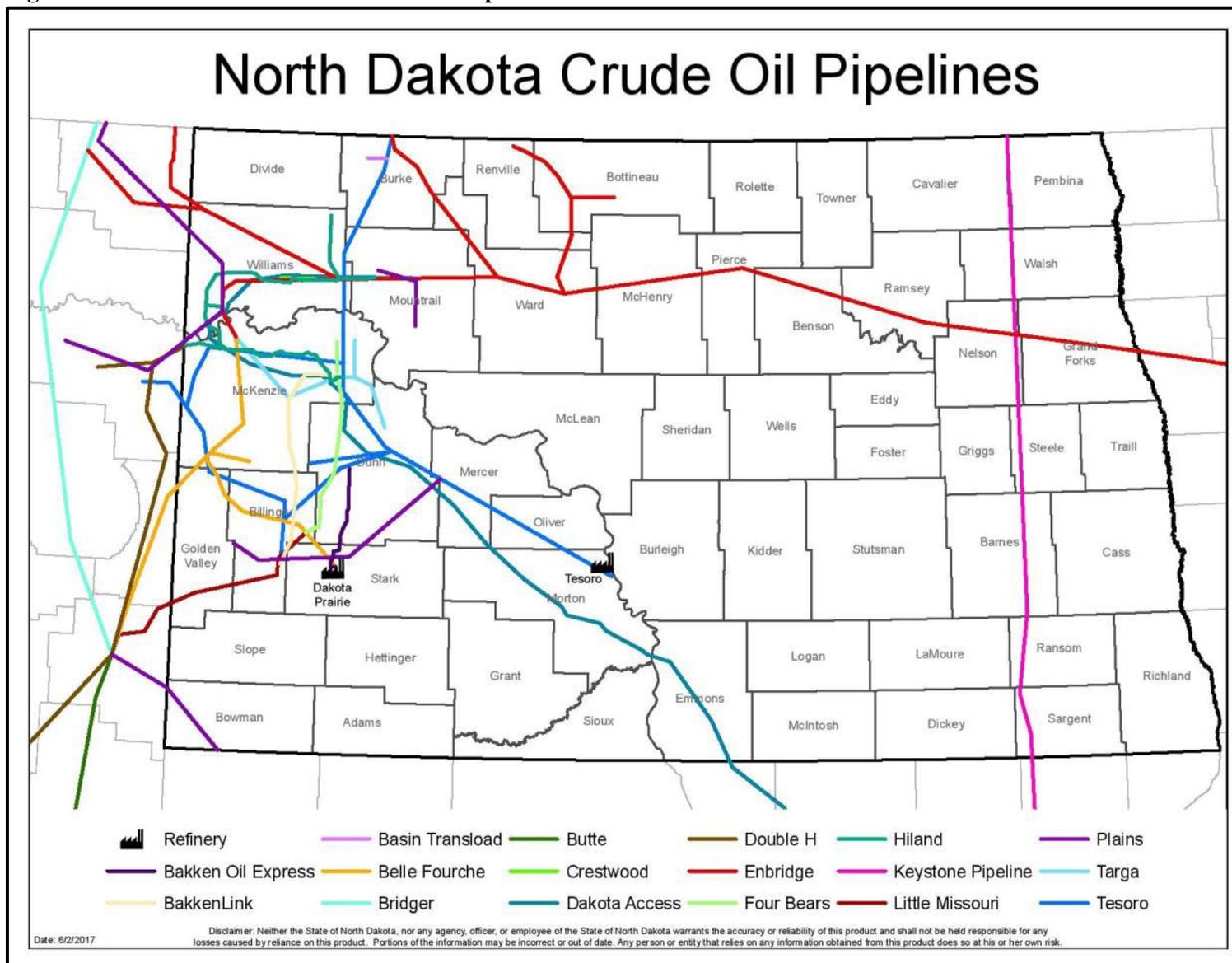
Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. The extent/magnitude of a hazardous material release can vary from minimal in localized incidents to catastrophic in situations of explosions or high wind. Releases when high winds are present may carry chemicals and material great distances and impact many people.

- Per Table 4.9.1, the largest reported spill/release was 1,450.00 pounds of anhydrous ammonia on April 30, 2008, followed by 360 gallons of a mixture of Section 2EC, crop oil, interlock, and water on July 15, 2010. Planning for the extent/magnitude of hazardous material releases is difficult to determine as reporting history lacks the cause for the leak/spill in most cases. However, any type of release/spill in rural areas of the county could pose a challenge to smaller emergency services.
- **The extent/magnitude of hazardous material release from railroad is zero as the county has a Level II railroad. However, with the opening of the Summit Carbon Solutions pipeline on October 1, 2024, the extent/magnitude of a release involving a pipeline can be catastrophic. The pipeline will operate at a capacity of up to 12MM TPA (tons per year) or four billion GPY (gallons per year) at less than 10 cubic feet per second. Figure 4.9.3 on the following pages illustrates the location of the pipeline in Logan County.**
- **Crop sprayers utilizing airplanes for application, and private airplane owners, can result in local releases into the environment.**

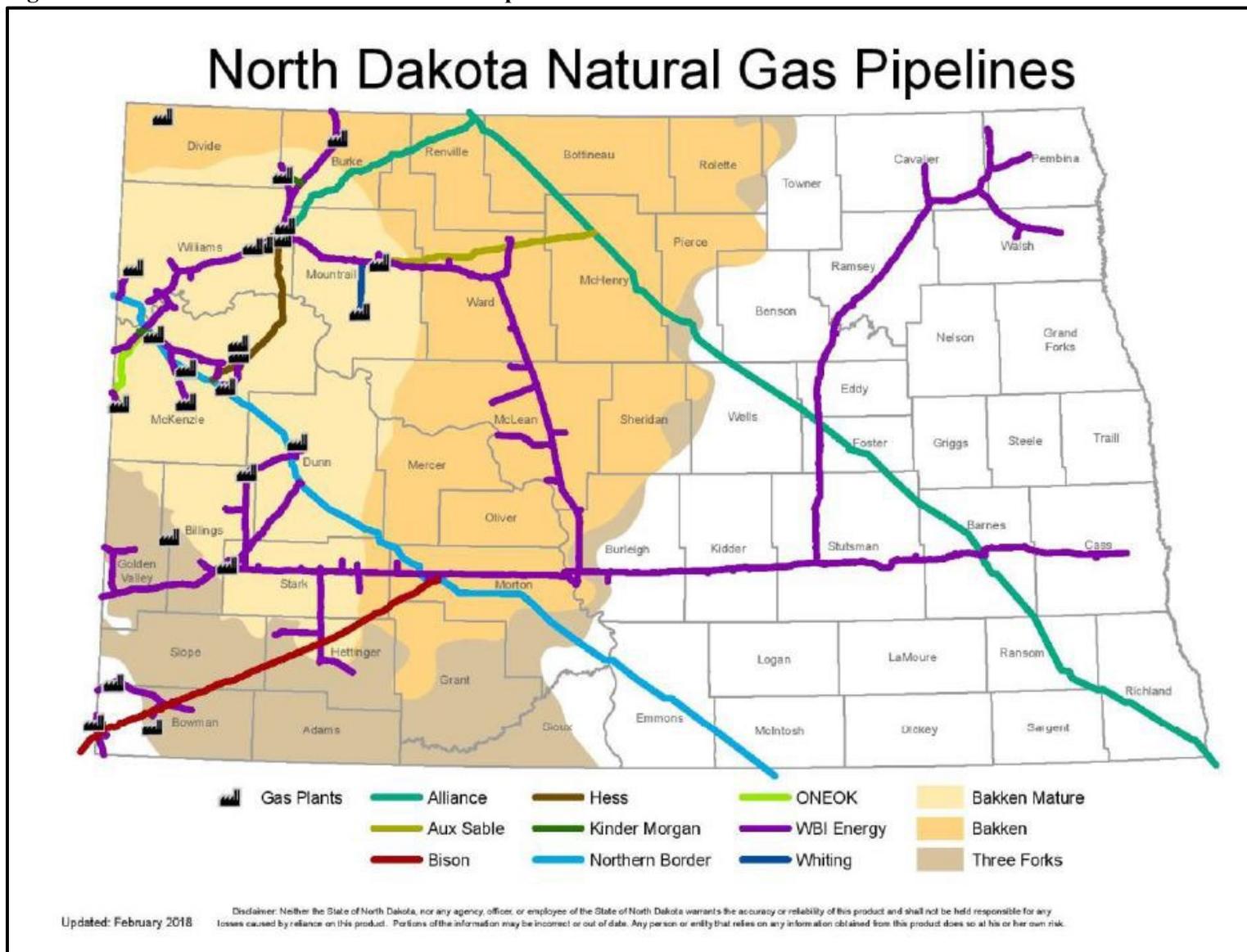
Profile meeting participants indicated the extent/magnitude or impact of a hazardous material release as catastrophic meaning more than 50 percent of the county, its people and property could be affected.

Figure 4.9.1 – 2018 North Dakota Crude Oil Pipelines



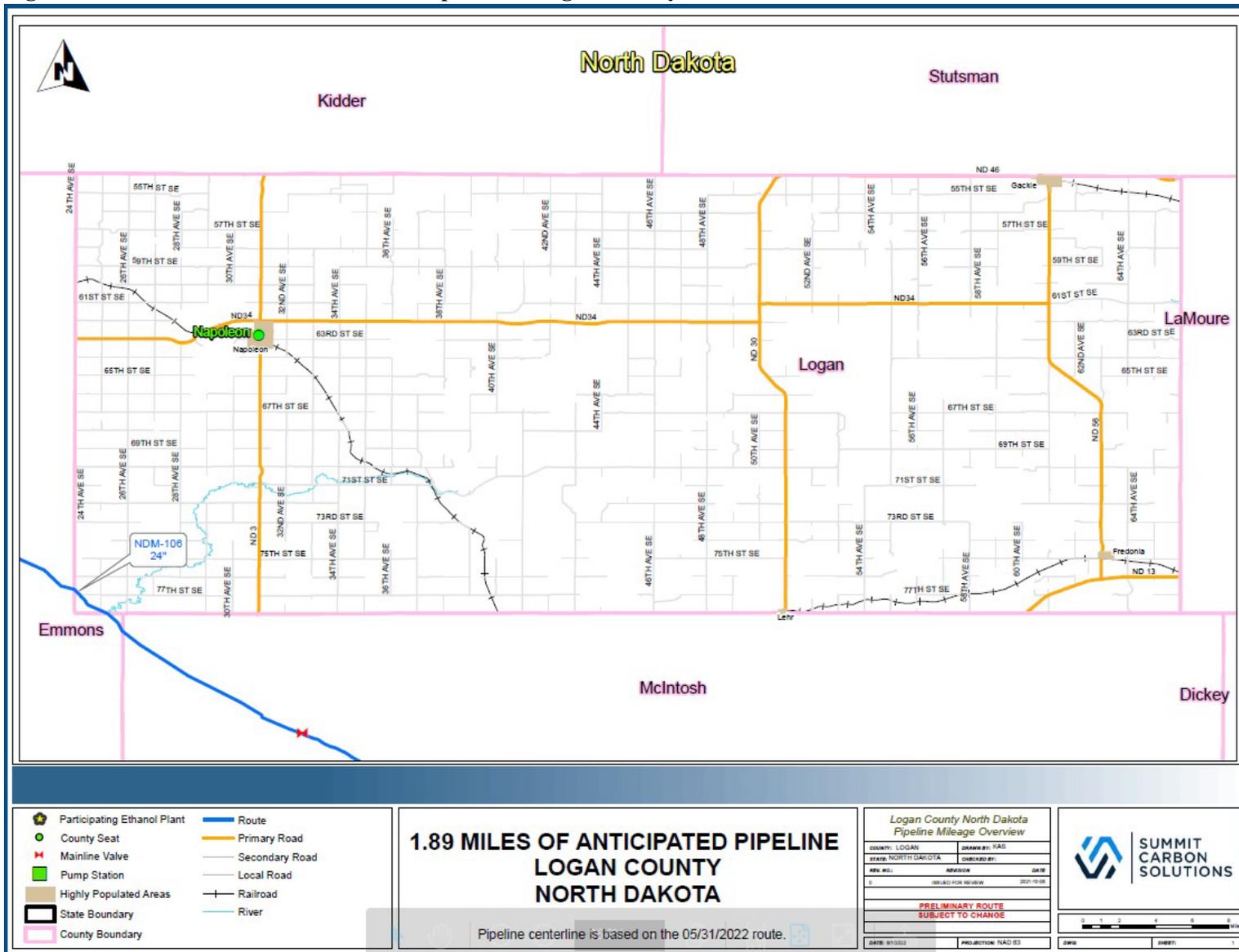
Source(s): 2018 N.D. Enhanced Mitigation MAOP

Figure 4.9.2 – 2018 North Dakota Natural Gas Pipelines



Source(s): 2018 N.D. Enhanced Mitigation MAOP

Figure 4.9.3 – Summit Carbon Solutions Pipeline in Logan County, North Dakota



Source(s): Summit Carbon Solutions

Risk Assessment

Table 4.9.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for hazardous material release. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.9.2 represents the sum of each jurisdiction’s impact, frequency, likelihood and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.9.2 – Logan County, North Dakota Hazardous Material Release Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	2	3	3	2	10
City of Fredonia	4	2	2	2	1	9
City of Gackle	4	2	2	2	1	9
City of Lehr	4	2	2	2	1	9
City of Napoleon	4	2	3	3	2	10

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.9.3 provides information on the specific impact, frequency, likelihood, vulnerability and capability of hazardous material release in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Vulnerabilities to Publicly-Owned Buildings and Property

All publicly-owned buildings and property are at risk to hazardous material release as this type of hazard/threat can occur anywhere at any given time for a multitude of reasons. Buildings and property located near or adjacent to transportation modes, such as highways, railroads or airports are more at risk as the hazard/threat typically occurs during transportation of hazardous materials. In the city of Napoleon, the Logan County Courthouse, Napoleon City Hall, churches servicing at storm shelters, emergency services buildings and public schools are vulnerable to a hazardous material release due to proximity to N.D. Highways 3 and 34.

If facilities are located near fixed hazardous material sites (Tier II), such as propane or anhydrous ammonia tanks, the risk is increased as the source for the hazard/threat will always be present. If an explosion were to occur, buildings and properties located nearby could experience moderate to severe damage and contamination, depending on the intensity and duration of the release.

A summary of publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Like publicly-owned buildings and property, the vulnerability of the hazard to critical facilities and infrastructure depends largely on location. Critical facilities and infrastructure located near transportation arteries or hazardous material storage sites are most at risk. Depending on the facility or infrastructure, impact could range from moderate to severe. Water infrastructure could become contaminated and

threaten public health. Critical facilities such as the Logan County Courthouse could be shut down temporarily or indefinitely. If a release were to occur on a major roadway, emergency services would be limited and response times could be increased.

In addition, the fire hall for smaller incorporated jurisdictions is typically located near the railroad or highway and is vulnerable to hazardous material release.

Vulnerabilities to New and Future Development

The vulnerability of new and future development depends largely on the type and density being proposed and where development is allowed. Residential development should be developed in areas away from hazardous material storage sites or major transportation arteries where chemicals are transported. If new development is already in progress, a development moratorium should be implemented to stop future growth or densities should be limited to reduce the number of people at risk.

New development located near or adjacent to the Summit Carbon Solutions pipeline in the extreme southwest corner of Logan County will be vulnerable to hazardous material releases from pipelines. The county should update zoning ordinances to implement setbacks for new development from this infrastructure.

Development in the industrial and agricultural sectors maintain demand for hazardous materials and are best situated near storage sites or transportation arteries to limit time spent in transit. Ultimately, hazardous materials should be prohibited from locating in residential or commercial areas, near hospitals, schools, or community gathering spaces. If already existing, plans should be put into place for relocation at a future time when funding permits or an appropriate alternative site becomes available. **This type of development should also be prohibited from being developed or located within 1,000 feet of a public school or facility with vulnerable populations such as daycares and care centers.**

Data Limitations

The difficulty in understanding a hazardous material release is the lack of complete data reported on past releases. If any of the following information – location, time of day, wind speed/direction, temperature, humidity, method of release (transportation or facility failure), the amount of release and what material(s) are involved – is not reported, the ability to understand the true impact of the hazard/threat and develop mitigation strategies is limited. With numerous sources for potential release, whether from the agriculture sector, oil and gas sector, commercial and residential entities, or a combination from another hazard/threat such as a transportation incident, understanding how releases occur and identifying ways to mitigate this hazard proves impractical. Developing an inventory of hazardous materials from agriculture operations on the location and type of hazardous material being used, and what mode is being utilized for transportation, would assist in understanding the hazard.

Table 4.9.3 – Logan County, North Dakota Hazardous Material Release Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Business Interruptions/Loss of Economy • Explosion • Environmental Degradation • Fuel Outage/Shortage • Human/Injury Death • Increased Public Safety Runs 	<ul style="list-style-type: none"> • Loss of Critical Facilities and Infrastructure • Loss/Overcrowded Medical Facilities • Loss of Transportation Systems/Accessibility - Blocking of roads when emergency services respond to incidents • Leaking fuel tanks contaminate local waterways and potable water supplies (individual wells) • School Closure – Gackle-Streeter Public School in 2018
<p>Frequency</p>	<ul style="list-style-type: none"> • 12 releases/spills were reported in Logan County from 1975 to 2020 resulting in one incident every three and-a-half to four years. 	<ul style="list-style-type: none"> • 1,450.00 gallons of anhydrous ammonia release on April 30, 2008
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Presence of N.D. Highways 3, 13, 30, 34, 46, and 56 • Agriculture economy with heavy use of chemicals • Crop sprayers and private plane operators • Logan County has 17 Tier II Sites • American Legion Hall adjacent to Dakota Frontier Coop • The new Napoleon Care Center is adjacent to the railroad, airport, and agronomy storage facilities • Summit Carbon Solutions Pipeline opening October 1, 2024 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Tier II reporting and regulations (fixed facilities only) • No pipelines traversing Logan County • Level II railroad traversing Logan County • Ordinances regulating development/placement of HAZMAT • Fire departments have HAZMAT training
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Presence of N.D. Highways 3, 13, 30, 34, 46, and 56 • Agriculture economy with heavy use of chemicals • Crop sprayers and private plane operators • Logan County has 17 Tier II Sites • American Legion Hall adjacent to Dakota Frontier Coop • The new Napoleon Care Center is adjacent to the railroad, airport, and agronomy storage facilities • Summit Carbon Solutions Pipeline opening October 1, 2024 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Tier II reporting and regulations (fixed facilities only) • No pipelines traversing Logan County • Level II railroad traversing Logan County • Ordinances regulating development/placement of HAZMAT • Fire departments have HAZMAT training • Winter months sees decrease in agriculture-related chemicals • NDDES HAZConnect
<p>Capability</p>	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address hazardous material release. 	

Other Key Documents

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Logan County Comprehensive Plan (1995)
- Logan County Commercial Animal Feed Operation Ordinance
- Logan County Evacuation Plan through Central Valley Health District (CVHD)
- Logan County Local Emergency Operations Plan
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, HAZMAT Annex
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.10 Infectious Disease

Including animal, human, and plant diseases.

Characteristics

Infectious disease is an illness that is caused by an infectious agent, such as bacteria, virus, fungi or parasites and/or toxic microorganisms and is transmittable from an infected animal, human or plant to another animal, human or plant.

Seasonal Pattern	<p><u>Animal.</u> Depends on the organism and current season.</p> <p><u>Human.</u> Depends on the organism and current season.</p> <p><u>Plant.</u> More susceptible in the summer as they are dormant in the winter, and year-round for plants grown indoors such as greenhouses.</p>
Duration	Hours/Days/Weeks/Months/Years
Speed of Onset	Hours to weeks (12 hours for most diseases)
Location	County-wide across all jurisdictions (incorporated and/or unincorporated)

For more information regarding infectious disease please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

Information on infectious disease was obtained from the U.S. Dept. of Agriculture, Farm Services Agency (FSA); N.D. Dept of Health; U.S. Dept. of Agriculture, Risk Management Agency (RMA); Logan County Public Health; and NDSU Extension/Logan County. The history of infectious disease for animals, humans and plants is summarized for Logan County in the following section. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4.

Animal – Livestock. According to the Farm Services Agency (FSA), losses for livestock can be tracked by analyzing payments made under the Livestock Indemnity Program (LIP). However, the cause of the loss is not recorded. The FSA stated that disease is a likely contributor to losses occurring under LIP. Between 2013 and 2019, the following was paid to cover animal losses in Logan County:

- 2013: \$25,346.00
- 2014: \$5,538.00
- 2015: \$3,857.00
- 2016: \$15,145.00
- 2017: \$7,897.00
- 2018: \$4,392.00
- 2019: \$21,699.00

Animal - Rabies. According to the N.D. Dept. of Health, Logan County has experienced six cases of rabies in animals between 2003 and 2021. Table 4.10.1 illustrates the history of rabies in Logan County.

- Rabies was most prevalent in cows with four cases, followed by dogs 2012 with two cases, and one case involving a skunk.

Table 4.10.1 – 2003 to 2021 Logan County, North Dakota Rabies History

Animal	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL		
Bat																					0	
Cat																						0
Cow	1			1						1	1											4
Dog					1		1															2
Goat																						0
Horse																						0
Pig																						0
Raccoon																						0
Skunk			1																			1
Sheep																						0
TOTAL	1	0	1	1	1	0	1	0	0	1	1	0	7									

Source(s): N.D. Dept. of Health

Human. A history of infectious disease in humans is shown in Tables 4.10.2 and 4.10.3 in Logan County. Table 4.10.2 shows the history of influenza by season, which defined as a primarily between the months of August 1 to July 31 of any given year from 2010 to 2021. Table 4.10.3 shows the history of infectious diseases in Logan County between 2004 and 2021.

- Between 2010 and 2021, Logan County recorded an average of 26 cases of influenza on annually. The 2012/2013 flu season had the highest number of reported cases at 51 followed by the 2019/2020 flu season where 47 cases were reported.

Table 4.10.2 – 2010 to 2021 Logan County, North Dakota Influenza History

Infectious Disease	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Influenza	18	19	51	36	26	18	21	30	19	47	0

Note: Each seasonal total includes cases recorded between August 1 to July 31 of any given year.

Source(s): N.D. Dept. of Health

- Aside from influenza, Logan County recorded 131 infectious disease cases between 2004 and 2021, or an average of eight cases per year.
- Between 2004 and 2021, Logan County recorded 42 cases of Campylobacteriosis, 31 cases of Giardiasis, 17 cases of Chlamydia, 14 cases of Hepatitis C Chronic, and seven cases of Cryptosporidiosis representing 32.1 percent, 23.7 percent, 13.0 percent, 10.7 percent, and 5.3 percent of reported infectious diseases, respectively.
- Logan County averages two cases of Campylobacteriosis and Giardiasis annually.

Table 4.10.3 – 2004 to 2021 Logan County, North Dakota Human Infectious Disease History

Infectious Disease	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total by Disease	Percent by Disease	Average	
Babesiosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0
Brucellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0
Campylobacteriosis	0	3	1	2	0	4	8	1	1	2	0	2	3	4	1	5	4	1	42	32.1%	2	
Chicken Pox (varicella)	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	1	4	3.1%	0	
Chlamydia	0	0	0	0	0	0	0	0	3	5	0	1	1	1	4	1	1	0	17	13.0%	1	
Coccidioidomycosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Cryptosporidiosis	0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	0	2	0	7	5.3%	0	
E.coli, Shiga Toxin-Producing	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	2	0	5	3.8%	0	
Giardiasis	1	0	1	7	0	2	3	2	0	0	3	1	1	3	0	2	3	2	31	23.7%	2	
Gonorrhea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1.5%	0	
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Hepatitis B Acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Hepatitis Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Hepatitis C Acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Hepatitis C Chronic	0	3	1	0	0	1	0	0	1	1	1	0	1	2	2	0	1	0	14	10.7%	1	
HIV/AIDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Lyme Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Malaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Measles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Meningococcal Meningitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Pertussis	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	2.3%	0	
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Rubella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Salmonellosis	0	0	0	1	0	0	0	0	1	0	0	2	0	0	0	0	1	0	5	3.8%	0	
Shigellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Syphilis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	1.5%	0	
Tetanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Trichinellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Tuberculosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Tularemia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
Typhoid Fever (Salmonella Typhi)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	
West Nile Virus	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	3	2.3%	0	
Total by Year	2	6	5	11	0	10	11	5	6	10	6	7	6	12	10	9	15	4	131	100.0%	8	

Source(s): N.D. Dept. of Health

Humans – COVID-19 Pandemic. Between June 1, 2020, and July 29, 2021, a total of 1,981 unique individuals were tested resulting in 639 positive cases and 19 deaths.

Humans – Tuberculosis. Although not as common as in the past, the disease is still prevalent across North Dakota according to the N.D. Dept. of Health.

Plant. Crop loss from infectious disease is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres and indemnity amount. The damage description identifies the cause of damage, determines acres, identifies the number of acres lost due to damage, and the indemnity amount identifies the total amount of the loss for the designated peril. **The indemnity amount was not available prior to 2001. Between January 1, 2001, and December 31, 2020, Logan County experienced 31 incidents of crop loss due to infectious disease impacting approximately 16,712.56 acres of crops totaling \$1,227,051.00 in losses.**

The NDSU Extension/Logan County indicated that crop/plant losses occur annually and vary in severity.

Probability

The probability of a hazard or threat is how likely it is it will happen. Jurisdictions with the highest animal and human populations, and crop exposure are at greatest risk of infectious disease occurrences.

Animal. Based on data from the Livestock Indemnity Program (LIP) and the assumption that all losses are disease-related, the probability of losses resulting from infectious disease in animals is \$11,982.00 in annual losses on average. Meeting participants indicated the probability of infectious disease in animals as likely meaning that there is a 50 percent probability in the next year of an occurrence.

Human. Per the infectious disease history for humans in Logan County, the probability of infectious disease is 100 percent. Meeting participants indicated the probability of infectious disease in humans as highly likely, meaning that there is a 100 percent chance in the next year of an occurrence.

Plant. Per the infectious disease history for plants in Logan County, the probability of infectious disease in any given year is approximately 100 percent. Meeting participants indicated the probability of infectious disease in crops as highly likely, meaning that there is a 100 percent chance in the next year of an occurrence.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount of damage or losses either caused or could occur in a community. Jurisdictions with the highest animal and human populations, and crop exposure are at greatest risk to impacts from infectious disease occurrences.

Animal. With the lack of cause description and total number of animals lost in the data from the FSA, the extent/magnitude of animal loss from infectious disease cannot be determined.

- Meeting participants indicated that with the local rural economy heavily dependent on agriculture, significant animal losses could have a catastrophic impact.
- Figure 4.10.1 illustrates the cattle and calf inventory in North Dakota. Logan County has 66,000 head as of 2018.
- A total of seven cases of rabies were reported in Logan County between 2003 and 2021.
- Meeting participants indicated that with the local economy heavily dependent on agriculture, significant animal losses may have a catastrophic impact.

Human. The extent/magnitude of infectious disease for humans can range from low to high, depending on the disease involved, and the specific location of occurrence. If an outbreak occurred in a remote area where there is a shortage of health professionals, the extent/magnitude could be catastrophic. Figure 4.10.2 shows the areas in North Dakota that have a shortage of health professionals. All of Logan County is designated as a Health Professionals Shortage Area (HPSA).

- According to Central Valley Health District, if a pandemic from a new strain of Influenza or Avian Flu occurred in Logan County, the impact could be catastrophic, like the COVID-19 Pandemic. **The COVID-19 pandemic resulted in 19 fatalities in Logan County as of October 2021.** The total economic losses from the pandemic are still unknown but are estimated to be in the hundreds-of-thousands to millions of dollars in Logan County. **Approximately 19.9 percent of Logan County residents contracted the disease as of October 2021.**
- Influenza is an infectious disease that is common-place and the extent/magnitude is managed by modern medical advances. However, the jet-age has contributed to faster spread of disease. With the re-emergence of Ebola and the onset of COVID-19, the extent/magnitude for infectious disease in humans has the potential to be catastrophic resulting from modern-day travel.
- Meeting participants indicated that infectious disease in humans can have a catastrophic impact after what was experienced in Logan County due to the COVID-19 Pandemic. The pandemic resulted in a near total shut down of local economic and human activity.
- **The extent/magnitude of infectious disease could be unanticipated in Logan County as unknown vectors are moving north due to climatic change.**

Plant. Per crop loss data from the RMA the following statistics illustrate the extent/magnitude of infectious diseases on crops in Logan County.

- There were 31 incidents of crop loss due to infectious disease between January 1, 2001, and December 31, 2020, resulting approximately one and-a-half occurrences of crop loss annually.
- On average, crop losses from infectious disease impacts 835.63 acres per year resulting in an average of \$66,352.55 in crop losses annually.
- Meeting participants indicated that with the local economy heavily dependent on agriculture, significant crop losses may have a catastrophic impact.

Risk Assessment

Table 4.10.4 shows the risk assessment as determined by individual jurisdictions and the Plan Update Committee for infectious disease. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment. The total in Table 4.10.4 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard less the jurisdiction’s capabilities to respond to the hazard.

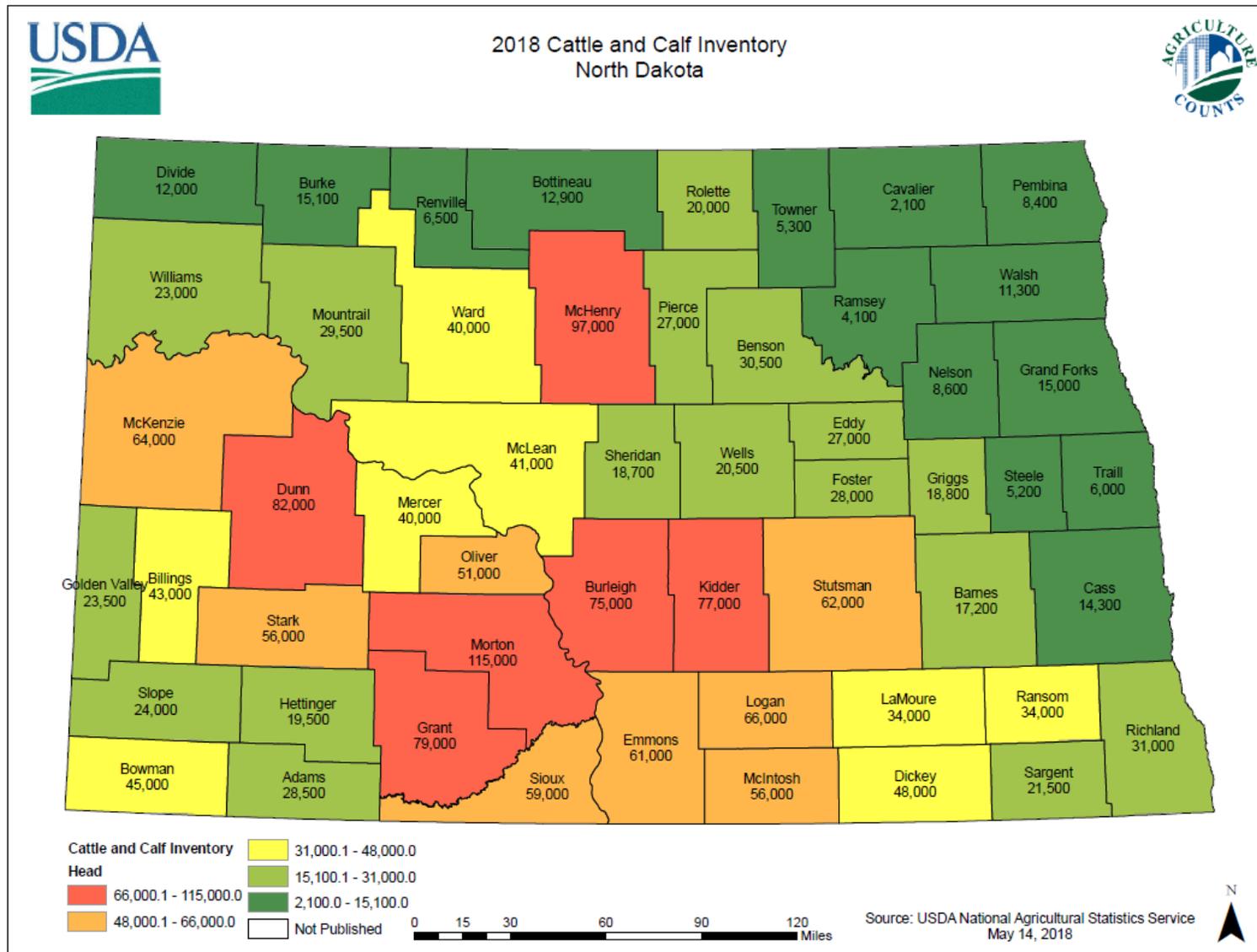
Table 4.10.4 – Logan County, North Dakota Infectious Disease Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County – Human	4	4	4	3	3	12
Logan County – Animal & Plant	4	4	4	4	3	13
City of Fredonia	4	4	4	4	1	15
City of Gackle	4	4	4	4	2	14
City of Lehr	4	4	4	4	1	15
City of Napoleon	4	4	4	4	3	13

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

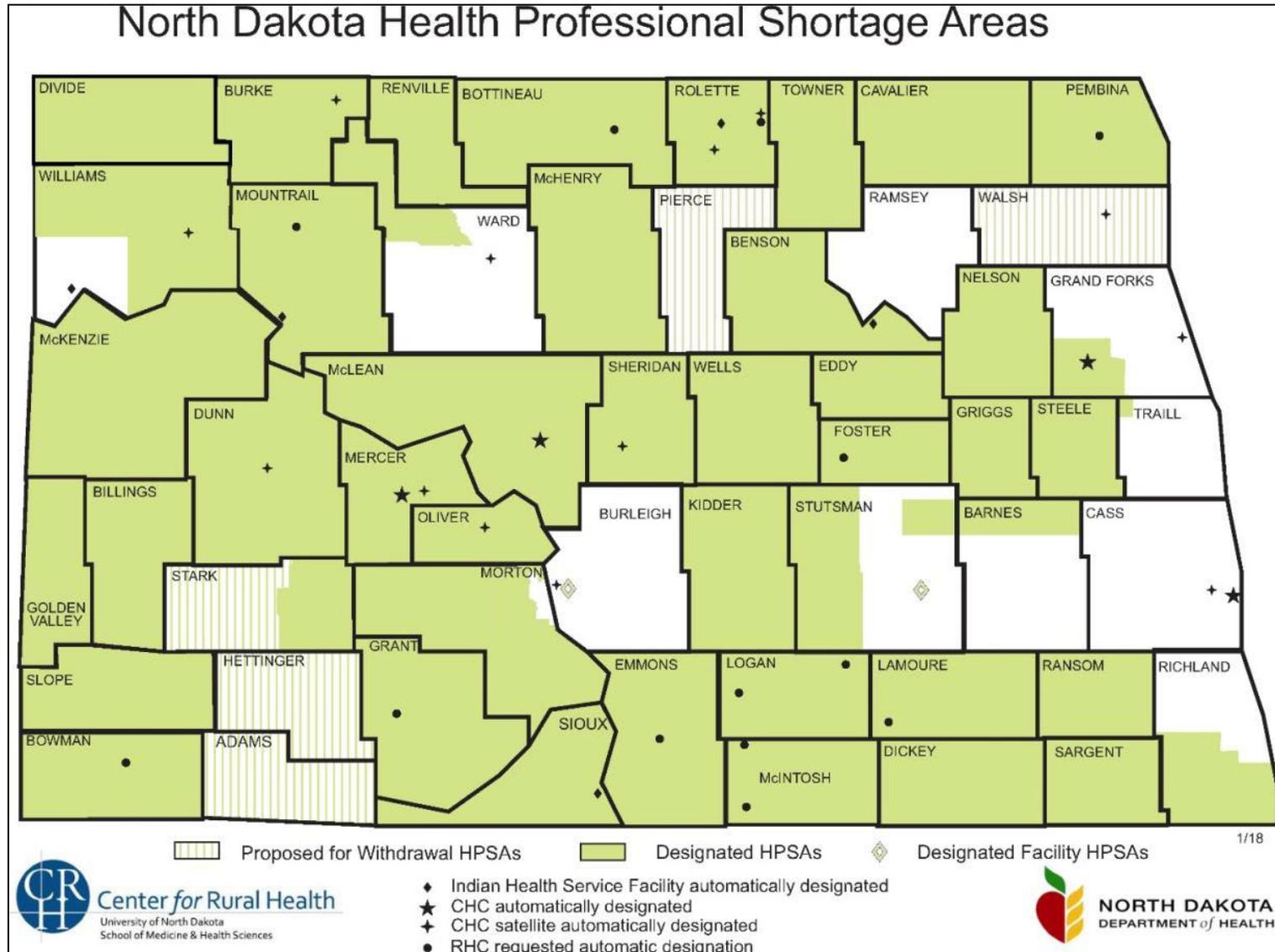
Tables 4.10.5, 4.10.6, and 4.10.7 provide information on the specific impact, frequency, likelihood, vulnerability, and capability of infectious disease in Logan County in animals, humans and plants, respectively. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Figure 4.10.1 – 2018 North Dakota Cattle and Calf Inventory



Source(s): 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP); USDA National Agricultural Statistics Service, 2018

Figure 4.10.2 – North Dakota Health Professional Shortage Areas



Source(s): 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP); Center for Rural Health, University of North Dakota School of Medicine and Health Sciences, 2018

Table 4.10.5 – Logan County, North Dakota Infectious Disease Risk Assessment - Animal

<p>Impact</p>	<ul style="list-style-type: none"> • Disease Outbreak/Mass Infections – (animals only) • Government Interruptions • Labor Shortages • Livestock Loss • Loss of Economy • Loss/Overcrowded Veterinarian Facilities • Loss of Drinking/Potable Water 	<ul style="list-style-type: none"> • Strain on local veterinarian resources • Financial cost to local producers and the public • Lack of awareness of public resulting from difficulties in communicating through media sources • Distress of local producers from a pandemic • Compression of supply chain can lead to supplies and vaccination shortages • Carcass disposal
<p>Frequency</p>	<ul style="list-style-type: none"> • Animal losses due to infectious disease occur annually • A total of eight cases of rabies were reported in Logan County between 2003 and 2021. 	
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • 66,000 head of cattle & calf in 2018 in the county • Agriculture economy • Dependent on weather for animals and crops • Transporting of animals across state lines • N.D. Highway 3 = heavy livestock traffic • Overuse of antibiotics leading to disease tolerance 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public and private facilities, producers, etc. • Impact is highly dependent on the type of disease and its effect on the population of livestock
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • 66,000 head of cattle & calf in 2018 in the county • Agriculture economy • Dependent on weather for animals and crops • Transporting of animals across state lines • N.D. Highway 3 = heavy livestock traffic • Overuse of antibiotics leading to disease tolerance • Shortage of veterinary service • Cross contamination between producers 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public and private facilities, producers, etc. • Veterinarian clinics in the county help address the need for services, but does not meet overall demand
<p>Capability</p>	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address infectious disease. 	

Table 4.10.6 – Logan County, North Dakota Infectious Disease Risk Assessment - Human

<p>Impact</p>	<ul style="list-style-type: none"> • Human Injury/Death • Loss of Economy (crop, livestock, manufacturing, etc.) • Loss/Overcrowded Medical Facilities • Mass Casualties/Fatalities • Loss of Potable Water • School Closure • Compression of supply chain can lead to shortages of supplies and vaccinations • Disruptions in essential services and critical infrastructure operations due to lack of alternative staff 	<ul style="list-style-type: none"> • Financial cost to public health resources • Infrastructure degradation resulting from labor shortages • Mass casualties can overwhelm funeral homes • Labor shortages in medical facilities • Loss of capability to transfer patients to other facilities with higher levels of care • Psychological impacts to the public and medical community – medical staff leaving the profession • Loss confidence in local government • COVID-19 resulted in 19 deaths as of October 2021
<p>Frequency</p>	<ul style="list-style-type: none"> • Annual occurrences of death, primarily among elderly • Occurrence of 1 in 3 for people annually • COVID-19 resulted in 19 fatalities • Approximately 19.9 percent of all county residents had confirmed cases of COVID-19 • 131 infectious disease cases between 2004 and 2021 in Logan County, or roughly eight cases per year 	<ul style="list-style-type: none"> • According to public health, the average age of COVID-19 cases are 48 years of age • Between 2004 and 2021, Logan County recorded 42 cases of Campylobacteriosis, 31 cases of Giardiasis, 17 cases of Chlamydia, 14 cases of Hepatitis C Chronic, and seven cases of Cryptosporidiosis representing 32.1 percent, 23.7 percent, 13.0 percent, 10.7 percent, and 5.3 percent of reported infectious diseases, respectively.
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Growing elderly population • Public school, daycares, and skilled nursing, assisted living, and group homes • Increasing number of adults avoiding COVID-19 vaccinations for themselves and their children • Small increase in avoidance of vaccinating in general • 33 percent of people in Logan County are classified as obese in 2021 – lack of physical activity • Emergence of the COVID-19 variants 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv promoting wellness and preventative measures – conducted through public health and Logan County • Public health and employment regulations for public and private facilities, producers, etc. • Immunizations & medications • Lower population • Mask-wearing

Table 4.10.6 – Logan County, North Dakota Infectious Disease Risk Assessment – Human – CONTINUED

<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Breakthrough COVID-19 cases in vaccinated individuals • Unvaccinated individuals are 5 times more likely to contract COVID compared to vaccinated individuals and 29 times more likely to be hospitalized • Resistance of the public to mask wearing and following of isolation/quarantine guidelines 	
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Growing elderly population • Increase in mobility and air travel • Shortage of health professionals in Logan County • Shortage of advanced medical equipment – i.e., ventilators, bipap, bypass, dialysis, air and surface-sterilization • Lack of a hospital in the county • Unknown vectors moving north from climate change • The prevalence of social media increasing skepticism of disease prevention measures • Public school, daycares, and skilled nursing, assisted living, and group homes • 41 percent of people in Logan County are classified as obese in 2021 – lack of physical activity • N.D. State Legislature voted in 2021 that the State Health Officer and the Governor cannot implement a mask mandate • Emergence of the COVID-19 variants • Breakthrough COVID-19 cases in vaccinated individuals 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv promoting wellness and preventative measures • Public health and employment regulations for public and private facilities, producers, etc. • Immunizations & medications • The population density of the rural parts of Logan County is sparse and the rural setting allows for immediate social distancing • Colder climate limits social interactions • Central Valley Health District • Gackle and Napoleon Ambulance Services • Adequate storage space and refrigeration units for stockpile of medical supplies at public health • Logan County is ranked as having a low social vulnerability • 96 percent of long-term care residents, 93 percent for assisted living tenants, and 60 percent of long-term care staff have received COVID-19 vaccinations in Logan County as of October 2021 • N.D. Dept. of Health is statutorily responsible for disease outbreaks – local public health departments work under this direction by way of an MOU

Table 4.10.6 – Logan County, North Dakota Infectious Disease Risk Assessment – Human – CONTINUED

Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Resistance of the public to mask wearing and following of isolation/quarantine guidelines • Delay of information sharing about disease trends to local public health from state department of health • Delay of information sharing due to local paper only publishing weekly • Lack of local epidemiologist providing specific disease statistics and reporting for Logan County • Lack of indoor drive-through mass vaccinating/testing facility • Lack of backup generator for Napoleon Ambulance • Lack of consistent information from state leaders • Lack of refrigeration storage in the county • Infectious disease statistics is not always indicative of community spread as not all cases of disease are reported 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Central Valley Health District • Regional and state epidemiologists working with local public health to manage disease outbreaks • Regional Public Information Officer (PIO) • Regional Environmental Health Practitioner • Regional Emergency Preparedness and Response Coordinator • Logan County PIO and back up PIO • Logan County has a low Social Vulnerability Index per the CDC as of 2021
	Capability	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address infectious disease.

Table 4.10.7 – Logan County, North Dakota Infectious Disease Risk Assessment - Plant

Impact	<ul style="list-style-type: none"> • Crop Loss • Disease Outbreak/Mass Infections (plants only) • Livestock Loss • Loss of Economy • Soil Erosion 	<ul style="list-style-type: none"> • Strain on local, state, and federal governments resources, and private enterprise • Between January 1, 2001, and December 31, 2020, Logan County experienced 31 incidents of crop loss due to infectious disease impacting approximately 16,712.56 acres of crops totaling \$1,227,051.00 in losses.
Frequency	<ul style="list-style-type: none"> • Crop loss due to infectious disease occurs annually 	<ul style="list-style-type: none"> • Between January 1, 2001, and December 31, 2020, Logan County averaged 835.63 acres of crops impacted by infectious disease totaling \$61,3520.55 in losses.
Likelihood	<p><u>More likely</u></p> <ul style="list-style-type: none"> • Agriculture economy • Dependent on weather for animals and crops 	<p><u>Less likely</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public and private facilities, producers, etc. • Pesticide Training facilitated by NDSU Extension
Vulnerability	<p><u>More vulnerable</u></p> <ul style="list-style-type: none"> • Agriculture economy • Dependent on weather for animals and crops 	<p><u>Less vulnerable</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities • Pesticide Training facilitated by NDSU Extension
Capability	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address infectious disease. 	

Vulnerabilities to Publicly-Owned Buildings and Property

Most structures remain unaffected by impacts from infectious disease as only animals, humans and plants are susceptible to the hazard. Buildings can become contaminated and uninhabitable due to secondary impacts from a pandemic – i.e., people sheltering-in-place and inadvertently neglecting property. Also, critical facilities are not always available for vaccinations or testing due to competing community events/uses. An increase in disinfection measures, both staff-time and cost to local budgets, does occur during influenza season and during pandemics, such as COVID-19.

There are almost no physical vulnerabilities to publicly-owned buildings and property from infectious disease in animals and plants.

A summary of publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Since animals, humans and plants are affected by infectious disease, critical facilities and infrastructure are relatively unaffected in structural terms. However, critical facilities such as public health, clinics, hospitals, and veterinarian clinics can become contaminated and/or quickly overwhelmed if an outbreak/pandemic of infectious disease occurs in animals or humans. **The surge to facilities and shortages or outages of medical supplies (personal protective equipment also known as PPE) and staff can limit or stop altogether the functionality of medical and veterinarian facilities and services.** The stress/strain infectious disease can place on the private sector (businesses or individuals) and public sector also impacts the vulnerability to critical facilities and infrastructure due to people sheltering-in-place resulting in shortages of labor.

Similarly, emergency services can also become stressed in rural areas where populations are dispersed over a large geographic expanse. The vulnerability and exposure to infectious disease is likely to increase due to greater frequency of emerging diseases, increased mobility (primarily jet travel), an aging population, and anti-vaccination trends.

Infrastructure for drinking/potable water could be impacted by infectious disease through contamination, or through quarantine of a large portion of a given population that could delay physical maintenance and/or repair to infrastructure. The age of the drinking/potable water system in the cities of Gackle and Napoleon results in numerous water line breaks, which can contribute to higher rates of infectious disease in humans.

Due to presence of the livestock industry in Logan County, veterinary services can also become overwhelmed in the case of an outbreak in farm animals and livestock.

There are almost no physical vulnerabilities to critical facilities and infrastructure from infectious disease in animals and plants.

Vulnerabilities to New and Future Development

New development would largely avoid physical impact from infectious disease and not be vulnerable. While mold may make a building uninhabitable, it is not an infectious disease. However, new structures could be susceptible to deterioration from contamination if structures are not constructed properly. In addition, if drainage in new development is not designed properly or not installed altogether, the standing water could Logan vector growth.

There are almost no physical vulnerabilities to new and future development from infectious disease in animals and plants.

Population growth or decline, attributable to new and future development, will either increase or decrease the vulnerability to infectious disease. Similarly, population growth in livestock could increase or decrease the vulnerability to infectious disease.

Data Limitations

Animal

The lack of available animal loss data from the N.D. Dept. of Agriculture results in the inability to track livestock losses from infectious disease. Similarly, the Farm Services Agency (FSA) provided information on payments made through the Livestock Indemnity Program, but the cause of the loss and the number of animals impacted is not available.

Statistics on infectious disease in animals available on the N.D. Dept. of Health website cannot be downloaded and must manually compiled and analyzed. Statistics on rabies and all other diseases are fragmented on the website, being available in separate sections throughout.

Human

Statistics on infectious disease in humans available on the N.D. Dept. of Health website cannot be downloaded and must manually compiled and analyzed. Statistics on influenza and COVID-19 are shown in separate sections on the department's website from all other infectious diseases impacting humans.

The delay of information sharing about disease trends and statistics from the N.D. Dept. of Health to local public health units causes disruption in delivery of services and reduces mitigation capability.

Plant

The U.S. Dept. of Agriculture-Risk Management Agency is not able to provide monetary crop loss information prior to 2001.

Other Key Documents

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Centers for Disease Control Social Vulnerability Index, Logan County, North Dakota
- Logan County Local Emergency Operations Plan
- Logan County Continuity of Operations Plan
- Logan County Mass Vaccination Plan through Central Valley Health District (CVHD)
- Logan County Pandemic Influenza Response Plan through Central Valley Health District (CVHD)
- Logan County Point of Dispensing Plan (POD) through Central Valley Health District (CVHD)
- Logan County Mass Care Plan through Central Valley Health District (CVHD)
- Logan County Shelter Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Infectious Disease Annex
- North Dakota State Disaster Recovery Plan
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.11 Severe Summer Weather

Including downbursts, extreme heat, hail, high wind, lightning, and tornadoes.

Characteristics

Summer storms are caused by atmospheric temperature imbalances. Thunderstorms develop as warm, moist air rises. These conditions will produce updraft and downdrafts that can reach velocities of 170 mph. Updrafts and downdrafts are the reason for gust fronts, heavy rain (flash severe summer weather), lightning, hail, and high winds. Downburst or straight-line winds can be as deadly as tornadoes. If a thunderstorm continues to intensify, a tornado may develop. A thunderstorm affects a relatively small area when compared to a winter storm. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Despite their small size, all thunderstorms are dangerous. Severe summer storms can result in loss of life, injuries, and damage to property and crops.

Seasonal Pattern	March to November
Duration	2 to 6 hours
Speed of Onset	12 to 24 hours warning
Location	Total geographic extent of Logan County

Downbursts: Strong winds can form along the leading edge of a thunderstorm. Downburst winds occur when air is carried into a storm's updraft, cools rapidly, and comes rushing to the ground. These winds are forced horizontally when they reach the ground and can cause significant damage. These types of strong winds can also be referred to as straight-line winds.

Extreme Heat: According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities.

Hail: Hail is frozen precipitation that forms and falls from cumulonimbus clouds. Hail occurs when strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. The ice particles grow, finally becoming too heavy to be supported by the updraft and fall to the ground.

High wind: High wind events occur separately from tornadoes and severe thunderstorms. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems are, (one high pressure, one low pressure) the stronger the pressure gradient, and therefore, the stronger the winds are.

Lightning: Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause a separation of electrical charges. Positively charged ice particles rise to the top of the cloud and negatively charged ones fall to the middle and lower sections of the cloud. The negative charges at the base of the cloud attract positive charges at the surface of the Earth.

Tornado: A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Most tornadoes develop from supercell thunderstorms. Supercell thunderstorms have a persistent rotating updraft and can form when there is sufficient vertical wind shear in the atmosphere. A funnel cloud is a

rotating column of air extending out of a cloud base, but not yet touching the ground. Once a funnel cloud reaches the ground, it becomes a tornado. Tornadoes can create tremendous damage over a small area.

For more information regarding severe summer weather please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

Information on the history of severe summer weather in Logan County was obtained from the National Climatic Data Center (NCDC); the National Oceanic and Atmospheric Administration (NOAA); the USDA, Risk Management Agency; and Logan County Emergency Management. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Table 4.11.1 summarizes the history of severe summer weather in Logan County between January 1, 1950, to December 31, 2021. The following are key points.

- Logan County experienced 177 occurrences of severe summer weather resulting in approximately two-to-three storms of significance annually.
- Approximately \$5,036,000.00 in property damage and \$2,175,000.00 in crop damage was reported.
- 10 injuries and no fatalities were reported.

Table 4.11.1 – 1950 to 2021 Logan County, North Dakota Severe Summer Weather Hazard History Summary

Severe Summer Weather				
Occurrences	Injuries	Fatalities	Property Damage	Crop Damage
177	10	0	\$5,036,000.00	\$2,175,000.00

Source(s): National Climatic Data Center (NCDC); National Oceanic and Atmospheric Administration (NOAA)

U.S. Dept. of Agriculture, Risk Management Agency

- Crop loss from severe summer weather is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres and indemnity amount. The damage description identifies the cause of damage, determines acres identifies the number of acres lost due to damage, and the indemnity amount identifies the total amount of the loss for the designated peril. Cause of Loss categories included in severe summer weather include cold wet weather, excess moisture/precip/rain, hail, heat, hot wind, tornado, and wind/excess wind. **Between January 1, 2001, and December 31,**

2020, Logan County experienced 352 incidents of crop loss due to severe summer weather impacting approximately 165,265.75 acres of crops totaling \$12,580,075.93 in losses.

There have been disaster declarations and emergencies pertaining to a severe summer weather in Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. Profile meeting participants and the Steering Committee indicated the probability of severe summer weather in Logan County is highly likely, meaning that there is a 100 percent probability in the next year of an occurrence.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Per Table 4.11.1, the following statistics on the probability of severe summer weather in Logan County is as follows.

- The probability of severe summer weather is 100 percent based on 177 occurrences between January 1, 1950, and December 31, 2021, or two to-three severe summer weather events of significance annually.
- Logan County experiences approximately \$69,944.44 in property damage and \$30,208.33 in crop damage annually between January 1, 1950, and December 31, 2021.
- Approximately 10 injuries and no fatalities have been reported between January 1, 1950, and December 31, 2021.

U.S. Dept. of Agriculture, Risk Management Agency

- According to information obtained from the U.S. Dept. of Agriculture, Risk Management Agency (RMA), crop loss due to severe summer weather totals \$629,003.80 annually in Logan County between January 1, 2001, and December 31, 2020.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. The extent/magnitude of the severe summer weather ranges from large tornados and hail causing massive property and crop damage, power outages, and loss of critical facilities and infrastructure to localized flooding and fallen tree branches. Figures 4.11.1 to 4.11.8 illustrate the history of significant hail, tornado, and wind speed occurrences recorded between 1950 and 2018 in Logan County. Profile meeting participants and the Steering Committee indicated the extent/magnitude or impact of severe summer weather as catastrophic meaning as an estimated 50 percent or more of Logan County could be affected.

2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)

- According to the 2018 N.D. Enhanced Mitigation MAOP, FEMA recognizes four wind zones in the United States. Winds speeds can reach up to 160 miles per hour in Zone II and 200 miles per

hour in Zone III. No special wind regions are identified in North Dakota. Logan County is split in half longitudinally between Zones II and III.

National Climatic Data Center/National Oceanic and Atmospheric Administration

- **May 22, 1966.** An F3 Tornado occurred in the county causing \$25,000 in property damage and had a path of destruction 15.8 miles in length.
- **August 26, 2007.** A hailstorm impacted the city of Napoleon and produced hail 3.5 inches in diameter resulting in \$250,000 in property damage and \$500,000 in crop damage. **According to meeting participants, the size of the hail was around a softball. Most single-family homes in the city experienced some damage such as damaged shingles and siding, and broken windows.**
- **June 12, 2001.** A Thunderstorm Wind event produced winds of 70 m.p.h. resulting in \$45,000.00 in property damage in the city of Napoleon.
- **June 22, 2016.** A Thunderstorm Wind event produced winds of 87 m.p.h. impacting unincorporated Burnstad resulting in \$1,200,000.00 in property damage and \$50,000.00 in crop damage. According to the Logan County Sheriff's Office, power grid infrastructure (power poles) were snapped in half and resulted in prolonged power outages of up to 10 days in some areas. Figures 4.11.1 to 4.11.5 illustrate storm damage to rural areas of Logan County. Stretches of power lines were down between the cities of Hazelton (in neighboring Emmons County) and the city of Napoleon. N.D. Highway 3 was closed to clear the power lines south of the city of Napoleon. Reports of garages rotated, grain silos knocked down, propane tanks turned, vehicles and trailers tossed, and farm buildings destroyed.

Figure 4.11.1 – June 22, 2016, Severe Storm Damage in Logan County, North Dakota



Source(s): Logan County Emergency Management

Figure 4.11.2 – June 22, 2016, Severe Storm Damage in Logan County, North Dakota



Source(s): Logan County Emergency Management

Figure 4.11.3 – June 22, 2016, Severe Storm Damage in Logan County, North Dakota



Source(s): Logan County Emergency Management

Figure 4.11.4 – June 22, 2016, Severe Storm Damage in Logan County, North Dakota



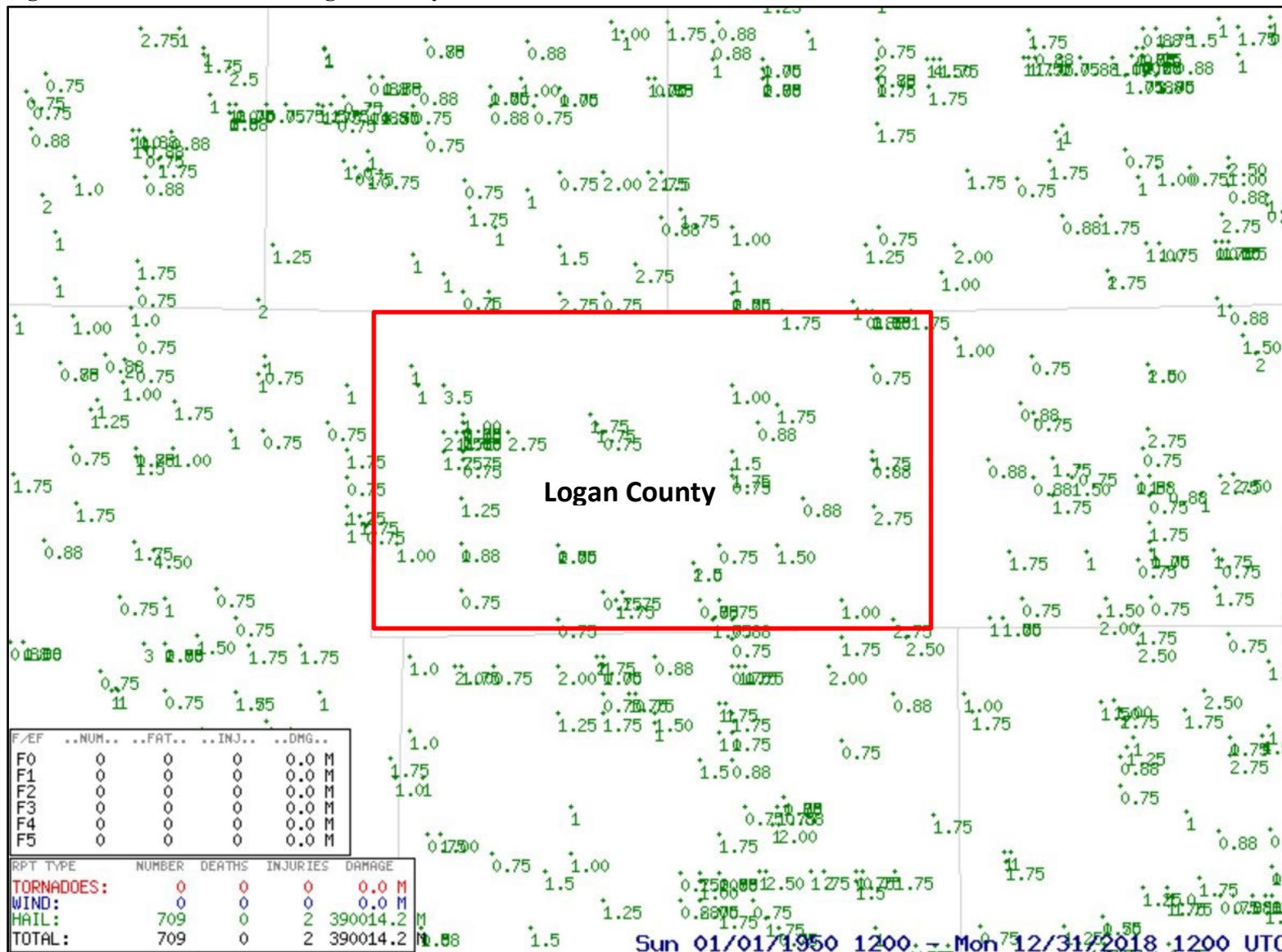
Source(s): Logan County Emergency Management

Figure 4.11.5 – June 22, 2016, Severe Storm Damage in Logan County, North Dakota



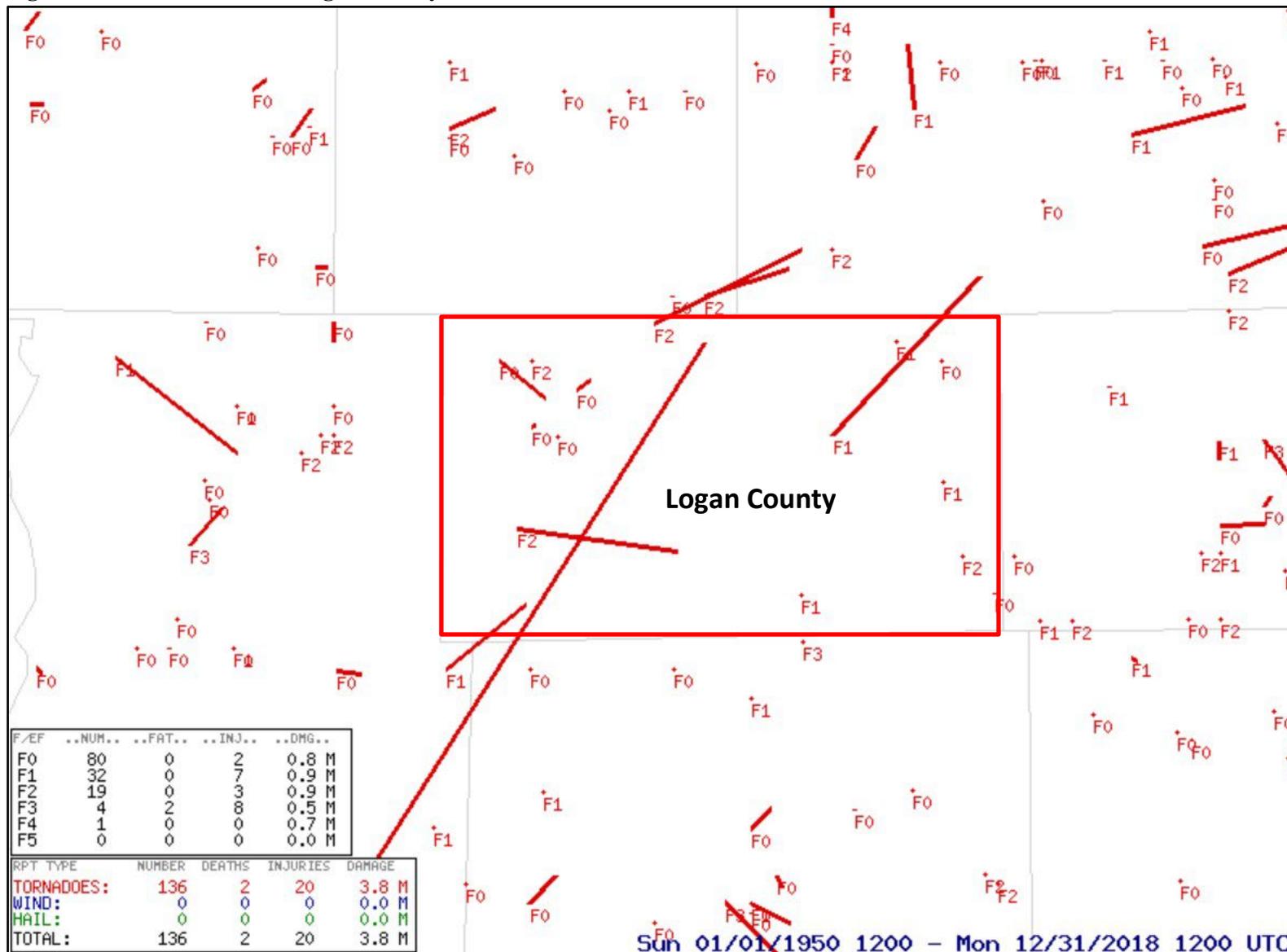
Source(s): Logan County Emergency Management

Figure 4.11.6 – 1950 to 2018 Logan County, North Dakota Recorded Hail Occurrences



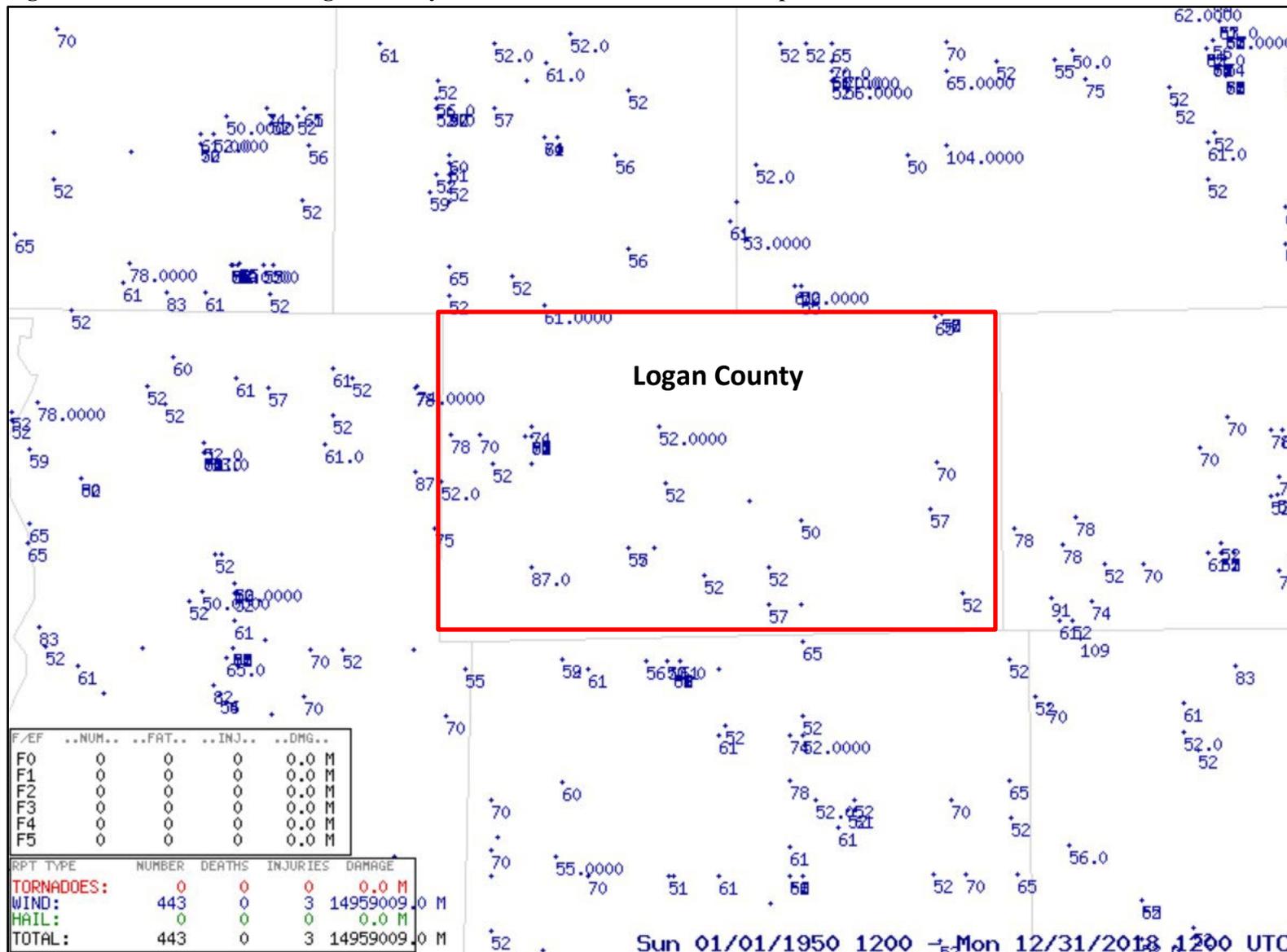
Source(s): National Oceanic and Atmospheric Administration (NOAA), Storm Prediction Center

Figure 4.11.7 – 1950 to 2018 Logan County, North Dakota Recorded Tornado Occurrences



Source(s): National Oceanic and Atmospheric Administration (NOAA), Storm Prediction Center

Figure 4.11.8 – 1950 to 2018 Logan County, North Dakota Recorded Wind Speed Occurrences



Source(s): National Oceanic and Atmospheric Administration (NOAA), Storm Prediction Center

Risk Assessment

Table 4.11.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for severe summer weather. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.11.2 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.11.2 – Logan County, North Dakota Severe Summer Weather Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	4	4	2	3	11
City of Fredonia	4	4	4	2	1	13
City of Gackle	4	4	4	3	1	13
City of Lehr	4	4	4	3	1	13
City of Napoleon	4	4	4	3	3	11

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.11.3 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of severe summer weather in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Vulnerabilities to Publicly-Owned Buildings and Property

Publicly-owned buildings and property are susceptible to severe summer weather in many forms. Buildings are often constructed to withstand impacts from severe summer weather, but may not sustain high wind speeds, tornadoes, or large hail. Large hail can damage building roofs, break windows, injure people and/or result in fatalities. Depending on the size of the building and the role it plays in day-to-day operations, the vulnerability to severe summer weather can vary from nominal for larger structures such as the Logan County Courthouse to severe for county shops in smaller cities, which are considerably less sturdy. The lack of stormwater management in smaller incorporated jurisdictions contributes to the vulnerability of publicly-owned buildings and property from flash flooding due to severe summer weather.

Publicly-owned buildings and property are places where populations congregate, which temporarily increases vulnerability to severe summer weather if an event of significance occurred and impacted that respective building or property.

A summary of publicly- owned buildings is provided in Chapter 3, Profile and Inventory.

Table 4.11.3 – Logan County, North Dakota Severe Summer Weather Risk Assessment

<p>Impact</p>	<p><u>Blocked Roads from Wash Outs:</u></p> <ul style="list-style-type: none"> • 27th Ave SE between Sections in 9 and 10 Kroeber Township • 25th Ave SE at 60th St. in Sections 6 and 5 in Kroeber Township • Intersection of 71st St. and 39th Ave Se in Sections 27 and 34 in Red Lake Township • Intersection of 71st St. SE and 35th Ave SE in Sections 25 and 26 in Starkey Township • Intersection of 34th Ave SE and 71st St. SE Sections 26 and 27 in Starkey Township • Intersection of 77th St. SE and 28th Ave SE in Sections 28 and 33 in Shell Butte Township • Intersection of 73rd St. SE and 29th Ave SE in Sections 2 and 11 in Shell Butte Township <ul style="list-style-type: none"> • Evacuation (Localized) • Human Injury/Death – heat exhaustion or from flying debris • Loss of Livestock • Loss of Crops • Loss of Power/Downed Power Lines • Property/Vehicle Damage – repair of roofing, siding, and drainage systems for homes, windows and paint for cars • Sewer Backup • Shelter-in-place • Strain to emergency services and responders if damage is widespread 	<ul style="list-style-type: none"> • Overland flooding in incorporated jurisdictions due to improper drainage in some areas • Unpaved streets in small jurisdictions can become damaged from rainfall and moisture • Direct hit from a tornado would be catastrophic \$5,036,000.00 in property damage and \$2,175,000.00 in crop damage between January 1, 1950, and December 31, 2021, according to NCDC. • Two injuries reported between January 1, 1950, and December 31, 2021. • Temporary economic boost due to rebuilding/repairs of homes, businesses and other structures. • August 26, 2007. A hailstorm impacted the city of Napoleon produced hail 3.5 inches in diameter resulting in \$250,000 in property damage and \$500,000 in crop damage. • June 22, 2016. A Thunderstorm Wind event produced winds of 87 m.p.h. impacting unincorporated Burnstad resulting in \$1,200,000.00 in property damage and \$50,000.00 in crop damage. According to the Logan County Sheriff’s Office, power grid infrastructure (power poles) were snapped in half and resulted in prolonged power outages of up to 10 days in some areas.
<p>Frequency</p>	<ul style="list-style-type: none"> • Annual occurrences of power loss from storms • Extensive property damage (\$1,200,000.00) near unincorporated Burnstad in June 2016 • Property damage from severe storm in summer 2016 • Four significant storms producing damage to trees and property annually 	<ul style="list-style-type: none"> • 177 occurrences between January 1, 1950, and December 31, 2021, or two to-three severe summer weather events of significance annually • Logan County experiences \$69,944.44 in property damage and \$30,208.33 in crop damage annually between January 1, 1950, and December 31, 2021.

Table 4.11.3 – Logan County, North Dakota Severe Summer Weather Risk Assessment - Continued

Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 	
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Lack of permanent generators at critical facilities and infrastructure • Aging infrastructure (roads, water, electrical systems) • Small communities have experienced prolonged response from emergency services due to location and blocked roads occasionally • Presence of truck traffic carrying hazardous materials through the county • Lack of 24-hour storm shelters in smaller communities and rural areas of the county • Structural integrity of temporary housing • Staff limitations during events of significance • Lack of storm water systems in small cities and rural areas • Lightning strikes to hay bales causing fires and damage to nearby structures • Removal of shelterbelts leaves little to no protection to structures from severe summer weather • Critical facilities: Logan County Courthouse, Logan County Shops, Napoleon City Hall/Police Station/Public Works Shop, all fire halls and ambulance buildings county-wide • Undersized culverts for drainage • Older bridges (two wooden and concrete box culverts) are not large enough to allow for adequate drainage of runoff/do not meet current standards 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Building codes and enforcement • Advanced warning/notification such as internet and TV • Switching of overhead telecommunication lines to underground – change to fiber-optic lines • Instant communication capabilities through cell phones • Increase in technological capabilities of tractors and farm equipment to warn farmers of severe storms • Emergency sirens are in place throughout the county • Education in schools has increased • Better predictions from the National Weather Service • Switch to no-till farming reduces blowing of soil • Increased awareness through Logan County IPAWS • Presence of social media alerting to the public • Advancements in public works equipment to use for responding to significant events
Capability	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address severe summer weather. 	

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities such as Logan County Courthouse, ambulance and fire halls, schools, water towers, roadways, and other specialty facilities such as nursing homes and assisted living facilities are vulnerable to severe summer weather in a similar fashion to publicly-owned buildings and property. In terms of infrastructure, overhead power lines are susceptible to wind and debris, which can disrupt electricity and cause power outages. Disruptions in water service can be caused by physical damage to water towers or lift stations, or a loss of power. Roadways can become blocked due to flash flooding and overland flooding or from windblown debris, which limits access for emergency services and disrupts economic activity. The lack of stormwater management in smaller incorporated jurisdictions contributes to the vulnerability of critical facilities and infrastructure to severe summer weather. The American Legion and Golden Age Center in Napoleon host weddings, meal events, and other community gathering resulting in large crowds. These facilities lack indoor siren capabilities to alert attendees of inclement weather.

A summary of publicly- owned buildings is provided in Chapter 3, Profile and Inventory.

Vulnerabilities to New and Future Development

Building codes ensure buildings and structures are built adequately to better withstand severe summer weather. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have adopted buildings codes, but only the city of Napoleon has enforcement. Similarly, incorporated jurisdictions with a high number of trailer and mobile homes, which are more susceptible to severe weather, may experience more impacts from the hazard. An inventory of the household units by type in jurisdictions in Logan County is shown in Chapter 3, Profile and Inventory. As populations grow, more people are at risk of injury and potential death from tornadoes, large hail, and windblown debris such as tree branches. Strengthening and enforcement of buildings codes would mitigate impacts from the hazard. This mitigation project for the county can be found in Chapter 6, Mitigation Strategy.

Data Limitations

Residents often experience impacts from severe summer weather, such as broken windows on homes or damage to vehicles, they do not report. Weather data provided by NCDC, NOAA, and other agencies can be incomplete and reported damages can vary significantly from local sources. Fewer active storm spotters reduces the amount of reported weather information available to federal and state agencies, county emergency management.

National Climatic Data Center/National Oceanic and Atmospheric Administration

The hazard history provided in terms of property damage and crop damage (which are only estimates) is calculated based on what the National Weather Service received from insurance companies and individual property owners upon request. Both sources have been reluctant to share that information. Therefore, both practices were discontinued. Because of this, the National Weather Service makes a best guess using all available data at the time of the publication. The damage amounts are received from a variety of sources. Property and crop damage should be considered as a broad estimate.

The hazard history provided through the National Climatic Data Center/National Oceanic Atmospheric Administration's Storm Events Database contains data as entered by NOAA's National Weather Service

(NWS). Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures. **All types of severe summer weather were not recorded cohesively until 1996.**

1. Tornado: From 1950 through 1954, only tornado events were recorded.

2. Tornado, Thunderstorm Wind and Hail: From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.

3. All Event Types (48 from Directive 10-1605): From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

U.S. Dept. of Agriculture, Farm Services Agency

The Livestock Indemnity Program (LIP) provides financial assistance to local producers that experience livestock losses. The program does not provide the cause of loss and, therefore, an accurate description of livestock loss from severe summer weather cannot be identified.

U.S. Dept. of Agriculture, Risk Management Agency

One of the Cause of Loss categories for crop loss data from the USDA, RMA is titled Other (snow, lightning, etc.) combines elements of severe summer weather and severe winter weather. Therefore, crop loss data for any given jurisdiction is incomplete.

Other Key Documents

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Building Codes
- Logan County Comprehensive Plan (1995)
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- Logan County Zoning Ordinance (2006)
- North Dakota Continuity of Operations Plan
- North Dakota Dept. of Transportation Design Manual
- North Dakota Drought Mitigation Plan
- North Dakota Emergency Operations Plan, Severe Summer Weather Annex
- North Dakota League of Cities: Planning and Zoning Handbook
- North Dakota State Building Code
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)

- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

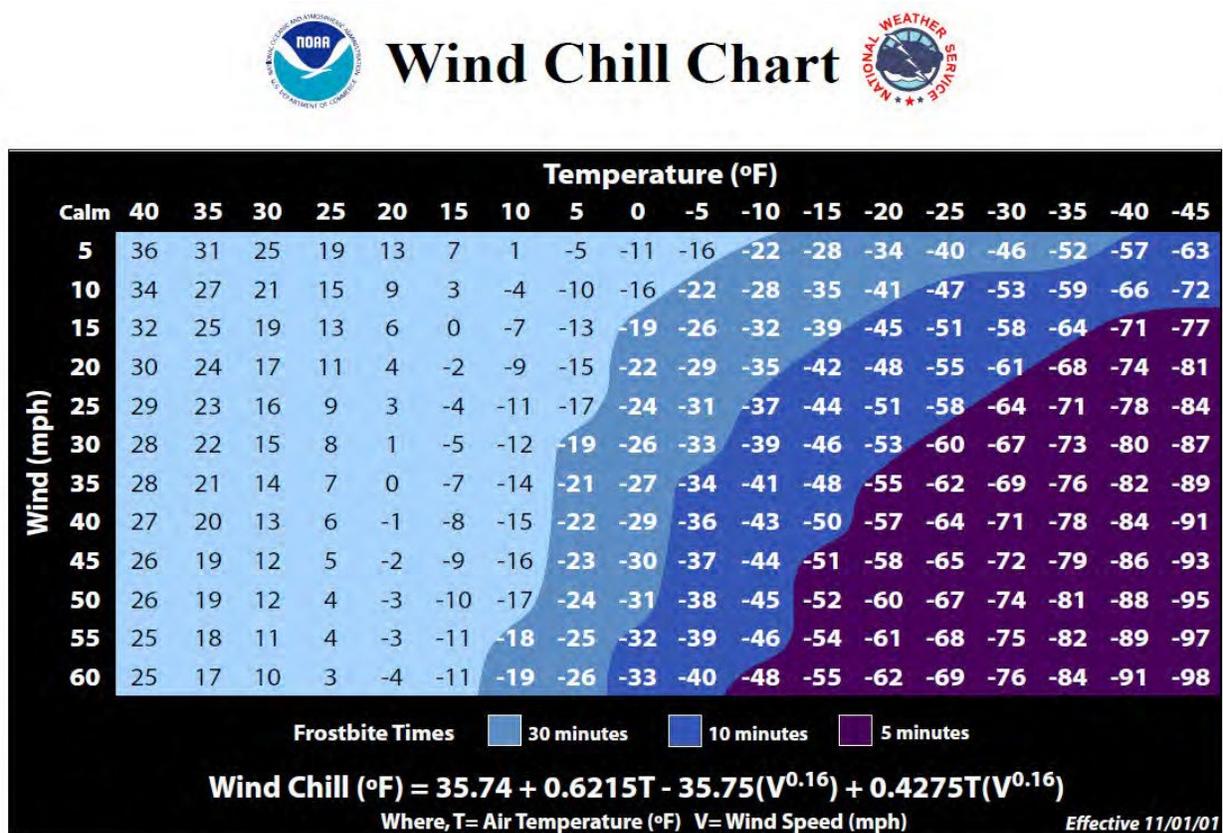
4.12 Severe Winter Weather

Including blizzards, extreme cold, heavy snow, ice storms, recycled snow, structure collapse, and secondary hazards.

Characteristics

Winter storms have the capability to completely immobilize large areas of a state or several states simultaneously. Winter storms occur in several forms, such as heavy snowstorms, blizzards, and ice storms. Each in its own way is a potential killer of hundreds of people, livestock and wildlife, whenever the storm strikes. A brief explanation of each follows Figure 4.12.1.

Figure 4.12.1 – Wind Chill Chart



Source: National Weather Service

Blizzards are the most dramatic and dangerous winter storms. A blizzard has winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for at least 3 hours. Blizzards are usually characterized by low temperatures and by strong winds bearing substantial amounts of snow. Snowfall is usually present during the preliminary stages of the blizzard. However, most of the snow in a blizzard is in the form of fine, powdery particles of snow which are whipped up from the surface in such great density that at times the visibility is only a few yards, creating a blinding condition.

Extreme Cold includes prolonged periods of cold temperatures throughout the winter months. People are forced to limit time spent outdoors in extreme frigid conditions. When cold temperatures combine

with wind, dangerous wind chill occurs. Wind chill describes how cold it feels and is based on heat loss on exposed skin from wind and cold. The wind chill makes it feel much colder than the actual temperature.

Heavy Snow is probably the most significant winter weather phenomenon. Snow can be continuous, intermittent, flurries or if showery in nature, snow squalls. Snow squalls are brief and intense for short durations and are comparable to summer rain showers. Blowing and drifting snow often occur together, due to strong winds and falling or loose snow on the ground.

Ice Storms are freezing rain or drizzle that occurs when surface temperatures are below freezing. The moisture falls in liquid form freezing upon impact, resulting in ice or glaze on exposed surfaces and is called an ice storm. Sleet sometimes incorrectly referred to as an ice storm; is frozen rain drops and ice pellets, which bounce when hitting the ground. Sleet does not stick to trees but enough can cause hazardous driving conditions. Heavy accumulations of ice can bring down trees, topple utility poles/power lines and communication towers; and can disrupt communications and power for days while utility companies repair extensive damage. Small accumulations of ice can be extremely dangerous to motorists and pedestrians because bridges and overpasses freeze before other surfaces.

Recycled Snow is the ongoing blowing and drifting of already accumulated snow from one or more snow events that continues to blow and drift for days and weeks. The blowing snow is raised above the surface and blows in quantities that reduce visibility, continuously form new drifts, and fills in plowed roads up to three or four times per day. It is the most significant winter weather phenomenon in the county.

Structure collapse occurs when the forces of gravity or other external forces overcome the structural integrity of a building. A severe winter weather event, accompanied by ice and heavy snow, can lead to structure failure due to overwhelming ice and snow loads. Power lines and communications towers also topple during winter storms, disrupting supplies to residents, businesses, and agricultural producers.

Secondary hazards are often associated with severe winter weather. The most common hazards during winter weather events are transportation incidents. Roadways become hazardous quickly during snow, blowing snow, and ice events. Most incidents involve passenger vehicles; however, an incident involving a commercial vehicle transporting hazardous chemicals is always possible.

Seasonal Pattern	October to April – will occur in May in rare instances
Duration	Hours/days/up to a week in severe cases
Speed of Onset	12 to 24 hours warning
Location	Total geographic extent of Logan County

For more information regarding severe winter weather please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

Information on the history of severe winter weather in Logan County was obtained from the National Climatic Data Center (NCDC); the National Oceanic and Atmospheric Administration (NOAA); the USDA, Risk Management Agency; and Logan County Emergency Management. A detailed hazard history for Logan County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Table 4.12.1 summarizes the history of severe winter weather in Logan County between January 1, 1996, and December 31, 2021. Data was not available between January 1, 1950, to December 31, 1995, as only occurrences of tornado, thunderstorm wind and hail were recorded. Starting January 1, 1996, all event types (48) are recorded. The following are key points.

- Logan County experienced 108 occurrences of severe winter weather resulting in approximately four storms of significance annually.
- Approximately \$183,000.00 in property damage was reported.
- No injuries or fatalities were reported.

Table 4.12.1 – 1996 to 2021 Logan County, North Dakota Severe Winter Weather Hazard History Summary

Severe Winter Weather				
Occurrences	Injuries	Fatalities	Property Damage	Crop Damage
108	0	0	\$183,000.00	\$100,000.00

Source(s): National Climatic Data Center (NCDC), National Oceanic and Atmospheric Administration (NOAA)

U.S. Dept. of Agriculture, Risk Management Agency

- Crop loss from severe winter weather is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres and indemnity amount. The damage cause description identifies the cause of damage, determines acres identifies the number of acres lost due to damage, and the indemnity amount identifies the total amount of the loss for the designated peril. Cause of Loss categories included in severe winter weather include cold winter, freeze, and frost. **Between January 1, 2001, and December 31, 2020, Logan County experienced 105 incidents of crop loss due to severe winter weather impacting approximately 27,649.51 acres of crops totaling \$2,357,707.73.**

2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)

- Logan County experienced \$123,000 in property damage from 64 severe winter weather events between 2000 and 2018, and no injuries or fatalities.

- Claims paid for collapse on state facilities and other critical facilities are insured by the North Dakota Tornado and Fire Fund, 2013, and between 1989 and 2013 no claims were paid to local state agencies, adjutant general, state universities, local governments, or school districts.

Logan County Emergency Management

- A portion of the roof of the bowling alley in the city of Napoleon collapsed in 2013.

There have been disaster declarations and emergencies pertaining to a severe winter weather in Logan County.

Probability

The probability of a hazard or threat is how likely it is it will happen. Profile meeting participants and the Steering Committee indicated the probability of severe winter weather in Logan County is highly likely, meaning that there is a 100 percent probability in the next year the hazard will occur to some extent.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Per Table 4.12.1, the following statistics on the probability of severe winter weather in Logan County is as follows:

- The probability of severe winter weather in Logan County is 100 percent based on 108 occurrences between January 1, 1996, to December 31, 2021, resulting in approximately four incidents of significance annually. Logan County experiences approximately \$7,038.46 in property damage and 3,846.15 crop damage annually.
- No injuries or fatalities were reported between January 1, 1996, and December 31, 2021.

U.S. Dept. of Agriculture, Risk Management Agency

- According to information obtained from the U.S. Dept. of Agriculture, Risk Management Agency (RMA), crop loss due to severe winter weather totals \$117,885.39 annually in Logan County between January 1, 2001, and December 31, 2021.

Extent/Magnitude

The extent/magnitude of a hazard or threat is expressed in the amount and/or number of damages or losses either actualized in a community or estimated based on known assets and levels of risk. The extent/magnitude of the severe winter weather ranges from large blizzard with prolonged sub-zero temperatures causing widespread power outages and loss of critical facilities and infrastructure to localized icy road conditions with minor traffic accidents.

- Several major blizzards and severe winter weather events occurred in Logan County resulting in prolonged power outages. The blizzard that occurred over Christmas of 2016 resulted in 65 hours of power outages, or roughly 2.5 days.

- **February 2, 2021.** A freezing fog event resulted in \$40,000 in property damage, primarily sagging power lines.

Profile meeting participants and the Steering Committee indicated the magnitude or impact of severe winter weather as catastrophic meaning 50 percent or more of Logan County and its people could be affected.

Risk Assessment

Table 4.12.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for severe winter weather. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.12.2 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.12.2 – Logan County Severe Winter Weather Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	4	4	3	3	12
City of Fredonia	4	4	4	4	2	13
City of Gackle	4	4	4	3	2	12
City of Lehr	4	4	4	3	2	12
City of Napoleon	4	4	4	3	2	12

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.12.3 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of severe winter weather in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Vulnerabilities to Publicly-Owned Buildings and Property

Most publicly-owned buildings and property remain unaffected by impacts from severe winter weather. Damage occurs from heavy snow, frozen pipes, power outages or potential damage to structural foundations from freezing and thawing of soil. Roof collapses are the biggest single-event on property resulting from heavy snow loads that can result in the loss of life. Heavy snow can also block sewer vents on single-family homes which can cause fatalities. A portion of the roof of the bowling alley in the city of Napoleon collapsed in 2013.

A summary of publicly-owned buildings is provided in Chapter 3, Profile and Inventory.

Table 4.12.3 – Logan County, North Dakota Severe Winter Weather Risk Assessment

<p>Impact</p>	<p>Blocked Roads: Wentz Hills east of Napoleon along N.D. Highway 34</p> <ul style="list-style-type: none"> • Saturation of roadways annually due to inadequate/blocked drainage of snow melt • Restricted access for emergency services from snow blocking roads • Loss of Economy • Increased isolation of rural residents/small communities • Severe low temperatures may increase utility costs • Increased cost for fuel for snow removal during large snow events • Highways can become icy reducing mobility speeds • Heavy snow causing spring melting and potential flooding • Disruption in economic activity and transportation routes moving goods and people, and provided services • Increased difficulty in mobility of general population may result in missed work or school • May contribute to shortage or outage of critical materials and infrastructure due to limited mobility from blocked roads and restrict delivery of commodities and products to the marketplace 	<ul style="list-style-type: none"> • Delayed Emergency Response • Human Injury/Death • Livestock Loss • Loss of Power/Downed Power lines • Limited mobility of local employers and employees/general population • Additional calls for emergency services may strain resources • Sheltering stranded people • All county and city roads are impacted by severe winter weather, depending on wind direction and quantity of snow received and duration of the incident • Logan County experiences approximately \$7,038.46 in property damage and 3,846.15 crop damage annually annually from NCDC/NOAA. • Per crop loss information obtained from the U.S. Dept. of Agriculture, Risk Management Agency (RMA), crop loss due to severe winter weather totals \$117,885.39 annually in Logan County. • Temporary economic boost due to rebuilding/repairs of homes, businesses and other structures.
<p>Frequency</p>	<ul style="list-style-type: none"> • Multiple occurrences of blizzard, extreme cold, and heavy snow annually • Annual occurrences of power loss from ice storms • March 2017 snowstorm resulted in blocked roads all over the county and in city limits • Blizzard conditions, heavy snow, extreme wind chill occur each year 	<ul style="list-style-type: none"> • Strong winds are commonplace • Occurrences of blocked roads from heavy snow occurs frequently • 108 occurrences between January 1, 1996, and December 31, 2021, resulting in a probability of 100 percent.

Table 4.12.3 – Logan County, North Dakota Severe Winter Weather Risk Assessment – Continued

Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 	
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Lack of permanent generators at critical facilities and infrastructure • Aging infrastructure (roads, water, electrical systems) • Short staffing of local employers and employees/general population • Townships do not have equipment to clear roads and rely on farmers, the county, and private contractors • Low-lying roads shut down from snow accumulation • Longer response times from emergency services • Stranded motorists - primarily N.D. Highway 34 and 46 • County lacks time required to adequately respond to above average snow precipitation and accumulation • Increased removal of shelterbelts allows more ground blizzard conditions • Some township roads lack signage for navigation for emergency services and first responders in rural areas • Improper placement of existing shelter belts adjacent to roadways contributes to blockage • Lack of storm water systems in some communities may contribute to overland flooding during spring thaw • Critical facilities: Logan County Courthouse, Logan County Shops, Napoleon City Hall/Police Station, all fire halls and ambulance buildings county-wide 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Building Codes • Advanced warning and notification such as internet and TV • Switching of overhead telecommunication lines to underground – change to fiber-optic lines • Independent work ethic of local populations • County has adequate equipment for clearing roads during typical winter storm events • Better weather alerts and education of residents through internet, TV and cable • Increased awareness through Logan County IPAWS • Presence of social media alerting to the public • County highway department and NDDOT will assist ambulances to calls in rural areas during incidents of severe winter weather • Logan County Highway Department is on-call during blizzard warnings • Appropriately positioned living snow fences

Vulnerabilities of Critical Facilities and Infrastructure

The greatest issues for critical facilities and infrastructure resulting from severe winter weather impacts are inaccessibility due to blocked roads, and utility and power outages. The Logan County Courthouse, schools, lift stations and numerous critical facilities and infrastructure in Logan County should upgrade existing generators or install new generators to maintain power, if not done so already. See Chapter 6, Mitigation Strategy for a list of generators needed throughout the county.

Power. Critical facilities with backup generators are better equipped to handle impacts from severe winter weather if loss of power does occur. Suspended power lines are highly susceptible to high winds and subsequent fallen tree branches, other debris or accumulation of ice on power lines, leading to power outages. Restoration of power can take several days or up to several weeks in rare instances. All jurisdictions in the county have experienced power outages during severe winter weather to varying degrees of severity.

Road. The greatest issue for critical facilities and infrastructure is maintenance of the road system during severe winter weather. Emergency services can have trouble responding during power outages and are limited in responding to emergencies when roads are blocked from snow drifts. During blizzards or snowstorms, cars and trucks can become stranded if roads are blocked with heavy snow and ice. When Interstate 94 is closed, smart phone technology redirects interstate traffic to N.D Highways 34 and 46 which results in a high frequency of stranded motorists, most of whom are from out of state. Response times for emergency services can also be prolonged and prevent access to communities. Prolonged closures of roads can threaten propane, fuel and food supplies, and delivery of medical supplies.

Second Avenue in the city of Fredonia is impacted by snow drifts and becomes blocked during severe winter weather events.

Sanitary Sewer. Sanitary sewer systems can fail causing sewer backup resulting in property damage if prolonged power loss occurs and lift stations fail. **In the city of Napoleon, the city has a 30-minute window from initial power loss before sanitary sewer backups are reported by city residents.**

Water. Disruptions in drinking/potable water service can be caused by physical damage to water towers, the well house, or a loss of power. Delivery of water to jurisdictions can be interrupted by water main breakage resulting from freeze and thaw cycles.

Vulnerabilities to New and Future Development

New and future development could be seriously impacted by severe winter weather in jurisdictions that lack building codes and/or enforcement. Homes and businesses lacking the capability of supporting heavy snow loads could experience roof collapse. Jurisdictions without building codes and/or enforcement should have improved construction methods to better withstand severe winter weather.

Street design also plays an important role in vulnerability to severe winter weather. New and future development developed in a “suburban style” manner containing curvilinear roads and cul-de-sacs are more susceptible to severe winter weather impacts. Snow removal on these roadways has proven difficult and raises the potential for blocked roads and limits access for emergency services. Maintaining a high

level of connectivity, which is defined as how often streets or roadways intersect, can increase the ease of snow removal and lessen the impact of blocked roads and maintain access for emergency services.

Increases in population further complicate matters when dealing with severe winter weather. An example of this would be higher numbers of people susceptible to vehicle accidents on icy or blocked roads, health hazards due to wind chill and extreme cold, etc. Conversely, increases in populations in existing jurisdictions may lessen the risk to impacts from severe winter weather as it leads to less isolated populations and increases the number of people reachable by emergency services during an emergency.

Data Limitations

Residents often experience impacts from severe winter weather, such as minor structural damage, increased utilities, loss of livestock, frozen water lines, but do not report.

National Climatic Data Center/National Oceanic and Atmospheric Administration

The hazard history provided in terms of property damage and crop damage (which are only estimates) is calculated based on what the National Weather Service received from insurance companies and individual property owners upon request. Both sources have been reluctant to share that information. Therefore, both practices were discontinued. Because of this, the National Weather Service makes a best guess using all available data at the time of the publication. The damage amounts are received from a variety of sources. Property and crop damage should be considered as a broad estimate.

The hazard history provided through the National Climatic Data Center/National Oceanic Atmospheric Administration's Storm Events Database contains data as entered by NOAA's National Weather Service (NWS). Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures. **Severe winter weather was not recorded as a separate incident until 1996.**

- 1. Tornado:** From 1950 through 1954, only tornado events were recorded.
- 2. Tornado, Thunderstorm Wind and Hail:** From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.
- 3. All Event Types (48 from Directive 10-1605):** From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

U.S. Dept. of Agriculture, Farm Services Agency

The Livestock Indemnity Program (LIP) provides financial assistance to local producers that experience livestock losses. The program does not provide the cause of loss and, therefore, an accurate description of livestock loss from severe winter weather cannot be identified.

U.S. Dept. of Agriculture, Risk Management Agency

One of the Cause of Loss categories for crop loss data from the U.S.D.A., RMA is titled Other (snow, lightning, etc.) combines elements of severe summer weather and severe winter weather. Therefore, crop loss data for any given jurisdiction is incomplete.

Other Key Documents

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Building Codes
- Logan County Comprehensive Plan (1995)
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- Logan County Zoning Ordinance (2006)
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Dept. of Transportation Design Manual
- North Dakota Emergency Operations Plan, Severe Winter Weather Annex
- North Dakota League of Cities: Planning and Zoning Handbook
- North Dakota State Building Code
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.13 Space Weather

Conditions in space that affects Earth and its technological and infrastructure systems.

Characteristics

Space Weather is a consequence of activity on the sun, the Earth's magnetic field and atmosphere, and the Earth's location in the solar system. These storms originate from the sun and occur in space near Earth or its atmosphere. Disruptions are primarily categorized into three types of events: geomagnetic storm, solar flares, and solar radiation storms. The storms can affect critical facilities and infrastructure such as blackouts, and disruptions in high-frequency radios and satellite navigation.

Geomagnetic Storm is a major disturbance of Earth's magnetosphere that occurs when there is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth.

Solar Flares are large eruptions of electromagnetic radiation from the sun lasting from minutes to hours. The sudden outburst of electromagnetic energy travels at the speed of light, therefore, any effect upon the sunlit side of Earth's exposed outer atmosphere occurs at the same time the event is observed.

Solar Radiation Storms occur when a large-scale magnetic eruption, often causing a coronal mass ejection (CME) and associated solar flare, accelerates charged particles in the solar atmosphere to very high velocities.

Seasonal Pattern	None.
Duration	Minutes. Secondary impacts could last hours, days, weeks, months or even years.
Speed of Onset	Immediate identification from NOAA Space Weather Prediction Center; 8 minutes to reach the Earth.
Location	Total geographic extent of Logan County.

For more information regarding space weather please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The plan can be accessed by following the link:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](https://www.des.nd.gov/planning)

<https://www.des.nd.gov/planning>

History

According to the 2018 N.D. Enhanced Mission Area Operations Plan (MAOP), there are no recorded catastrophic space weather events impacting North Dakota. However, the following events from other locations across North America and the World provide insight.

- The nearest recorded event affected Montreal, Quebec, Canada on March 13, 1989, when a geomagnetic storm took out the electric power for nine hours impacting six million people.
- The largest geomagnetic storm in modern recorded history is named the Carrington Event. The solar super storm occurred on September 1st and 2nd, 1859, and impacted telegraph systems across Europe and North America. Auroras were recorded as far south as the Caribbean in the northern hemisphere.

There have been no declared disasters or emergencies pertaining to a space weather in Logan County.

Probability

The probability of space weather is 100 percent as the hazard is a natural phenomenon uncontrollable by humans and will occur at some point in the future. The 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP) documented six occurrences impacting Earth.

Profile meeting participants indicated the probability of space weather as possible, meaning that there is between a one and 10 percent chance of an occurrence in the next year.

Extent/Magnitude

The extent/magnitude of space weather can range from minimal to catastrophic. The National Oceanic and Atmospheric Administration Space Weather Prediction Center has created scales to communicate impacts on people and technologies from the hazard to the public. The scales have numbered levels of one to five, like other measurement scales for natural hazards like tornadoes and hurricanes. The scales rate the severity of possible effects of space weather. The extent/magnitude of a space weather event can range from extreme (radio blackout on the entire sunlit side of the earth or outages in maritime and aviation systems) to minor (slight degradation of radio communication or navigation signals).

Profile meeting participants indicated the magnitude or impact of space weather as catastrophic meaning 50 percent or more of Logan County and its people could be affected.

Risk Assessment

Table 4.13.1 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for space weather. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment. The total in Table 4.13.1 represents the sum of each jurisdiction’s impact, frequency, likelihood, and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.13.1 – Logan County, North Dakota Space Weather Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	4	1	2	4	2	9
City of Fredonia	4	1	2	4	2	9
City of Gackle	4	1	2	4	2	9
City of Lehr	4	1	2	4	2	9
City of Napoleon	4	1	2	4	2	9

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.13.2 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of space weather in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats is shown in Chapter 4.

Table 4.13.2 – Logan County, North Dakota Space Weather Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Business Interruptions • Delayed Emergency Response • Explosion • Financial Hardship (Private and Public) • Government Interruptions • HAZMAT Release • Human Injury/Death • Increased Fire Potential • Increased Public Safety Runs • Infrastructure Degradation • Labor Shortages • Loss of Communications • Loss of Economy • Loss/Overcrowded Medical Facilities • Loss/Overcrowded Veterinarian Facilities • Loss of Potable Water 	<ul style="list-style-type: none"> • Loss of Power/Electricity Outage • Loss of Transportation Accessibility • Mass Casualties/Fatalities • Property Damage (Structure, Equipment & Vehicle) • Public Distress/Social Discord • School Closure • Sewer Backup • Sheltering of Displaced Populations • Utility Outage/Shortage • Loss of digital infrastructure at Logan County Courthouse, Gackle Care Center, Gackle-Streeter Public School, Napoleon Care Center, Napoleon City Hall, Napoleon Public School
<p>Frequency</p>	<ul style="list-style-type: none"> • Never a recorded occurrence in Logan County or North Dakota 	<ul style="list-style-type: none"> • The nearest recorded event affected Montreal, Quebec, Canada on March 13, 1989, when a geomagnetic storm took out their commercial electric power for nine hours. The storm impacted six million people.
<p>Likelihood</p>	<ul style="list-style-type: none"> • Dependent on solar activity and the 11-year solar cycle 	<ul style="list-style-type: none"> • Likely to occur once every 500 years per the 2018 N.D. Enhanced Mitigation MAOP
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV – over-reliance on these systems to support society • Increasing dependency of digital/technological systems in agriculture, private and public sectors • Gas-powered backup generators for critical facilities and infrastructure – the availability of fuel sources may be impacted and/or not available to replenish systems 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet & TV • Local food production/households with gardens • Gas-powered backup generators for critical facilities and infrastructure
<p>Capability</p>	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address space weather. 	

Vulnerabilities to Publicly-Owned Buildings and Property

The physical integrity of publicly-owned buildings would not be impacted directly from space weather, but secondary impacts such as loss of electric power or digital/technological systems could affect operations. Secondary impacts resulting from loss of power include loss of heat during severe winter weather, which could result in frozen and burst water pipes causing widespread interior damage, sewer backups, and subsequent flooding, or loss of digital assets from damaged servers and other telecommunications infrastructure. Conversely, loss of power from a space weather event could compromise cooling systems during severe summer weather, which could result in server rooms overheating and shutting down either temporarily or permanently. The interdependency of electricity with the operation of publicly-owned buildings and property can lead to more complex issues and prolonged outages.

A summary of publicly-owned buildings and property in Logan County is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities such as the Logan County Courthouse, Gackle Care Center, Gackle-Streeter Public School, Napoleon Care Center, Napoleon City Hall, Napoleon Public School are vulnerable to space weather in a similar fashion to publicly-owned buildings and property. The Logan County Courthouse has a specific vulnerability to space weather as prolonged outages of power and data/technological systems could compromise security and endanger the overall functionality of the city of Napoleon and greater Logan County. Communication and utility infrastructure would also be disrupted from loss of power from space weather compromising the capabilities of emergency services and public and private sectors. The interdependency of electricity with the operation of critical facilities and infrastructure can lead to more complex issues and prolonged outages.

An inventory of critical facilities and infrastructure is provided in Chapter 3, Profile and Inventory.

Vulnerabilities to New and Future Development

As populations grow, more people are at risk to impacts from space weather such as those described in vulnerabilities to publicly-owned buildings and property, and critical facilities and infrastructure. A breakdown of population trends and projections by jurisdiction in Logan County is shown in Chapter 3, Profile and Inventory, and Chapter 8, Jurisdictions.

Installation of faraday cages/shields at specific locations and/or equipment such as technological/digital systems for buildings (both public and private) and sewer backup valves at critical facilities and infrastructure should be considered for new and future development, but also for existing publicly-owned buildings and property, and critical facilities and infrastructure. Investment in power grid system redundancies can also mitigate the impacts of space weather.

Data Limitations and Other Key Documents

Power and digital/technological system outages, whether brief or prolonged, occur on a regular basis across North Dakota and Logan County. Since these events are not considered normal for critical facilities and infrastructure and are caused by other hazards such as severe summer or winter weather, identification of the role space weather is limited. An analysis of each critical facility and infrastructure would be needed to identify specific vulnerabilities from space weather.

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation MAOP
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Space Weather Annex
- North Dakota State Disaster Recovery Plan
- North Dakota State Preparedness Report (SPR)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)

4.14 Transportation Incident

Including aircraft, bicycle, boat, bus, motorcycle, pedestrian, railway, truck, automobile vehicle, and recreational vehicle (ATV, side-by-side, etc.) incidents.

Characteristics

A transportation incident is any small or large-scale aircraft, bicycle, boat, bus, motorcycle, pedestrian, railway, truck, automobile vehicle, and recreational vehicle (ATV, side-by-side, etc.) involving mass casualties. Mass casualties can be defined as an incident resulting in many deaths and/or injuries that reach a magnitude that overtaxes the response abilities of local resources. In most disasters, death and injury represent one of the hazard impacts. In transportation incidents, mass casualties and/or resulting evacuations or hazardous material releases are often the primary impact and focus of the event.

Transportation incidents occur with little or no warning. They involve many people and require special types of equipment and emergency medical personnel. Such incidents not only affect people with significant numbers of deaths/injuries, but also cause traffic problems, property damage, or even a hazardous material release and/or explosion. The probability is increased during winter storms, periods of poor visibility from snow, smoke, or dust; festivities with more opportunities for drinking and driving; and times of increased traffic volume. The agricultural and energy economy of the region also increases the opportunity for the release of hazardous materials in a transportation incident.

Seasonal Pattern	None. Prevalent with the agriculture sector and general vehicular traffic. Incidents in rural areas of the county are more prevalent during severe winter weather/winter conditions.
Duration	Minutes/hours/days/weeks – depending on extent of the incident
Speed of Onset	Little to no warning
Location	Total geographic extent of the Logan County with a focus on N.D. Highways 3, 13, 30, 34, 46, and 56; county and township roads; the Dakota Missouri Valley & Western Railroad; the Napoleon Airport, and boating/recreational traffic on Beaver Lake State Park.

For more information regarding transportation incident please reference the **2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)**. The state plan can be accessed by following the electronic hyperlink or link to the N.D. Dept. of Emergency Services website:

[2018 North Dakota Enhanced Mitigation Mission Area Operations Plan](#)

<https://www.des.nd.gov/planning>

History

Per the profile meeting participants, traffic incidents with minor damage or injuries occur bi-monthly in Logan County (primarily in and around the city of Napoleon). Incidents involving cars and farm equipment occur annually. History on transportation incidents in Logan County was provided by the Logan County Sheriff's Office, Logan County Emergency Management, Dakota Missouri River & Western, and the N.D. Dept. of Transportation.

Logan County Emergency Management

Logan County Emergency Management provided the following information regarding aircraft incidents occurring in Logan County.

- **September 21, 2018.** A plane crashed into a field after striking a power line in rural Logan County 10 miles southwest of the city of Napoleon. A crop sprayer flown by an employee of Mattern Spray Service crashed when the right wing struck the top of a power pole. The plane lost control and crashed into a field on a nearby farmstead. The wreckage was scattered throughout a quarter-mile area. If the plane traversed another 20 feet in its path of destruction it would have entered a slough and the pilot could have drowned. Conversely, if the plane did not veer in the direction it did, it could have struck a house. The National Transportation Safety Board (NTSB) released the wreckage to the owner and cleared KEM Electric to begin power line repair. The N.D. Dept. of Health is investigating the crash as it resulted in the release of jet fuel into the environment. The pilot was air-lifted to Sanford Medical Center in Bismarck and survived the crash.

Rail

- According to Dakota Missouri River & Western, no Federal Railroad Administration reportable incidents have occurred in Logan County in the last three years.

N.D. Dept. of Transportation

Table 4.14.1 shows crash data provided by the N.D. Dept. of Transportation and is for crashes occurring on state highways in Logan County between 2005 and 2020. The following are key points from Table 4.14.1.

- Between 2005 and 2020, Logan County experienced 563 total crashes of which 483 were property damage only crashes, 75 were injury crashes resulting in 85 injuries, and five were fatal crashes resulting in five fatalities. Approximately 85.8 percent of crashes were property-damage only.
- Logan County experiences an average of 30 property-damage only crashes, five injury crashes resulting in six injuries, and .33 fatalities between 2005 and 2020, or 35 crashes annually.
- The last fatal crash in Logan County occurred in 2020.
- According to the Logan County Sheriff's Office, incidents involving vehicles with wildlife are no longer required to be reported as of 2014 and has resulted in a significant decrease in overall reported incidents in Logan County.

Table 4.14.1 – 2005 to 2020 Logan County, North Dakota Crash Summary

Year	Property Damage Only (PDO)	Injury Crashes	Total Injuries	Fatal Crashes	Total Fatalities	Total Crashes
2005	40	4	--	--	--	44
2006	34	2	4	1	1	37
2007	51	6	6	1	1	58
2008	50	5	6	1	1	56
2009	44	4	7	0	0	48
2010	40	2	5	0	0	42
2011	59	4	5	1	1	64
2012	42	4	4	0	0	46
2013	23	7	6	0	0	30
2014	15	2	3	0	0	17
2015	21	5	5	0	0	26
2016	10	4	4	0	0	14
2017	20	7	9	0	0	27
2018	15	9	9	0	0	24
2019	11	5	5	0	0	16
2020	8	5	7	1	1	14
TOTAL	483	75	85	5	5	563

Source(s): N.D. Dept. of Transportation

Probability

The probability of a hazard or threat is how likely it is it will happen. Per the N.D. Dept. of Transportation, Logan County experiences an average of 30 property-damage only crashes, five injury crashes resulting in six injuries, and .33 fatalities between 2005 and 2020, or 35 crashes annually.

The profile meeting participants indicated the probability of a vehicular transportation incident for Logan County is highly likely, meaning that there is a 100 percent probability in the next year of an incident. Transportation incidents involving aircraft, trains, and other modes of transportation are occasional.

Extent/Magnitude

The extent/magnitude of a hazard or threat is the expressed in the amount of damage or losses either caused or could occur in a community. Meeting participants at the profile meeting indicated the extent/magnitude of a transportation incident for Logan County would be critical, meaning an incident would result in noticeable damage to people, buildings, and property. According to the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), Logan County has a low-moderate vulnerability to transportation incidents based on analysis of its transportation infrastructure; the county does not have a commercial passenger airport, not interstate or U.S. Highways, and only has state highways and Level II railroad infrastructure.

According to 2016 N.D. Dept. of Transportation Crash Summary, approximately 10 percent of fatal crashes in the state occurred in urban locations and 90 percent of the fatal crashes occurred on rural roads. Logan County was not among the top 10 counties with estimated injury and fatality costs for motor vehicle crashes in 2016.

Figure 4.14.1 illustrates transportation system in North Dakota.

Risk Assessment

Table 4.14.2 shows the risk assessment as determined by individual jurisdictions, the Steering Committee, and meeting participants at the profile meeting for transportation incident. The risk assessment methodology can be found in the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA). The total in Table 4.14.2 represents the sum of each jurisdiction’s impact, frequency, likelihood and vulnerability to a hazard/threat less the jurisdiction’s capabilities to respond to the hazard/threat.

Table 4.14.2 – Logan County, North Dakota Transportation Incident Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Logan County	3	2	3	2	2	8
City of Fredonia	3	2	2	2	1	8
City of Gackle	3	2	3	3	2	9
City of Lehr	3	2	3	3	2	9
City of Napoleon	3	2	3	3	2	9

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 4.14.3 provides information on the specific impact, frequency, likelihood, vulnerability and capability of transportation incident in Logan County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard Identification Risk Assessment (THIRA).

Vulnerabilities to Publicly-Owned Buildings and Property

Publicly-owned buildings and property should not be affected by transportation incidents except in an instance where a train derails or a vehicle crash impacting a building. However, any truck incident involving hazardous materials, train derailments, or aircraft incidents occurring in proximity of a publicly-owned building or property could result in property damage, mass casualties/fatalities, or large-scale evacuations. Should an incident of this nature occur, damage could exceed hundreds of thousands or millions of dollars, depending on the structure impacted. Buildings supporting key functions to daily county and incorporated jurisdiction operations most vulnerable include but are not limited to Logan County Courthouse, public schools, and buildings supporting emergency services such as fire stations and ambulance halls. A transportation incident can result in power outages if occurring near and impacting power infrastructure. Power losses could result in the prolonged loss of service of publicly-owned buildings and property.

A summary of city and county-owned buildings and property in Logan County is provided in Chapter 3, Profile and Inventory.

Table 4.14.3 – Logan County, North Dakota Transportation Incident Risk Assessment

<p>Impact</p>	<ul style="list-style-type: none"> • Blocked roads from severe weather and at-grade railroad crossing with roads and highways • Explosion • HAZMAT Release • Human Injury/Death / Mass Casualties/Fatalities • Increased Fire Potential • Increased Public Safety Runs • Loss of Transportation/Accessibility 	<ul style="list-style-type: none"> • 85 injuries and five fatalities from vehicular crashes between 2005 and 2020 • Decrease in regional economic activity if impacting a major transportation artery for an extended period such as N.D. Highway 3
<p>Frequency</p>	<ul style="list-style-type: none"> • Annual occurrences of car crashes, truck-related incidents, etc. • Incidents of significance involving cars and truck occurs every 3 to 5 years • Aircraft accident in 2018 • No train derailments 	<ul style="list-style-type: none"> • Logan County experiences an average of 30 property-damage only crashes, five injury crashes resulting in six injuries, and no fatalities between 2005 and 2020, or 35 crashes annually.
<p>Likelihood</p>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • N.D. Highways 3, 13, 30, 34, 46, and 56; county and township roads; the railroad; the Napoleon Airport, and boating/recreational traffic on Beaver Lake State Park. • High truck traffic with chemicals, fuel, and farm and agriculture related industries on N.D. Highways 3 and 34. • Un-mechanized railroad crossings in the county 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Lack of an interstate or U.S. Highway • DMR&W infrastructure in the county is level II and therefore does not transport hazardous materials • The railroad infrastructure in the eastern portion of the county traversing through the city of Gackle was decommissioned in the late 1980s
<p>Vulnerability</p>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • N.D. Highways 3, 13, 30, 34, 46, and 56; county and township roads; the railroad; the Napoleon Airport, and boating/recreational traffic on Beaver Lake State Park. • High truck traffic with chemicals, fuel, and farm and agriculture related industries on N.D. Highways 3 and 34. • Un-mechanized railroad crossings in the county 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Lack of an interstate or U.S. Highway • Railroad infrastructure in the county is level II and therefore does not transport hazardous materials • The railroad infrastructure in the eastern portion of the county traversing through the city of Gackle was decommissioned in the late 1980s • In 2001/2002, road improvements were completed on 70th St. SE to reduce snow blocking access to Beaver Lake State Park near unincorporated Burnstad. Improvements consisted of removing trees and ditches were cut down to increase visibility.
<p>Capability</p>	<ul style="list-style-type: none"> • See Chapter 7 for a list of capabilities to address transportation incident. 	

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities such as the Logan County Courthouse, the Gackle Ambulance/Fire Hall, the Napoleon Ambulance/Fire Hall, and infrastructure such as water/wastewater treatment facilities and power grid infrastructure should not be affected by transportation incidents, except in rare occurrences if an incident physically impacts these facilities and/or infrastructure, or personnel employed therein are impacted by an incident.

Railroads or roads would be affected as this is where transportation incidents are likely to occur. Vulnerabilities could include a closure of a major transportation artery such as N.D. Highway 3 or the Dakota Missouri River & Western Railroad due to an incident, which can block access for emergency services, disrupt economic activity, and add strain onto other arteries in the overall transportation system. A transportation incident can result in power outages if occurring near and impacting power infrastructure. Power losses could result in the loss of critical facilities such as lift stations or water treatment plants. According to meeting participants, an MDU substation is located adjacent to Lake Avenue in southeast Napoleon. Lake Avenue experiences high truck traffic from agriculture-related activity and to the city of Napoleon landfill which is located east of the city. In addition, Construction of the new care center across Lake Avenue will have a noticeable increase in traffic, therefore increasing vulnerability of a transportation incident impacting the substation.

Vulnerabilities to New and Future Development

New and future development could result in increased traffic related to commercial, industrial or residential development. Any additional traffic will increase the probability of minor, moderate, or major transportation incidents. The location of new and future development will determine the probability of future transportation incidents and should be conducive to nearby transportation infrastructure – i.e., industrial development near major highways or railroads, or commercial development near existing commercial corridors or transportation infrastructure with high visibility. Locations of new and future residential development conducive to transportation infrastructure is dependent on the local zoning code and proposed density of each respective development. The new care center in Napoleon will increase the vulnerability of transportation incidents in southeast Napoleon and the adjacent MDU Substation.

Data Limitations and Other Key Documents

This plan incorporates data from the following documents and information from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- 2018 N.D. Highway Safety Plan
- 2020 N.D. Dept. of Transportation Urban High Crash Locations Report
- 2006 Logan County Zoning Ordinance
- Logan County Comprehensive Plan (1995)
- Logan County Local Emergency Operations Plan
- Logan County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Transportation Incident Annex

Chapter 4

- North Dakota State Disaster Recovery Plan
- North Dakota Statewide Transportation Improvement Plan (STIP)
- North Dakota Threat and Hazard Identification and Risk Assessment (THIRA)
- TransAction III, North Dakota's Statewide Strategic Transportation Plan

5. Future Conditions

The Federal Emergency Management Agency (FEMA) is now requiring inclusion of information on the long-term effects of climate change on identified hazards in state hazard mitigation plans. The 2021 Logan County Multi-Jurisdictional Multi-Hazard Mitigation Plan is incorporating this requirement at the local level to remain in line with state leadership.

National Climate Assessment (NCA)

Developed by the U.S. Global Change Research Program (USGCRP) is a synthesis of climate knowledge, impacts, and trends across regions of the United States and various sectors to inform decision-making with respect to a changing climate. This synthesis also identifies resilience-building activities that can be incorporated at the local level through mitigation planning.

Changes in North Dakota Weather and Climate

According to the NCA information included in the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), the state of North Dakota will experience the following changes in climate patterns across the state:

- More days with precipitation over a half-inch
- Longer dry spells (consecutive days without precipitation)
- Summer days with maximum temperatures over 95 degrees Fahrenheit will increase as well as summer nights with minimum temperatures over 65 degrees Fahrenheit
- Increase in winter and spring precipitation
- Warming winters

North Dakota's annual temperature increase over the previous 130 years is the fastest in the contiguous United States and is driven primarily by warming winters.

Anticipated Future Impacts

According to the NCA information included in the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), the following impacts for the state of North Dakota will influence the long-term vulnerability to natural hazards and will be realized if predictions on future conditions come to fruition:

- Increases in winter and spring precipitation may heighten chances of spring flooding leading to wetter soils to start growing season
- Longer growing seasons but continued risk for late spring and early fall freezing
- More days over 95 degrees Fahrenheit during the summer adding stress to livestock and increasing evaporation with subsequent drying of soils and degradation of plant life
- Increase in demand for energy during the summer (air conditioning)
- Decrease in demand for energy during the winter (heating)
- Potential increase in invasive species including animals, fungi, insects, plants, and viruses
- Decrease in culturally significant animal and plant life in tribal communities

Anticipated Future Impacts of Natural Hazards and Man-Made Threats

A changing climate will affect more than just temperatures and precipitation levels. An increase in frequency and severity of extreme heat events and severe summer weather which will adversely affect public health, water resources, and the production of agriculture (crops and livestock). A changing climate will simultaneously increase the frequency and severity of extreme cold and severe winter weather which will also adversely impact public health and water resources, in addition to essential services. The average length of the growing seasons will increase by 12 days per century in North Dakota.

According to the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), the expected impact of climate change on the 14 natural hazards and man-made threats detailed in this plan are outlined below.

- **Civil Disturbance.** Increased risk to civil disturbances targeted toward the oil and gas industry in North Dakota from growing public concern over impacts from climate change.
- **Criminal, Terrorist, or Nation-State Attack.** No expected impact.
- **Cyberattack.** No expected impact.
- **Dam Failure.** The expected increase in intensity and severity of precipitation events may put more dams at risk to scenarios that exceed original design criteria of each respective dam. Aging dams are most at risk to this expected impact.
- **Drought.** According to the 2014 NCA, the “Northern Plains, including North Dakota, will remain vulnerable to periodic drought because of the projected increase in precipitation is expected to occur in the cooler months while increase temperatures will result in addition evapotranspiration during the summer months. The warming trend observed in North Dakota is expected to continue, which may contribute to an increase in the frequency and intensity of drought in the state.” Drought impacts on vulnerable water users such as the agriculture industry and municipal systems will be exacerbated. Overall, droughts are expected to be more frequency and intense, which will result in increased losses.
- **Fire (Urban Structure/Collapse).** No expected impact. However, water supplies use for fire suppression may be compromised and occurrences may increase as North Dakota expects an increase in wildland fires.
- **Fire (Wildland).** The top 10 years with the largest area burned have all occurred since 2000 in the state of North Dakota. The frequency of wildland fires will increase as will the risk due to increasing rural residential development in the Wildland-Urban Interface. In addition, as of October 4, 2017, 96% of fire departments in North Dakota are staffed with volunteers. As the frequency and intensity of wildfires increase, these volunteer firefighters may become stressed for resources and time to respond to these fires. Volunteer fire departments are losing personnel strength when firefighters retire and, in many cases, move to larger towns where medical care is more readily available.

- **Flood.** According to the 2014 NCA, winter and spring precipitation is projected to increase in the northern Great Plains region relative to a 1971 to 2000 average. This increase in precipitation may exacerbate flooding in North Dakota due to the increased amount, but also due to precipitation falling when the ground is frozen and unable to absorb moisture. The number of days with heavy precipitation is also likely to increase by mid-century. Overall, climate change is projected to increase precipitation in North Dakota.
- **Geologic Hazard.** Increased development pressure and the impacts of climate change may increase risk to state assets if they are constructed on areas prone to geologic hazards. Expansive soils and landslides are likely to increase due to the projected increase in precipitation.
- **Hazardous Material Release.** Although largely human-caused, climate change indirectly impacts this hazard. The frequency of hazardous material releases may coincide with increased occurrences of natural hazards such as wildland fires and floods due to the vulnerability of fixed facilities that store hazardous materials or waste.
- **Infectious Disease.** The state of North Dakota should expect an increased risk to infectious disease and pest infestations in the future. The two largest factors influencing future risk relate to how and where population growth (or withdrawal) and development occurs.
- **Severe Summer Weather.** Uncertainty regarding changes in severe storms exists as the localized nature of the hazard is difficult to capture in climate models. However, it is expected that downpours will be exacerbated by climate change leading to an increase in flash flooding.
- **Severe Winter Weather.** Winter storms have increased in frequency and intensity since the 1950s. The tracks of storms has shifted northward over the United States. Winter and spring precipitation is expected to increase in North Dakota due to climate change. Liquid winter precipitation (indicated by ice storms) are more frequent. Increasing occurrences of winter storms that bring blizzard conditions, heavy snow, and ice will impact people and the local and state economy and will have an impact on critical facilities and infrastructure.
- **Space Weather.** No anticipated impact.
- **Transportation Incident.** Natural hazards can and do influence the probability and extent/magnitude of transportation incidents. Therefore, the changing nature of severe summer weather and severe winter weather from climate change will have an indirect impact on transportation incidents, primarily through hazardous road conditions. These conditions may put strain on existing emergency medical services and require an increase in sheltering capacities.

6. Logan County, North Dakota Mitigation Strategy

Mitigation Purpose, Goals, and Projects

The Logan County Multi-Jurisdictional Multi-Hazard Mitigation Plan includes a mitigation strategy consisting of six goals and specific mitigation projects for each incorporated jurisdiction based on the risk assessment developed at Steering Committee and jurisdictional meetings.

The following are the seven goals that were reviewed, updated, and approved:

Goal 1: Improve and expand education and outreach programs to improve public awareness of hazards.

Goal 2: Improve and expand administrative and technical capability to mitigate hazards.

Goal 3: Improve and expand financial capability to mitigate hazards.

Goal 4: Improve and expand planning and regulatory capability to mitigate hazards.

Goal 5: Reduce impacts of hazards.

Goal 6: Improve resiliency of critical facilities and infrastructure.

Goal 7: Provide places of refuge and early warnings for the public and vulnerable populations to take protective action during hazard events.

The mitigation strategy for Logan County consists of 34 mitigation projects.

All-natural hazards and man-made threats were considered, and mitigation projects were formulated based on the potential or previous effects of hazards, the high probability of hazard or threat occurrences, the vulnerability of jurisdictions to hazards, and hazards each project can mitigate. The problem statement for Logan County, which assisted in formulating specific mitigation actions to reduce the impacts of hazards, is shown before the mitigation actions.

Mitigation Project Development

The Steering Committee identified the following characteristics of each mitigation project and is included in each project profile:

- Description/benefit
- Hazard(s) addressed
- Affected jurisdiction
- Project status
- Priority
- Responsible agency
- Partners
- Timeframe for completion
- Cost
- Funding sources

Scoring and Prioritization

The Steering Committee also scored and ranked projects based on a FEMA process – STAPLEE – that allows a community to understand the support for a project; the potential costs in dollars, time and expertise; environmental impact; and the benefit of the project. The specific words in the acronym STAPLEE are social, technical, administrative, political, legal, economic, and environmental. Each project was scored using a one to five (1 to 5) scoring.

- A score of one (1) indicated a project is ineffective, not feasible and/or too costly;
- A score of three (3) was neutral, and
- A score of five (5) indicated the project was highly effective, feasible and/or a higher benefit compared to cost.

Each mitigation project included in the plan is valuable as it addresses needs specific to Logan County and its jurisdictions. Due to a variety of constraints, not all projects can be implemented simultaneously and must be prioritized with the most critical projects being emphasized for implementation in the near term. However, the prioritization of each project can change over time to respond to changes in a community and to take advantage of resources that become available.

The Steering Committee prioritized each mitigation project on a very high, high, medium, and low designation based on scoring of the documentation, past experiences and professional judgement, and what projects are technically feasible to accomplish based on the capabilities of all jurisdictions. Table 6.1 summarizes the projects by priority by jurisdiction.

Table 6.1 – Logan County, North Dakota Prioritization of Mitigation Projects by Jurisdiction

	Project Number by Prioritization			
<u>Jurisdiction</u>	<u>Low</u>	<u>Medium</u>	<u>High</u>	<u>Very High</u>
Logan County				
City of Fredonia				
City of Gackle				
City of Lehr				
City of Napoleon				

Projects with affected jurisdictions identified as ‘Logan County and incorporated jurisdictions’ are shown in the table under Logan County as these projects are assumed to be a county effort. Mitigation projects with jurisdictions specifically identified are represented in the respective jurisdiction profile located in Chapter 8, Jurisdictions.

Mitigation Project Titles

The title of each mitigation project corresponds with the category of mitigation capability it addresses: Administrative & Technical (AT), Education & Outreach (EO), Financial (F), and Planning and Regulatory (PR). A fifth category, Infrastructure (I), was created to identify projects involving construction activities and physical building efforts.

Acronyms and Definitions

The acronyms and definitions used in the responsible agency and partners section of each mitigation projects profile are described in Table 6.2.

Table 6.2 – Acronyms and Definitions of Responsible Agencies and Partners for Mitigation Projects

Acronym/Definition	Entity
ARS	U.S. Dept. of Agriculture, Agriculture Research Station
BOR	Bureau of Reclamation
CDBG	Community Development Block Grant
City Council(s)	Cities of Fredonia, Gackle, Lehr, and Napoleon
County Commission	Logan County Commission
DHS	Dept. of Homeland Security
DWR	N.D. Dept. of Water Resources
Emergency Management	Logan County Office of Emergency Management
Emergency Services	Ambulance, fire, law enforcement, specialty units (local, regional, state)
Engineering	Municipal engineering department or private engineering firms
EPA	Environmental Protection Agency
Extension	NDSU Extension/Logan County Service
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FRA	U.S. Dept. of Transportation, Federal Railroad Administration
FSA	USDA - Farm Service Agency
Historical Society	State Historical Society of North Dakota
HUD	U.S. Dept. of Housing and Urban Development
Media	<u>Newspaper:</u> Napoleon Homestead, Tri-County News <u>Social Media:</u> BEK Communications Facebook, Logan County Emergency Management Facebook, Logan County Sheriff's Office Facebook, Napoleon News Facebook, Gackle-Streeter Public School Facebook, Napoleon Public School Facebook, Napoleon Ambulance Facebook, Napoleon Care Center Facebook, Napoleon Fire Facebook, City of Fredonia Facebook, City of Gackle Facebook <u>Websites:</u> Logan County, City of Napoleon, Gackle-Streeter Public School, Napoleon Public School
Medical Service Providers	<u>Hospitals:</u> Linton Hospital (neighboring Emmons County), South Central Health, Wishek Hospital (neighboring McIntosh County), <u>Medical Clinics:</u> South Central Health, Napoleon Clinic; South Central Health, Gackle Clinic
NCDC	National Climatic Data Center
NDACo	N.D. Association of Counties
NDDA	N.D. Dept. of Agriculture
NDDC	N.D. Dept. of Commerce
NDDEQ	N.D. Dept. of Environmental Quality
NDDES	N.D. Dept. of Emergency Services
NDDH	N.D. Dept. of Health
NDDOT	N.D. Dept. of Transportation
NDGF	N.D. Game & Fish
NDGS	N.D. Geological Survey
NDIT/NRG	N.D. Information Technology/NRG Technology Services

**Table 6.2 – Acronyms and Definitions of Responsible Agencies and Partners for Mitigation Projects
– Continued**

Acronym/Definition	Entity
NDLC	N.D. League of Cities
NDTOA	N.D. Townships Officers Association
NOAA	National Oceanic and Atmospheric Administration
NRCS	U.S.D.A. Natural Resources Conservation Service
NWS	National Weather Service
PHMSA	Pipeline and Hazardous Materials Safety Administration
Planning & Zoning	Planning and Zoning Board or Commission, or County Commission & City Council(s)
Public Health	Central Valley Health District
PSC	Public Service Commission
Public Utilities	<u>Cable</u> : BEK Communications, Daktel, Dish Network/DirecTV/Satellite <u>Electricity</u> : Dakota Valley Electric Cooperative, Kidder Emmons McIntosh (KEM) Electric Cooperative, Otter Tail Power Company <u>Internet</u> : BEK Communications, Daktel, Dish Network/DirecTV/Satellite <u>Natural Gas</u> : None <u>Phone (cellular)</u> : AT&T, Smart Talk/Trac Phones, Verizon <u>Phone (landlines)</u> : BEK Communications, Daktel, Dish Network/DirecTV/Satellite <u>Waste (solid and water)</u> : Gahner Sanitation, municipal services <u>Water</u> : Individual wells, municipal wells, private irrigation systems, South Central Regional Water District, Southeast Water Users District
Public Schools	Gackle-Streeter Public School, Napoleon Public School
Public Works	Logan County Highway Department, Napoleon Public Works, city public works, county and city park boards/districts
Red Cross	American Red Cross
Regional Council	South Central Dakota Regional Council (SCDRC)
RD	U.S. Dept. of Agriculture – Rural Development
Social Services	Central Prairie Social Services District
USACE	U.S. Army Corps. of Engineers
USDA	U.S. Dept. of Agriculture
USFS	United States Forest Service
VOAD (Voluntary Organizations Active in Disaster)	Adventist Community Services, American Red Cross, Catholic Charities, Church of Jesus Christ of Latter Day Saints, Citizen Corps, Civil Air Patrol, FirstLink, Legal Services of North Dakota, Lutheran Social Services Disaster Response, Mental Health American of ND, N.D. Emergency Management Association (NDEMA), MECHAMA – Jewish Response to Disaster, Presbytery of Northern Plains, Psychological Association, Radio Amateurs, RSVP+, The Salvation Army, Team Rubicon, Inc., United Church of Christ – Northern Plains Conference, United Methodist Disaster Response – Dakotas Conference, World Renew
Water Resource District	Logan County Water Resource District Board
Weed Board	Logan County Weed Control Board

Problem Statements

Problem statements provide a concise description of the vulnerabilities of the jurisdiction to threats and hazards that should be addressed through mitigation actions. The specific mitigation actions to reduce the impacts of hazards are identified for each jurisdiction and are found after the problem statement. The problem statements and jurisdiction-specific mitigation projects can be found in Chapter 8, Jurisdictions.

Logan County

Logan County can be impacted by civil disturbance; criminal, terrorist or nation-state attack; cyberattack; dam failure; drought; fire (urban and wildland); flood (overland and riverine); geologic hazard; hazardous material release, infectious disease, severe summer weather, severe winter weather, space weather and transportation incidents. Economic loss to the agriculture and livestock industry, and hunting/recreational industry from natural hazards impacts the county's economy. Poor drainage in rural areas causes overland flooding resulting in blocking of roads and highways limiting access for emergency services and economic activity. Critical facilities and infrastructure lack sources of backup power. Beaver Lake State Park and incorporated jurisdictions lack outdoor emergency sirens and storm shelters. The county is enrolled in the National Flood Insurance Program. Severe summer weather and severe winter weather are frequent and impose property and crop damage. The county has existing mitigation capabilities that need to be expanded and upgraded. The county has integrated small-scale mitigation measures into its existing departments but relies on outside sources for funding and to accomplish large-scale mitigation projects.

Improvement and expansion of existing mitigation capabilities; upgrading of existing and installation of new outdoor emergency sirens, equipment, and communications; installation of generators at critical facilities and infrastructure; conducting of engineering studies to identify and implement improved drainage and drainage maintenance measures; upgrading/retrofitting or construction of storm shelters; and upgrading/expansion of administrative and technical, education and outreach, financial, and planning and regulatory capabilities are a priority for the county.

Logan County Project AT-1: Expand Administrative and Technical Mitigation Capabilities.

Description/Benefit		Expand administrative and technical mitigation capabilities to improve county readiness and preparedness. <u>Administration:</u> Update mutual aid agreements on a continuous basis. Special attention should be paid to public schools. Convert verbal to written. <u>Staff:</u> Conduct Floodplain Administrator and Planning and Zoning education in Logan County. Research options for relinquishing incorporated jurisdiction administration to Logan County. Educate staff to enforce building codes. <u>Technical</u> <ul style="list-style-type: none"> • Install solar-powered electronic fire index sign in the city of Napoleon at the intersection of N.D. Highways 3 and 34 or upgrade fire index sign at Logan County Courthouse in Napoleon, city of Gackle at intersection of N.D. Highway 46 and 56 • Install permanent generators – See Logan County Project AT-5 • Install and/or expand directional signage for emergency services, and for truck/hazmat routes wherever missing or needed – ordinances may be necessary. Cities of Gackle and Napoleon need improved truck route signage. • Install faraday cages/shields at digital/technological infrastructure systems at critical facilities and infrastructure • Install enhanced cybersecurity countermeasures (i.e., PA Traps/malware, multi-factor authentication, etc.) - specific attention should be paid to the recommendations made in N.D. Cybersecurity Maturity Assessment. 					
Hazard/Threat		All (Space Weather)					
Affected Jurisdictions		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		High					
Responsible Agency		County Commission, City Council(s), Emergency Services, NDIS, Public Schools, Public Works, Public Utilities					
Partners		Emergency Management, Extension, Planning & Zoning					
Completion Timeframe		Ongoing	Cost	Project-specific			
Funding Source		Local budgets. State and federal grants. FEMA. Public Utilities. Regional Council. RD. USFS.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
4	4	4	4	5	4	5	30
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP & Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Solicit project scope of work. Pursue grant funding or use local funds.		

Logan County Project AT-2: Upgrade and Expand Outdoor Early Warning System(s).

Description/Benefit		<p>Logan County coverage of current outdoor early warning system/sirens does not provide coverage to an adequate geographic expanse of the county. Upgrade existing manually activated sirens to radio/dispatch-activated sirens. There are no existing outdoor early warning sirens for the county outside incorporated cities. Additional investment should be made into NOAA Weather Radios.</p> <p>Upgrade sirens: City of Napoleon (Logan County Courthouse), City of Lehr at the city hall</p> <p>New sirens: Beaver Lake State Park (include cell phone booster/receiver), City of Napoleon at the city park</p> <p>NOAA Weather Radios: To any city or county residents, upon request</p>					
Hazard/Threat Addressed		Flood, Hazardous Material Release, Severe Summer Weather, Fire (Wildland)					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		Medium/High					
Responsible Agency		Emergency Management, Emergency Services					
Partners		County Commission, City Council(s), FEMA, NDDDES, NWS, Public Works					
Completion Timeframe		3 to 5 years	Cost	Siren: Up to \$20,000 per siren			
Funding Source		Local budgets. 9-1-1 funding. State Homeland Security Grant Program.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Develop specifications. Received EHP approval. Pursue grant funding. Approval by county commission/City Council(s).		

Logan County Project AT-3: Maintain Logan County, North Dakota Emergency Alerting System and Conduct User Training.

Description/Benefit		Logan County currently has a subscription to IPAWS. Logan County should continue participating in the required monthly testing schedule.					
		User training should be conducted with local first responders on a regular basis. A recurring schedule should be created to follow the monthly testing required by IPAWS.					
Hazard/Threat Addressed		All					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		Medium/High					
Responsible Agency		Emergency Management, Emergency Services					
Partners		County Commission, City Council(s), Emergency Services, Public Works					
Completion Timeframe		Ongoing and Continue.	Cost	IPAWS: \$250 annually			
Funding Source		9-1-1 funding.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Develop schedule and incorporated into existing plans.		

Logan County Project AT-4: Upgrade Existing/Purchase New Equipment & Infrastructure for Emergency Services & Incorporated Jurisdictions.

Description/Benefit		Purchase and/or install upgraded equipment for ambulance, fire and law enforcement. Improve administrative and technical capabilities of emergency services to mitigation the impact of hazards. A focus of emergency services should be to upgrade equipment to be GIS/GPS capable and be in compliance with SIRN 20/20.					
		<p>Fredonia, City of: Nothing identified at this time.</p> <p>Fredonia City/Rural Fire Dept: 800 Mhz trunking radios (SIRN 2020), new fire hall, two AEDs, medical bags with first aid</p> <p>Gackle, City of: Concrete barriers for crowd and traffic control during parades and community events, establish Sheriff's Office satellite office at city hall, garbage truck</p> <p>Gackle Ambulance: 800 Mhz trunking radios (SIRN 2020), AED, two medical bags with first aid kits</p> <p>Gackle Fire Dept: 800 Mhz trunking radios (SIRN 2020), new tanker/pumper combination truck, side-by-side w/ water tank</p> <p>Lehr, City of: Heating system for the Vet's Hall to be used at a storm shelter</p> <p>Lehr Fire Dept: 800 Mhz trunking radios (SIRN 2020), construct addition on fire hall to store bigger equipment, new grass rig</p> <p>Logan County Sheriff's Office: 800 Mhz trunking radios (SIRN 2020), portable surveillance cameras/drone, establish N.D. Highway Patrol office at Logan County Courthouse</p> <p>Napoleon, City of: 800 Mhz trunking radios (SIRN 2020), garbage truck, street sweeper, payload</p> <p>Napoleon Ambulance: 800 Mhz trunking radios (SIRN 2020)</p> <p>Napoleon Fire Dept.: 800 Mhz trunking radios (SIRN 2020), SCBAs and high-pressure air compressor, rescue pumper</p> <p>Napoleon Police Dept.: 800 Mhz trunking radios (SIRN 2020)</p>					
Hazard/Threat Addressed		All Hazard /Threats					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		High					
Responsible Agency		Emergency Management, Emergency Services					
Partners		County Commission, City Council(s)					
Completion Timeframe		Ongoing	Cost		Project-specific		
Funding Source		Local budgets. State and federal grants. CDBG, Emergency Services, FEMA, HUD, Public Utilities, RD, USFS.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	4	4	4	5	32
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Review by emergency services, cities, or county Budget or apply for grant funding. Approval by board, county commission, or City Council(s).		

Logan County Project AT-5: Install permanent generators and/or upgrade existing permanent or portable generators at critical facilities and infrastructure.

Description/Benefit		<p>Upgrade existing generators or install new generators to establish permanent source of backup power to maintain continued operation of the following critical facilities and infrastructure:</p> <p><u>Upgrade (permanent):</u> Logan County Courthouse, Lehr City Hall (to be used as a storm shelter)</p> <p><u>New (permanent):</u> Gackle-Streeter Public School, Napoleon Ambulance/Fire Hall, Napoleon Public School, City of Napoleon lift station and water tower, City of Gackle water pump station (includes control panel), BEK Communication service office in city of Napoleon, Logan County Highway Department (in process through USDA as of 2022), Lehr Vet’s Hall and/or City Hall</p> <p><u>New (portable):</u> Logan County Highway Department, City of Gackle (2), City of Napoleon (1), all fire departments (Fredonia, Gackle, Lehr, Napoleon), Lehr pumphouse</p> <p>Additional redundancies in power grid systems are a high priority.</p>					
Hazard/Threat Addressed		All Hazard /Threats					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		Ongoing and Continue					
Priority		Very High					
Responsible Agency		County Commission, City Council(s), Emergency Management, Emergency Services					
Partners		Medical Services Providers, Public Works, Public Utilities					
Completion Timeframe		Ongoing	Cost		Project-specific		
Funding Source		Public Utilities, Regional Council, RD., USDA. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program. State Homeland Security Grant Program.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	4	5	5	4	5	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Procure scope of work for project. Received EHP Approval. Apply for grant funding.		

Logan County Project AT-6: Encourage Fire Departments to Digitize Incident History.

Description/Benefit	The fire departments based in and serving Logan County maintain paper copies of incident history. Hardcopies are at risk to damage from fire and other miscellaneous hazards at the fire hall. Analysis of incident history is challenging at best with paper files.						
Hazard/Threat Addressed	Fire (Urban and Wildland), HAZMAT						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	Very High						
Responsible Agency	Emergency Services						
Partners	Emergency Management						
Completion Timeframe	1 year	Cost	Project-specific				
Funding Source	Local Budgets						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	1	5	5	5	5	31
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Identify fire department personnel capable of digitizing records. Select preferred digital method (excel, specified program or software).		

Logan County Project AT-7: Establish Permanent Maintenance System for Storm Water Systems/Drainage Ditches to Reduce and/or Eliminate Occurrences of Overland Flooding.

Description/Benefit	Create drainage ditch/storm water maintenance system to control flow of runoff to eliminate blocked roads, maintain access for city/county residents and emergency services, and maintain continuous operation of public infrastructure. Establishment of a system will assist in reimbursement from state and federal sources for expenses incurred during emergency events. The county highway department already has a schedule for maintaining storm water systems/drainage ditches but needs to be converted to a written document.						
Hazard/Threat Addressed	Drought, Flood (Overland), Infectious Disease, Severe Summer Weather, Severe Winter Weather, Wildland Fire						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	High						
Responsible Agency	County Commission, City Council(s), Public Works						
Partners	Emergency Management, Emergency Services, NRCS, SWC, Water Resource District						
Completion Timeframe	End of 2023	Cost	Staff-time				
Funding Source	Local budgets.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Development of system by county public works. Approval and adoption by county commission and water resource district board. Include as annex in local emergency operations plan.		

Logan County Project AT-8: Establish a “Safe Send” Site/Drop-Off Point for Disposal of Hazardous Materials.

Description/Benefit	<p>Surplus hazardous materials need to be disposed of properly to mitigate a release of hazardous materials and subsequent fires or infectious diseases. Establishment of a “Safe Send” will provide county residents to a place</p> <p>Logan County should work with Napoleon Landfill to include procedures for disposal in the county’s hazardous materials response plan. Specific attention should be paid to the waterway east of the landfill to assure no contamination occurs.</p> <p>A “Safe Send” site is available for fungicides, herbicides, and pesticides through the N.D. Dept. of Agriculture.</p>						
Hazard/Threat Addressed	Drought, Fire, Hazardous Material Release, Infectious Disease (All)						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New/Ongoing and Continue						
Priority	High						
Responsible Agency	County Commission, City Council(s), Public Works						
Partners	Emergency Management, Emergency Services, NRCS, SWC, Water Resource District						
Completion Timeframe	End of 2022	Cost	Staff-time				
Funding Source	Local budgets. Research local fee structure to address disposal costs.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	3	4	5	3	30
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Work with local emergency services to identify development of site.		

Logan County Project AT-9: Install Homeland Security Measures at Critical Facilities and Infrastructure.

Description/Benefit	<p>The Logan County Courthouse, emergency services buildings, and public schools are critical facilities, and utility and transportation infrastructure, are vulnerable to adversarial threats. Installation of (but not limited to) access control measures, alarms, cybersecurity enhancements, door alarms, door locks, enhanced lighting, security fencing, motion-detecting systems, security camera surveillance systems, and threat-proof building materials are needed to mitigate adversarial threats.</p> <ul style="list-style-type: none"> • Access Control Systems (Bollards): Gackle-Streeter Public School, Logan County Courthouse, Logan County Highway Department Shops (3), MDU Substation (city of Napoleon), Napoleon City Hall, Napoleon Public School • Alarm Systems: Install bell-alarm clock system at Gackle-Streeter Public School • Door Access Control Systems: Gackle Care Center, Gackle City Hall, Lehr Fire Hall, Napoleon Care Center, re-key or install keypads at Gackle-Streeter Public School • Security Camera Surveillance Systems: Logan County Courthouse (expand), Gackle City Hall, Lehr City Hall and Fire Hall, Logan County Highway Department Shops • Security Fencing: Around anhydrous plant in the city of Gackle (private business), Dakota Frontier Cooperative anhydrous tank (private business) • Security Lighting: Gackle-Streeter Public School, City of Napoleon Water Tower, MDU Substation (city of Napoleon) • Structures: Construction of exterior building/garage to store portable generator and miscellaneous equipment at Logan County Courthouse, addition onto Lehr Fire Hall, extension of shop building to Napoleon Public School for access control • Threat-Proof Doors and Windows: Gackle-Streeter Public School, Napoleon Public School 						
Hazard/Threat Addressed	Civil Disturbance; Criminal, Terrorist, or Nation/State Attack, Fire (Urban), Transportation Incident (all)						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	Very High						
Responsible Agency	County Commission, City Council(s), Emergency Management, Emergency Services, Public Works						
Partners	Dept. Homeland Security, NDDDES, private contractors						
Completion Timeframe	Ongoing	Cost		Project-specific			
Funding Source	Local budgets and department staff and resources. State Homeland Security Grants. FEMA. RD. USDA.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	4	5	5	3	3	29
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP & Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Develop scope of work and procure bids/quotes. Apply for grant funding. Select contractor. Receive EHP approval. Execute.		

Logan County Project AT-10: Support the N.D. Dept. of Water Resources Risk Mapping, Analysis, and Planning (RISK MAP).

Description/Benefit		The N.D. Dept. of Water Resources received funding from the Federal Emergency Management Agency (FEMA) to produce new and/or update flood maps for Logan County and incorporated jurisdictions. Workshops began Fall 2017.					
		Lack of participation will result in no opportunity to map unmapped areas or share risk knowledge and update existing maps.					
Hazard/Threat Addressed		Drought, Flood (Overland), Infectious Disease, Severe Summer Weather, Severe Winter Weather					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		Very High					
Responsible Agency		DWR					
Partners		County Commission, City Council(s), Emergency Management, Emergency Services					
Completion Timeframe		End of 2025	Cost	Staff-time			
Funding Source		FEMA					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment					

Logan County Project EO-1: Conduct Education and Outreach to Improve Household Disaster Readiness and Preparedness.

Description/Benefit		Continued education and outreach to keep households and vulnerable populations ready in case of a disaster using websites, social media, local media, utility inserts, mailings, etc. Develop new websites or communication outlets where necessary. Special attention paid to maintaining and further developing severe weather awareness campaign, ‘Are You Prepared’ information, shelter-in-place pamphlets, fire prevention, school safety, storm spotters’ program, Tier II, among others. Additional attention should be given to flooding, hazardous materials, severe weather, fire, truck routes, and safe routes to school. Outreach and attention should be given to mass notification systems.					
		Existing websites: Logan County, City of Napoleon, Gackle-Streeter Public School, Kidder Emmons McIntosh Electric Cooperative, Napoleon Public School					
		Existing social media: BEK Communications Facebook, City of Fredonia Facebook, City of Gackle Facebook, Gackle-Streeter Public School Facebook, City of Lehr, Logan County Emergency Management Facebook, Logan County Sheriff’s Office Facebook, Napoleon Ambulance Facebook, Napoleon Care Center Facebook, Napoleon Fire Facebook, Napoleon News Facebook, Napoleon Public School Facebook, NDSU Extension/Logan County					
		Develop new: Pursue additional social media platforms such as Instagram and Snapchat, where appropriate.					
Hazard/Threat Addressed		All Hazard /Threats					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		County Commission, City Council(s), Emergency Management, Emergency Services, Public Schools					
Partners		Extension, Media, Public Health, Public Utilities					
Completion Timeframe		Ongoing	Cost	\$1,000 to 2,000 annually			
Funding Source		Local resources. State and federal grants. Public Utilities.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
3	3	3	3	5	5	5	27
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Develop and review by appropriate jurisdictions or agencies. Review by state’s attorney. Distribute.		

Logan County Project EO-2: Increase Awareness of Methods for Prevention of Infectious Disease.

Description/Benefit	<p>Make public aware of risk of infectious diseases and methods for prevention in people, animals and crops for economic impact. Methods should focus on young and elderly populations (vulnerable and all populations), handwashing, influenza preparedness, and strategies used in agriculture-based economies such as pesticides, fungicides, herbicides and insecticides.</p> <p>New and future awareness should include social distancing and other measures to prevent the spread of infectious diseases.</p>		
Hazard/Threat Addressed	Infectious Disease (All)		
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions		
Project Status	New/Ongoing and Continue		
Priority	High		
Responsible Agency	Extension, Public Health, Weed Board, public information officers		
Partners	Emergency Management, Emergency Services, Dept. of Natural Resources, FSA, NDDA/State Veterinarian, NDDH, Medical Services Providers, RD, Stockmen’s Association, USDA		
Completion Timeframe	Ongoing	Cost	Project-specific
Funding Source	Extension. Public Health. Local, state and federal budgets or grants.		

Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)

Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	4	5	5	5	34

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

<u>Planning Mechanisms Utilized</u>	<u>Plan Element</u>	<u>Process for Integration</u>
Public Health (all plans) Logan County LEOP Logan County Mitigation Plan Logan County THIRA	Capability Assessment, Hazard History, Risk Assessment	Development by respective agency. Approval by county commission, city council(s) and emergency management. Distribute.

Logan County Project EO-3: Assist in the Annual Update of Central Valley Health District’s Strategic Plan.

Description/Benefit	Central Valley Health District (CVHD) provides contracted public health services to Logan County. The strategic plan for CVHD s required to be updated on an annual basis. The county should assist CVHD in this update where possible.						
Hazard/Threat Addressed	Infectious Disease (All)						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	High						
Responsible Agency	Public Health						
Partners	Emergency Management, Emergency Services, Medical Services Providers						
Completion Timeframe	Ongoing	Cost	Staff time and printing				
Funding Source	Public Health. Local, state, and federal grants.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Public Health (all plans) Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Development by Public Health. Approval by board. Distribute.		

Logan County Project EO-4: Develop and Implement Livestock Outreach Program.

Description/Benefit	Water and Feed Quality Program. Test the safety of water and feed for livestock to reduce the loss of livestock due to poor and/or inadequate quality. Program should focus on stock dams, well water, streams, and watersheds. Crop should be checked for nitrates.		
Hazard/Threat Addressed	Dam Failure, Drought, Flood, Infectious Disease, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions		
Project Status	Ongoing and Continue/New		
Priority	High		
Responsible Agency	Extension		
Partners	County Commission, City Council(s), Emergency Management, Emergency Services, Logan County Soil Conservation District, Producers, Media, N.D. Stockmen’s Association (NDSA), Weed Board, USDA (FSA, NRCS)		
Completion Timeframe	1 year. Ongoing and Continue.	Cost	\$3,000.00
Funding Source	NDSU Extension/Logan County. County budget. Grants (pay for water and feed test equipment).		

Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)

Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

<u>Planning Mechanisms Utilized</u>	<u>Plan Element</u>	<u>Process for Integration</u>
Bovine Emergency Response Plan (BERP) Drought Management Plan (State of North Dakota) Logan County LEOP Logan County Mitigation Plan Logan County THIRA	Capability Assessment, Hazard History, Risk Assessment	Development by NDSU Extension/Logan County. Review and approval by county commission. Updating of local plans.

Logan County Project EO-5: Increase Awareness of Drought Tolerant Practices and Soil Conservation Methods in Farming and Ranching, and Incorporated Jurisdictions.

Description/Benefit	Make public aware of crop programs, and drought tolerant practices and soil conservation methods in farming and ranching. Educating the public on rationing/restrictions on livestock feed and water usage. Prevent loss of crops and livestock during drought. Information for municipalities should focus on water conservation practices. A public awareness campaign for water conservation can increase awareness of drought.						
Hazard/Threat Addressed	Drought, Severe Summer Weather, Severe Winter Weather, Wildland Fire						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	Ongoing and Continue/New						
Priority	Medium						
Responsible Agency	Extension, NRCS						
Partners	Emergency Management, Emergency Services, Logan County Soil Conservation District, Media, Weed Board, USDA (FSA)						
Completion Timeframe	Ongoing	Cost	Contact Extension Office				
Funding Source	Rural Development. NRCS. Local resources. State and federal grants. North Dakota State University.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Bovine Emergency Response Plan (BERP) Drought Management Plan (State of North Dakota) Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Development by Extension. Approval by county commission, city council(s) and emergency management. Distribute.		

Logan County Project EO-6: Conduct Continuous Preventative Education to Increase Awareness of Cyberattack Threats.

Description/Benefit	<p>Make public aware of risk of cyberattacks such as Advanced Persistent Threats, Distributed Denial of Service, Doxing, Media Threats, Password Phishing Attacks, Socially Engineered Malware, and Unpatched Software. Specific attention should be paid to the framework developed and included in the K20W Initiative. Specific information should be developed for incorporated cities to protect utility infrastructure (i.e., Napoleon Potable Water System SCADA System, etc.)</p> <p>Specific education opportunities should be made available to staff at the Logan County Courthouse, Gackle-Streeter Public School, and Napoleon Public School.</p>						
Hazard/Threat Addressed	Cyberattack						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	Very High						
Responsible Agency	Logan County and Public Schools in partnership with Computer Express and NDIT						
Partners	County Commission, City Council(s), Emergency Management, Emergency Services, Public Schools						
Completion Timeframe	Ongoing					Cost	Project-specific
Funding Source	Local budgets. State and federal grants. NDIT. Homeland Security Grant Program.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	4	3	5	3	5	29
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Development by Logan County Office of Emergency Management, NDIT and Computer Express. Approval by county commission, city council(s) and emergency management. Distribute.		

Logan County Project EO-7: Make Public Aware of Risk of Shortage or Outage of Critical Materials or Infrastructure and Encourage Citizens to be Proactive and Self-Sufficient.

Description/Benefit	<p>Make public aware of risk of shortage of critical materials and/or infrastructure and encourage citizens to be self-sufficient. Use Logan Counties ‘Are You Prepared?’ brochure developed by Central Valley Health District.</p> <p>Educate residents on the importance of shelter-in-place, stocking of food, water, and medical supplies, fuel for heating, backup power generation, etc.</p>						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	High						
Responsible Agency	Emergency Management, Emergency Services, Public Schools, Social Services						
Partners	County Commission, City Council(s), Extension, Food Pantries, Media, NDDes, NDDH, Public Health, Public Utilities, Volunteer Organizations Aiding in Disaster (VOAD)						
Completion Timeframe	Ongoing	Cost	TBD				
Funding Source	Local budgets. State and federal grants. Private sector.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Central Valley Health District (all plans) Logan County THIRA State Vulnerable Populations Plan		Capability Assessment, Hazard History, Risk Assessment			Development by Emergency Management, Public Health, Public Schools, and Public Utilities. Approval by county commission, city council(s), school boards. Distribute.		

Logan County Project EO-8: Assist Central Valley Health District in Annual Updates to the Logan County Vaccination Outreach Plan and Perform Outreach.

Description/Benefit		<p>The influenza vaccination rate for school-aged children in Logan County needs to be increased. Develop outreach with the goal of increasing this rate to 100 percent. Recent immunization funding from the N.D. of Health will assist public health in increasing immunizations, creating a written outreach plan, and identify strategies to improve vaccine confidence in the community.</p> <p>It should be noted that the overall goal of 100 percent influenza vaccination for school-aged children is an objective/goal of Logan County. However, the rights of individual medical freedom and parent’s rights for the health of their children supersedes any local government objective/goal.</p> <p>All public schools in Logan County follow the immunization requirements set forth by the N.D. Dept. of Health, found on the following page. Exemptions are available to any parent or student who wishes to obtain one.</p>					
Hazard/Threat Addressed		Infectious Disease (only those that are vaccine preventable)					
Affected Jurisdiction(s)		Logan County, incorporated jurisdictions and unincorporated jurisdictions. Specific attention paid to communities with schools, care centers/nursing homes, higher education, and institutionalized populations.					
Project Status		New/Ongoing and Continue (new to the mitigation plan, but has always been executed by public health)					
Priority		High					
Responsible Agency		Public Health					
Partners		City Council(s), Emergency Management, Emergency Services, Medical Services Providers, Public Schools, Social Services, faith-based organizations. Local businesses and community champions.					
Completion Timeframe		Ongoing	Cost	Staff time and printing			
Funding Source		Public Health. N.D. Dept. of Health Immunization grant funding.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	4	5	5	5	34
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Central Valley Health District (all plans) Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Develop by Central Valley Health District. Approval by board, public schools and emergency management. Distribute.		

Logan County Project EO-9: Conduct Education and Outreach on Fire Safety and Prevention, Burn Bans, State Fire Indexes, and Regional/State Burning Regulations and Bans.

Description/Benefit	Make the public aware of methods to remain safe from risk of urban fire and wildland fire and potential prevention methods. Keep areas around buildings and structures clear of grass, overgrown vegetation and debris. Specific attention should be paid to property owners in city limits with substantial vegetation to reduce fuels for wildland fires. Education the public on burn bans and state fire indexes. Reduce risk of fire hazard from outdoor burning by residents and providing means of communication. Explore surface water access options for fire suppression. https://ndresponse.gov/burn-ban-restrictions-fire-danger-maps						
Hazard/Threat Addressed	Drought, Fire (Wildland), Hazard Material Release, Severe Summer Weather, Severe Winter Weather						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	Ongoing and Continue						
Priority	High. Primarily summer but can occur in spring and fall.						
Responsible Agency	Emergency Management, Emergency Services						
Partners	County Commission, Extension, fire departments/districts, NDDDES, NRCS, NWS, SCD						
Completion Timeframe	Ongoing	Cost	\$0 for a local PSA; \$1,000 to \$3,000/week for substantial outreach				
Funding Source	Local budgets. State and federal grants.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Development by Emergency Management and Emergency Services. Approval by county commission. Distribute.		

Logan County F-1: Expand and Improve Existing or Implement New Financial Mitigation Capabilities.

Description/Benefit	Expand financial mitigation capabilities to generate funds for completion of mitigation projects. <ul style="list-style-type: none"> • Create and implement impact fees for new development. • Restructure and improve building permit fees to be a percent of project cost. • Establish Capital Improvement Fund. • Restructure and increase utility fees (water, sewer) based on projected future infrastructure maintenance costs and necessary capital improvements. • Research additional revenue generators such as an electricity utility fee, wheel tax, etc. • Expand role of local economic development to generate more revenue through grant funding, loans funds, community endowment, etc. 						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	Very High						
Responsible Agency	County Commission, City Council(s)						
Partners	Emergency Management, Emergency Services, NDAC, NDLC, Planning & Zoning, Public Utilities						
Completion Timeframe	Ongoing	Cost		Staff-time			
Funding Source	Local budgets and staff time.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
3	4	4	1	5	5	5	27
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
City Council(s) and County Commission Planning Commission		Capability Assessment, Hazard History, Risk Assessment			Research effectiveness. Approval and adoption by county commission and city council(s).		

Logan County Project PR-1: Assure Logan County, North Dakota has FEMA-Approved Mitigation Plan.

Description/Benefit	Continuous assessment of vulnerabilities to the county and incorporated jurisdiction, and update of hazards and impacts, monitoring of mitigation project implementation and progress. Update plan on a continuing basis between plan update grant applications. See Chapter 10 and Appendix 8 of this plan.						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	Very High						
Responsible Agency	County Commission, Emergency Management						
Partners	Emergency Services, Extension, Planning & Zoning, Public Health, Public Works, DWR, Water Resource District						
Completion Timeframe	4 to 5 years	Cost	\$25,000 to \$50,000 (update of plan)				
Funding Source	Local budgets. FEMA’s HMGP or BRIC Grant program.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Hazard Mitigation Plan (all other existing mechanisms)		All elements			Adoption by county commission and city council(s). Approval NDDDES and FEMA.		

Logan County PR-2: Update/Expand Existing and/or Create New Planning and Regulatory Capabilities to Address Existing and New Development.

Description/Benefit		Build the planning and regulatory capability of Logan County and incorporated jurisdictions by updating existing and/or expand and create new plans, policies, and ordinances. To ensure new and existing structures adhere to building standards to withstand impacts from hazards. Energy development (oil and gas) in the western portions of the state may lead to economic and population growth in the future. Specific research should be conducted to address community fire/wildfire protection, cybersecurity, drought management, flood ordinances and management, grain bins, hazardous materials, impact fees, man camps, mitigation, rodent control, site plan review requirements, storm water management, and water conservation. Additional consideration should be given to prioritize sewer backup valves when upgrading existing or building new development. Redundancies in the power grid systems should be encouraged. Specific attention should be paid to tie-down procedures for temporary buildings. Develop and implement a county-wide computer security system/policy.					
		A list of plans, policies, codes and ordinances needing to be updated or created for Logan County and incorporated jurisdictions are bolded in text narratives and are found in Chapter 7, Capability Assessment.					
Hazard/Threat Addressed		All					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		High					
Responsible Agency		County Commission, City Council(s), Planning & Zoning					
Partners		Emergency Management, Emergency Services, NDACo, NDDES, NDLC, Public Works, RD					
Completion Timeframe		Ongoing	Cost	\$0 to \$100,000 / Staff-time			
Funding Source		Local budgets. Local, state and federal grants. Private sector.					
Values: 1 is low (negative impact and/or too costly) – Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	3	3	3	4	28
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
All		Capability Assessment, Hazard History, Risk Assessment			Development of specifications. Approval and adoption by county commission and city council(s).		

Logan County PR-3: Encourage Jurisdictional Participation in the National Flood Insurance Program (NFIP).

Description/Benefit	Ensure economic resiliency. Residents with property at risk would be insured. Ensure continuous review and updating or implementation of flood ordinances and flood control measures.						
Hazard/Threat Addressed	Flood (overland and riverine), Severe Summer Weather, Severe Winter Weather						
Affected Jurisdiction(s)	Logan County and the City of Napoleon. The cities of Fredonia, Gackle, and Lehr are not enrolled.						
Project Status	Ongoing and Continue						
Priority	Very High						
Responsible Agency	County Commission, City Council(s), Emergency Management						
Partners	Planning & Zoning, SWC, Water Resource District						
Completion Timeframe	Ongoing	Cost	\$0 to \$1,000 / staff time				
Funding Source	Local staff-time. FEMA. SWC.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Flood Ordinances Logan County LEOP, Flood Annex Logan County Mitigation Plan Logan County THIRA National Flood Insurance Program		Capability Assessment, Hazard History, Risk Assessment			Approval and adoption by county commission and city council(s).		

Logan County PR-4: Encourage Jurisdictions to Review Local Flood Ordinances to Meet or Exceed Minimum Federal and State Requirements, Comply with the NFIP (Once Enrolled) and Enroll in the Community Rating System.

Description/Benefit	To ensure Logan County and incorporated jurisdictions meet or exceed the NFIP and/or to prepare for enrollment in the NFIP.						
Hazard/Threat Addressed	Flood (overland and riverine), Severe Summer Weather, Severe Winter Weather						
Affected Jurisdiction(s)	Logan County and the City of Napoleon. The cities of Fredonia, Gackle, and Lehr are not enrolled.						
Project Status	Ongoing and Continue						
Priority	High						
Responsible Agency	County Commission, City Council(s), Emergency Management, Planning & Zoning						
Partners	Emergency Services, NDACo, NDDes, NDLC, DWR						
Completion Timeframe	Ongoing	Cost	\$0 to \$1,000 / staff time				
Funding Source	Local staff-time. FEMA. DWR.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	3	5	5	5	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Flood Ordinances Logan County LEOP, Flood Annex Logan County Mitigation Plan Logan County THIRA National Flood Insurance Program		Capability Assessment, Hazard History, Risk Assessment			Approval and adoption by county commission and City Council(s).		

Logan County PR-5: Create Post-Disaster Debris Management Plan and Update on an Annual Basis.

Description/Benefit		Provide temporary staging site for disposal of waste from structures to improve resiliency and recovery efforts and maintain quality of life. Establishment of a management plan increases disaster reimbursement from FEMA by five percent.					
Hazard/Threat Addressed		All					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New/Ongoing and Continue					
Priority		Medium					
Responsible Agency		County Commission, City Council(s), Emergency Management, Planning & Zoning, Public Works					
Partners		NDACo, NDDes, NDLC, Public Health, Public Utilities, Water Resource District					
Completion Timeframe		1 year. Annual review.			Cost	Staff-time	
Funding Source		Local budgets.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	4	3	3	5	5	29
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP (Appendix) Logan County Mitigation Plan Logan County THIRA Planning Commission		Capability Assessment, Hazard History, Risk Assessment			Organize planning committee and create plan. Approval and adoption by county commission and city council(s). Update annually.		

Logan County PR-6: Create Bovine Emergency Response Plan (BERP).

Description/Benefit		Gives first responders a standard operating procedure on how to mitigate issues pertaining bovine losses from natural hazards or man-made threats. The plan also assures public safety first and foremost, first responder safety, and animal well-being.					
		Training and education event with Central Grasslands Research Extension Center was conducted on October 29, 2021, at Napoleon Livestock.					
Hazard/Threat Addressed		Civil Disturbance, Dam Failure, Drought, Fire (Wildland), Flood, Hazardous Material Release, Infectious Disease, Severe Summer Weather, Severe Summer Weather, Transportation Incident					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		Medium/Low					
Responsible Agency		Extension, N.D. State Vet Office, local producers and/or veterinarians					
Partners		Emergency Management, Emergency Services, Weed Board, wrecker services					
Completion Timeframe		1 year	Cost	\$75 to \$100 per person. Staff time.			
Funding Source		Central Grasslands Research Extension Center. N.D. Beef Commission. Local budgets.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	4	5	5	5	5	34
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Develop draft plan and formally adopt by county commission. Integrate into local emergency services response protocols.		

Logan County PR-7: Update Flood Operations/Management Annex in the Logan County Local Emergency Operations Plan Annually.

Description/Benefit	Flooding impacts Logan County on an annual basis to varying degrees of severity. The Flood Operations/Management Annex in the Logan County Local Emergency Operations Plan should be updated annually based on the flooding event of the preceding year.						
Hazard/Threat Addressed	Dam Failure, Flood, Severe Summer Weather, Severe Winter Weather						
Affected Jurisdiction(s)	Logan County and Incorporated Jurisdictions						
Project Status	New						
Priority	Very High						
Responsible Agency	County Commission, City Council(s), Emergency Management, Emergency Services, Planning & Zoning, Public Works						
Partners	NDDDES, Public Health, Public Utilities, DWR, Water Resource District						
Completion Timeframe	1 year. Annual updates.			Cost	Staff time		
Funding Source	Local budgets.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP, Flood Annex Logan County Mitigation Plan Logan County THIRA Planning Commission		Capability Assessment, Hazard History, Risk Assessment			Utilize the Logan County LEPC or Mitigation Plan Steering Committee to update annually. Approval and adoption by county commission and city council(s).		

Logan County PR-8: Create Community Wildfire Protection Plan (CWPP).

Description/Benefit		<p>Logan County, incorporated jurisdictions, and unincorporated jurisdictions are becoming increasingly vulnerable to wildland fire due to an increase in the frequency and severity in drought and severe summer weather, and a growing interaction with its rural residential populations and the Wildland-Urban Interface.</p> <p>A Community Wildfire Protection Plan (CWPP) identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure. The CWPP recommends measures to reduce structural ignitability throughout the at-risk community, and may also address issues such as wildfire response, hazard mitigation, community preparedness, or structure protection - or all the above. The plan is developed in a collaborative framework between local government, local fire department(s), other stakeholders, and federal land management agencies that manage land in the planning area.</p> <p>The plan should place emphasis on achieving Firewise Certification for appropriate communities - https://rb.gv/uav9w5</p>					
Hazard/Threat Addressed		Drought, Wildland Fire, Severe Summer Weather, Transportation Incident					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New					
Priority		High					
Responsible Agency		County Commission, Emergency Management, Emergency Services, Planning & Zoning, Public Works					
Partners		City Council(s), NDDES, Public Health, Public Utilities, SWC, Water Resource District					
Completion Timeframe		2 to 3 years	Cost	\$25,000 to \$35,000			
Funding Source		Local budgets. State and federal grants. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Budget for the plan locally or obtain grant funding. Identify Steering Committee to direct the planning process. Adoption by City Council(s), county commission and fire departments.		

Logan County Project I-1: Assure Continued Monitoring and Maintenance of Dams in Logan County and Conduct Necessary Maintenance/Repair Work.

Description/Benefit	To protect human life and property from dam failures. <u>EAPs and contact information should be updated on an annual basis for each respective dam.</u> See Chapter 4.4 Dam Failure for additional information on high and medium hazard dams in Logan County. A full list of dams in Logan County can be found in the hazard history for the county on a disc at the beginning of this plan.						
Hazard/Threat Addressed	Dam Failure, Flood, Severe Summer Weather, Severe Winter Weather						
Affected Jurisdictions	Logan County and Incorporated Jurisdictions						
Project Status	Ongoing and Continue						
Priority	Very High						
Responsible Agency	Emergency Management						
Partners	County Commission, City Council(s), Engineering, Public Works						
Completion Timeframe	Ongoing.	Cost	To be determined. Project specific.				
Funding Source	Local, state and federal budgets, grants, and resources. Private dam owners.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element Utilized</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Hazard Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment, dam failure statistics			Work with state agencies to incorporate monitoring and maintenance schedules into local planning mechanisms.		

Logan County Project I-2: Retrofit and/or Upgrade Bridges, Culverts, Railroads, Roads and/or Grade Raises, Stormwater Pipes, and Underpasses to Withstand Natural Hazards and Adversarial Threats to Prevent Blockage to Maintain Access for Emergency Services.

Description/Benefit		Increase resiliency of bridges, culverts and railroads, roads, and stormwater pipes to maintain transportation to assure economic vitality and access for emergency services. A detailed description of each bridge, culvert, railroads, roads, and stormwater pipes is shown on the following page and in Chapter 4.4, Flood.					
Hazard/Threat Addressed		Drought, Fire (Wildland), Flood (overland and riverine), Hazardous Material Release, Severe Summer Weather, Severe Winter Weather					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		Ongoing and Continue/New					
Priority		Very High					
Responsible Agency		County Commission, FHWA, FRA, NDDOT, Public Works, Water Resource District					
Partners		Emergency Management, Emergency Services, Planning & Zoning					
Completion Timeframe		Ongoing	Cost	Project-specific			
Funding Source		FHWA, FRA and NDDOT. FEMA Hazard Mitigation, Section 406. State and federal grants.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA N.D. Dept. of Transportation State Transportation Improvement Plan (STIP)		Capability Assessment, Hazard History, Risk Assessment			Develop engineering specifications. Secure funding. Approval and adoption by county commission, township boards, and City Council(s).		

Logan County Project I-2: Retrofit and/or upgrade bridges, culverts, railroads, roads and/or grade raises, stormwater pipes, and underpasses to withstand natural hazards and prevent blockage to maintain access for emergency services.

Bridges:

Culverts: Install upgraded culvert at the intersection of Main St. North and 2nd Ave North in the city of Lehr. Culverts between North Lake/West Lake traversing under the DMR&W and N.D. Highway 34.

Pipes (stormwater):

Railroads: Starkey Township

Road Retrofits and/or Grade Raises:

Underpasses: None in the county at the time of this plan update.

Logan County Project I-3: Construct New Storm Shelters/Community Safe Rooms or Retrofit Existing Structures to Reduce and/or Eliminate the Risk to Vulnerable Populations and the Public.

Description/Benefit		Provide safe area of refuge for permanent residents, temporary populations, and seasonal/recreational populations from severe weather. Reduce/eliminate loss of life from hazards and man-made threats. Upgrade existing shelters to be fully ADA compliant and pet friendly. Construct new storm shelters/community safe room in jurisdictions currently lacking a storm shelter/safe room. Procure shelter supplies where necessary. More information on community shelters can be found through the following link: https://www.fema.gov/media-library/assets/documents/5090					
		Purchase cots and store at each public school.					
		Upgrade: American Legion Hall (City of Napoleon), Gackle Care Center, Gackle-Streeter Public School, Napoleon Care Center, Logan County Courthouse, Napoleon City Hall/Police Station, Napoleon Public School,					
		New: City of Fredonia, City of Lehr – Vet’s Hall and City Hall					
Hazard/Threat Addressed		All					
Affected Jurisdiction(s)		Logan County and Incorporated Jurisdictions					
Project Status		New/Ongoing and Continue					
Priority		Medium					
Responsible Agency		Emergency Management, Emergency Services, Public Health					
Partners		County Commission, City Council(s), NDDDES, Red Cross, Social Services, private housing/community owners,					
Completion Timeframe		3 to 5 years		Cost	\$75,000.00 to \$150,000.00 per shelter		
Funding Source		Local, state and federal grants. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	3	3	3	5	1	3	23
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Approval by county commission, City Council(s), and private house/community owners		

Logan County Project I-4: Remove and Reposition Inadequate Living Snow Fences at Strategic Points to Maintain Visibility and/or Install New Living Snow Fences.

Description/Benefit	Removal of trees and vegetation too close to sides of roads and flatten back slopes. Replace and plant new trees in appropriate areas to reestablish living snow fences. Figures on the following page illustrate locations of concern. City of Fredonia: 2 nd Avenue on the west side of the city City of Gackle: West side of Birch St., Gackle Country Club City of Lehr: West side of the fire hall City of Napoleon: 4 th St. West north of the railroad track, West side of 7 th St. W south of the railroad near the city park Logan County: Johannesdale Township near Section 31						
Hazard/Threat Addressed	Infectious Disease, Severe Summer Weather, Severe Winter Weather, Transportation Incident						
Affected Jurisdiction(s)	All						
Project Status	Ongoing and Continue						
Priority	Low						
Responsible Agency	Road Department						
Partners	Emergency Management, Emergency Services, NRCS, NDGF, USFS						
Completion Timeframe	Ongoing	Cost	Ongoing				
Funding Source	Local budgets and department staff and resources. NRCS.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County Courthouse General/Improvement Fund Logan County LEOP & Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Commission studies through a formal bidding process. Select contractor. Apply for grant funding to execute or budget in local budgets. Receive funding through NRCS.		

Logan County Project I-5: Construct and/or specific plausible solution identified in engineering study from water resource district.

Description/Benefit							
Hazard/Threat Addressed		Flood, Infectious Disease, Severe Summer Weather, Severe Winter Weather					
Affected Jurisdiction(s)		Logan County and the city of Napoleon					
Project Status		New					
Priority		Very High					
Responsible Agency		County Commission, Water Resource District					
Partners		Emergency Management, Emergency Services, DWR					
Completion Timeframe		TBD	Cost	DWR			
Funding Source		DWR.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	3	5	5	5	5	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA Logan County Water Resource District Capital Improvement Plan		Capability Assessment, Hazard History, Risk Assessment					

7. Mitigation Capability

Capability for mitigation is divided into four categories: Administrative and Technical, Education and Outreach, Financial, and Planning and Regulatory. Chapter 7.1 provides an assessment of the mitigation capabilities of Logan County and incorporated jurisdictions.

- Table 7.1.1 highlights **administrative and technical** capabilities.
- Table 7.1.2 highlights **education and outreach** capabilities.
- Table 7.1.3 highlights **financial** capabilities.
- Table 7.1.4 highlights **planning and regulatory** capabilities.
- Table 7.1.5 shows the **utilization of planning mechanisms** in Logan County by natural hazard/man-made threat and mitigation project.

Sources for mitigation funding are shown in Chapter 7.2, Mitigation Funding Sources.

Current planning mechanisms, and the process for integration of the mitigation plan into planning mechanisms, are discussed after Table 7.1.4 and before Table 7.1.5. The process to integrate the mitigation plan into existing planning mechanisms for each jurisdiction is shown in the respective jurisdiction profile in Chapter 8, Jurisdictions following the mitigation capability assessment.

Information in the tables is outlined as follows:

1. Boxes checked with an “X” indicate the jurisdiction possesses the capability; while boxes left blank indicate the jurisdiction is lacking the capability.
2. An asterisk (*) indicates a capability that can be obtained through the county, contracted services, or an outside entity.
3. A ^ denotes a mitigation capability in progress.

Narratives following each table detail the capabilities of Logan County and incorporated jurisdictions are found in Chapter 7.1, Mitigation Capability Assessment. Information on the capabilities of each jurisdiction was gathered at committee meetings, and jurisdictional workshops, and interviews during the planning process. **Bolded narratives identify mitigation projects.**

Each identified resource in the four mitigation capability categories can be used to implement mitigation strategies and access funding for projects. A definition of each mitigation capability category is provided.

- **Administrative and Technical:** Identification of administrative and technical capabilities, which includes staff and their skills and tools for mitigation planning to implement specific mitigation actions.
- **Education and Outreach:** Identification of education and outreach programs, and methods already in place to implement mitigation activities and communicate hazard-related information.
- **Financial:** Identification of access to or eligibility to use funding resources for hazard mitigation for jurisdictions.
- **Planning and Regulatory:** Jurisdictional plans, policies, codes, and ordinances adopted and in place that prevent and reduce the impacts of hazards.

7.1 County/City Jurisdiction Mitigation Capability Assessment

Table 7.1.1 shows the administrative and technical capabilities of the Logan County and incorporated jurisdictions. A box marked with an “X” indicates the jurisdiction has or has access to the administrative or technical capability for mitigation. An asterisk (*) denotes an administrative and technical capability that can be obtained through the county for incorporated jurisdictions, or contracted services or an outside entity for the county. A ^ denotes an administrative and technical capability in progress.

Administration

1. Logan County has an active county commission. The cities of Fredonia, Gackle, Lehr, and Napoleon have active city councils.
2. **Logan County has an active local emergency planning committee (LEPC). The cities of Fredonia, Gackle, Lehr, and Napoleon are represented by the local emergency planning committee (LEPC).**
3. **Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have an active mitigation planning committee through the county LEPC.**
4. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have joint powers agreements (mutual aid) with emergency services in the county, incorporated jurisdictions, and neighboring counties. **The mutual aid agreements between emergency services (ambulance, fire, and law enforcement) should be reviewed/updated on an annual basis.**
5. **Logan County has staff capable of mitigation activities. County staff includes the auditor's office, economic development director, emergency management, extension office, tax equalization, public health, recorder's office, and the sheriff's office. The auditors, city council members, and emergency services personnel for the cities of Fredonia, Gackle, Lehr, and Napoleon are capable of mitigation activities. Additional staff capable of mitigation activities in the city of Napoleon include the public works director and chief of police. Also, the superintendents at each public school are capable of mitigation capabilities.**
6. Logan County does not have a park board. The cities of Gackle and Napoleon has a park board separate from the city council. The cities of Fredonia and Lehr do not have park boards.
7. The Logan County Commission serves as the planning commission. The cities of Fredonia, Gackle, Lehr, and Napoleon have planning commissions through their city councils.
8. Logan County has a zoning administrator. The city of Napoleon has an appointed city council that acts as the administrator. The cities of Fredonia, Gackle, and Lehr have zoning administrators through their city councils.
9. The Logan County Commission serves as the planning and zoning board. The cities of Fredonia, Gackle, Lehr, and Napoleon have a planning and zoning board through their city councils.
10. Central Valley Health District Board serves Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon as its public health board.
11. Logan County has a water resource board. The cities of Fredonia, Gackle, Lehr, and Napoleon have a water resource board through Logan County.
12. Logan County has a weed board. The cities of Fredonia, Gackle, Lehr, and Napoleon have a weed board through Logan County.

Staff

1. Logan County has a part-time 9-1-1 coordinator. The cities of Fredonia, Gackle, Lehr, and Napoleon receive 9-1-1 coordination through Logan County.
2. **Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have a building official/inspector/board.**
3. Community planner/planning services are available to Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon through the regional council or other contracted services.
4. Logan County has a part-time contracted emergency manager. The cities of Fredonia, Gackle, Lehr, and Napoleon receive emergency management services through the Logan County contract.
5. Logan County has law enforcement services through the Logan County Sheriff's Office. Ambulance protection is provided to Logan County and the city of Napoleon receive ambulance services through Napoleon Ambulance Service. The city of Gackle receives ambulance services through Gackle Ambulance Service. The city of Fredonia receives ambulance services through the Kulm Ambulance. The city of Lehr receives ambulance services through Wishek Ambulance. The city of Napoleon has its own police department. The cities of Fredonia, Gackle, Lehr, and Napoleon have their own fire departments.
6. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have a full-time engineer on-staff. Engineering services are provided by contract and/or on as-needed basis.
7. Logan County has a floodplain administrator. The auditor serves as the floodplain administrator for the cities of Fredonia, Gackle, and Lehr. The chief of police serves as the floodplain administrator for the city of Napoleon.
8. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon can obtain GIS services as-needed through their respective engineering contract, the state, or another private entity.
9. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have staff with grant writing and administration capability through their respective auditor and/or other city/county staff.
10. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon receive public health services through Central Valley Health District in Jamestown.
11. The Logan County Highway Department serves as the public works department for Logan County. The cities of Fredonia, Gackle, Lehr, and Napoleon each have its own public works employee(s).
12. Logan County has a full-time Sheriff and two deputies. The Logan County Sheriff's Office provides law enforcement services through mutual aid to the cities of Fredonia, Gackle, Lehr, and Napoleon.

Technical

1. **Emergency services in Logan County and the city of Napoleon have GIS/GPS capabilities through the Computer Aided Dispatch (CAD) system administered through state radio. Emergency services in the cities of Fredonia, Gackle, and Lehr are not GIS/GPS capable. Emergency services personnel use app-based services on their mobile devices.**
2. Logan County does not have any manually-activated emergency sirens outside of incorporated city jurisdictions. The cities of Fredonia, Gackle, Lehr, and Napoleon have manually-activated sirens that are also dispatch-activated.
3. There are no radio-activated emergency sirens in Logan County outside incorporated jurisdictions. **However, a radio-activated emergency siren is needed at Beaver Lake State Park.** The city of

Napoleon has radio-activated emergency sirens at the Logan County Courthouse, near the Napoleon Public School, and the northwest side of the city along Avenue G. **The city of Napoleon needs an additional radio-activated emergency siren at the city park on the southwest side of the city.**

The city of Fredonia has a radio-activated emergency siren at its fire hall. The city of Gackle has a radio-activated emergency siren at its city hall. The city of Lehr has a manually-activated emergency siren.

4. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not maintain municipal fire breaks.
5. Logan County has a fire index sign at Beaver Lake State Park. The city of Napoleon has fire index signs at the Logan County Courthouse and at the fire hall. The city of Gackle has a fire index sign at city hall. The city of Lehr has a fire index sign at the fire hall. The city of Fredonia does not have a fire index sign.
6. Logan County does not have a county-wide fire department and therefore does not have a fire ISO rating. The fire ISO rating for Fredonia Fire Dept. is The fire ISO rating for Gackle Fire Dept. is The fire ISO rating for Lehr Fire Dept. is The fire ISO rating for Napoleon Fire Dept. is The fire ISO rating for fire departments based in Logan County in shown in Table 7.1.1.
7. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have Firewise Certification.
8. Logan County has a permanent generator at the Logan County Courthouse. The city of Fredonia does not have any permanent generators but needs one at its fire hall. The city of Gackle has a permanent generator at its ambulance/fire hall and Gackle Care Center, but needs permanent generators at city hall, for the lift station/water system, and the Gackle-Streeter Public School. The city of Napoleon has a permanent generator at the city hall/police station. The city of Napoleon needs permanent generators for its ambulance/fire hall, lift station, shelters, Napoleon Care Center, and the Napoleon Public School.

See Chapter 6, Mitigation Strategy project AT-4 or Chapter 8, Jurisdictions for a list of generators needed for each incorporated jurisdiction.

9. Logan County has one portable generator stored at each county shop. The city of Napoleon has one portable generator used specifically for its lift station. **The cities of Fredonia, Gackle, Lehr, and Napoleon need portable generators.**
10. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have a HAZUS Analysis.
11. The Logan County Highway Department and the respective public works department in the cities of Fredonia, Gackle, Lehr, and Napoleon conduct infrastructure maintenance on an as-needed basis and/or as-requested.
12. **Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have navigation signs for emergency services. All signs need to be monitored routinely for replacement due to impacts from severe weather, sun bleaching, etc. Logan County and incorporated cities need emergency route signage.**
13. N.D. State Radio, city councils, and emergency services (ambulance, fire, law enforcement) report hazard data to county emergency management.

Table 7.1.1 – Administrative and Technical Capabilities – Logan County, ND

Administrative and Technical Mitigation Capability		Logan County	City of Fredonia	City of Gackle	City of Lehr	City of Napoleon
Administration						
1	County/City Council or Commission	X	X	X	X	X
2	Local Emergency Planning Committee (LEPC)	X	*	*	*	*
3	Mitigation Planning Committee	X	*	*	*	*
4	Mutual Aid Agreements	X	X	X	X	X
5	Other Staff for Administration	X	X	X	X	X
6	Park Board	X	X	X	X	X
7	Planning Commission	X	X	X	X	X
8	Planning and Zoning Administrator	X	X	X	X	X
9	Planning and Zoning Board	X	X	X	X	X
10	Public Health Board	X	*	*	*	*
11	Water Resource Board	X	*	*	*	*
11	Weed Board	X	*	*	*	*
Staff						
1	911 Coordinator/Director and User Board	X	*	*	*	*
2	Chief Building Official/Inspector/Board					
3	Community Planner/Planning Services	*	*	*	*	*
4	Emergency Management/Local Coordinators	X	*	*	*	*
5	Emergency Services (ambulance, fire, law enforcement)	X	X	X	X	X
6	Engineering Services	*	*	*	*	*
7	Floodplain Administrator	X	X	X	X	X
8	GIS Coordinator	*	*	*	*	*
9	Grant Writing & Administration Staff	X	X	X	X	X
10	Public Health	*	*	*	*	*
11	Public Works and/or Road Department	X	X	X	X	X
12	Sheriff	X	*	*	*	*
Technical						
1	Emergency Services GIS/GPS capable	X	*	*	*	X
2	Emergency Siren (manually-activated)					
3	Emergency Siren (radio-activated)		1	1	1	3
4	Fire Break					
5	Fire Index Sign	1				1
6	Fire ISO Rating					
7	Firewise Certification					
8	Generator (permanent)	1		1		1
9	Generator (portable)					1
10	HAZUS Analysis					
11	Infrastructure Maintenance Programs	X	X	X	X	X
12	Navigation Signs for Emergency Services	X	X	X	X	X
13	Reporting of Data to Emergency Manager	X	X	X	X	X
14	StormReady Certification					
15	Warning Systems/Services	^	^	^	^	^

*Denotes administrative and technical capability available to the jurisdiction through the county, contracted services, or an outside entity.

14. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have StormReady Certification.
15. **Logan County has an early warning system through the state everbridge contract through IPAWS. The system allows county personnel to create emergency alerts and disseminate them to county residents who are signed up for the service. Residents in the cities of Fredonia, Gackle, Lehr, and Napoleon receive early warning through this system.**

Table 7.1.2 shows the education and outreach capabilities of the Logan County and incorporated jurisdictions. A box marked with an “X” indicates the jurisdiction has or has access to the education and outreach capability for mitigation. An asterisk (*) denotes an education and outreach capability that can be obtained through the county for incorporated jurisdictions, or contracted services or an outside entity for the county.

1. Events in the Logan County where education and outreach can be conducted include 4th of July Parade in Gackle, Tri-County Fair in Wishek, Napoleon Public School Alumni Weekend held at the American Legion, Napoleon Ambulance EMS Week, Napoleon Corn Show, and Santa Claus Days in Napoleon.
2. Logan County conducts continuous education and outreach through its social media presence, local newspaper, tax statement inserts, websites, and radio stations to county residents and the cities of Fredonia, Gackle, Lehr, and Napoleon.
3. Non-profit organizations/citizen’s groups providing public education and outreach in Logan County include, but are not limited, to emergency services (ambulance, fire, law enforcement), church groups, 4-H, Wildlife Club, Senior Citizen’s Group, Napoleon Business Association, and Logan County Livestock and Grain. The Lion’s Club provides funding to various entities in Logan County for education and outreach and host events for local youth.
4. Logan County did not identify any ‘Other’ education and outreach capabilities in addition to those listed in categories 3 and 4.
5. Private entities providing education and outreach to Logan County include Cenex Harvest States (CHS), Dakota Missouri Valley & Western (DMV&W), Gackle Coop, Dakota Frontier Cooperative, Allied Energy, Montana-Dakota Utilities, Dakota Valley Electric Cooperative, and Kidder-Emmons-McIntosh (KEM) Electric.
6. Public Entities providing public education include, but are not limited to, incorporated city councils and emergency services, Central Valley Health District, Logan County Emergency Management, Logan County Sheriff’s Office, South Country Social Services, and NDSU Extension/Logan County. Logan County receives public information and outreach from the state of North Dakota and the federal government.
7. The Logan County Local Emergency Planning Committee (LEPC) is a public-private partnership providing education and outreach to Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon. Farm Safety Week is hosted by Farm Bureau in conjunction with Napoleon Ambulance Service and Gackle Ambulance Service.
8. Public schools conduct an annual storm and fire awareness program in conjunction with local emergency services. The Logan County Sheriff’s Office also provides education and outreach to public schools. The Logan Soil Conservation District conducts education and outreach to adults and youth through Eco-Ed Day. NDSU Extension/Logan County hosts Logan County 4-H Program and

other healthy eating programs. Fire departments in Logan County conduct Fire Safety Prevention Week. Farm Safety Week is hosted by Farm Bureau in conjunction with Napoleon Ambulance Service and Gackle Ambulance Service.

9. Social media in Logan County includes Facebook pages maintained by Logan County to provide education and outreach to county residents include Logan County Emergency Management and the Logan County Sheriff’s Office, and NDSU Extension/Logan County. The city of Napoleon has a Facebook page called Napoleon News. The city of Gackle and Napoleon Police Department have Facebook pages. The Gackle-Streeter Public School and Napoleon Public School maintain Facebook pages. The Napoleon Public School has a Twitter account. The city of Fredonia has a Facebook page.
10. **Logan County and the city of Napoleon maintain websites with hazard education and outreach media. The cities of Fredonia, Gackle, and Lehr do not maintain websites with hazard education and outreach media. Gackle-Streeter Public School and Napoleon Public School maintain websites with hazard education and outreach. NDSU Extension/Logan County has a website hosted through North Dakota State University.**

Table 7.1.2 – Education and Outreach Capabilities – Logan County, ND

Education and Outreach Mitigation Capability		Logan County	City of Fredonia	City of Gackle	City of Lehr	City of Napoleon
1	County/City Events	X	X	X	X	X
2	County Emergency Management	X	*	*	*	*
3	Non-Profit Organizations/Citizen Groups	X	X	X	X	X
4	Other					
5	Private Entities	X	*	*	*	*
6	Public Entities	X	X	X	X	X
7	Public-Private Partnerships	X	*	*	*	*
8	School Programs	X	X	X	*	X
9	Social Media	X	*	X	X	X
10	Website with Hazard Education	X	*	X	*	X

*Denotes education and outreach mitigation capability available to the jurisdiction through the county, contracted services, or an outside entity.

^ Denotes capability in progress.

Table 7.1.3 shows the financial capabilities of the Logan County and incorporated jurisdictions. A box marked with an “X” indicates the jurisdiction has or has access to the financial capability for mitigation. An asterisk (*) denotes a financial capability that can be obtained through the county for incorporated jurisdictions, or contracted services or an outside entity for the county.

1. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have the authority to levy taxes for specific purposes, such as sales tax or special assessments, to raise revenue if warranted. A vote is required to pass any new taxes for specific projects. The city of Napoleon has a two one-percent sales taxes for economic development and public facilities.

2. **Logan County issues building permits for non-agriculture related buildings on a flat-fee basis. The cities of Gackle and Napoleon issue building permits at a cost based on the overall valuation of each project. The cities of Fredonia and Lehr do not issue building permits.**
3. **Logan County has a capital improvement fund. The city of Napoleon has a capital improvement fund. The cities of Fredonia, Gackle, and Lehr do not have a capital improvements fund/line items in local budgets.**
4. The Logan County does not qualify for funding through the Community Development Block Grant (CDBG) as it does not meet the low-to-moderate income requirement. However, CDBG can be obtained through a survey, project-specific projects, or economic development. Eligibility status of the cities of Fredonia, Gackle, Lehr, and Napoleon can be obtained by contacting the South Central Dakota Regional Council in Jamestown.
5. Montana-Dakota Utilities, Dakota Valley Electric Cooperative, Kidder-Emmons-McIntosh (KEM) implement a facility charge on the electric usage bill for customers in Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon.
6. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon qualify for grant funding through FEMA because Logan County has an approved multi-hazard mitigation plan.
7. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon issue general obligation bonds and/or special tax bonds to raise revenue, if warranted.
8. **Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon qualify for grant funding through the Dept. of Homeland Security’s State Homeland Security Grant Program, USDA Rural Development, and Logan County Jobs Development Authority. Public schools in the county qualify for federal title grants. Kidder-Emmons-McIntosh Electric Cooperative provides grants for youth programs such as pools, parks, youth sporting activities, etc. The Gackle Future Development Company provides funding for non-profit organizations in the city of Gackle such as the Legion Hall, Gackle-Streeter Public School, Gackle Public Library, Gackle Fire Department and Gackle Ambulance Service.**
9. **Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have impact fees for new development.**
10. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon did not identify any “Other” financial mitigation capabilities such as a road district, street maintenance, or wheel tax.
11. Private entities provide financial assistance for mitigation activities in Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon.
12. Property taxes are the primary source of revenue for Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon.
13. **Logan County does not have sanitary sewer utility fees outside incorporated jurisdictions. Most county residents utilize septic systems. Regulation of these systems is conducted in conjunction with Central Valley Health District in Jamestown and local public health through an on-site sewer treatment system permit. The cities of Fredonia, Gackle, Lehr, and Napoleon administer sanitary sewer utility fees to maintain existing systems and current operations.**
14. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have access to state funding programs.
15. **Logan County and the cities of Fredonia, Gackle, and Lehr do not have a storm water utility fee. The city of Napoleon has a storm water utility fee.**

Table 7.1.3 – Financial Capabilities – Logan County, ND

Financial Mitigation Capability		Logan County	City of Fredonia	City of Gackle	City of Lehr	City of Napoleon
1	Authority to Levy Taxes for Specific Purposes (sales tax or special assessments)	X	X	X	X	X
2	Building Permits	X		X		X
3	Capital Improvement Fund	X				X
4	Comm. Dev. Block Grant (CDBG)	*	*	*	*	*
5	Electric Utility Fee	X	X	X	X	X
6	FEMA Grant Programs	X	X	X	X	X
7	General Obligation Bond/Special Tax Bond	X	X	X	X	X
8	Grant Programs (other)	X*	*	*	*	*
9	Impact Fees for New Development					
10	Other					
11	Private Entities or Activities	X	X	X	X	X
12	Property Tax	X	X	X	X	X
13	Sanitary Sewer Utility Fee					
14	State Funding Programs	X	X	X	X	X
15	Storm Water Utility Fee					
16	Water Utility Fee					

* Denotes financial mitigation capability available to the jurisdiction through the county, contracted services, or an outside entity. ^ Denotes capability in progress.

16. Logan County and the cities of Fredonia and Lehr do not assess water utility fees for their respective municipal drinking/potable water systems. The cities of Gackle and Napoleon assess water utility fees to maintain their drinking/potable water systems.

Table 7.1.4 shows the planning and regulatory capabilities of the Logan County and incorporated jurisdictions. Boxes marked with an “X” indicate the jurisdiction has the planning and regulatory capability. An asterisk (*) indicates a capability that can be obtained through the county, contracted services, or an outside entity.

1. Logan County and the cities of Fredonia, Gackle, and Lehr do not have an abandoned building/nuisance ordinance. The city of Napoleon has an abandoned building/nuisance ordinance.
2. **Logan County and the cities of have adopted state building codes but lack enforcement.**
3. **Logan County issues building permits for non-agriculture related buildings on a flat-fee basis. The cities of Gackle and Napoleon issue building permits at a cost based on the overall valuation of each project. The cities of Fredonia and Lehr do not issue building permits.**
4. Logan County Emergency Management issues burn bans when necessary. The Logan County Commission manages burn bans and is the decision-maker for lifting bans.
5. **Logan County has a capital improvement fund. The city of Napoleon has a capital improvement fund. The cities of Fredonia, Gackle, and Lehr do not have a capital improvements fund/line items in local budgets.**

- 6. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have a building official/inspector/board. Inspection services are provided through the state.**
7. Logan County has a commercial animal feed operation ordinance. The cities of Fredonia, Gackle, Lehr, and Napoleon do not have commercial animal feed operation ordinances.
8. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have a community wildfire protection plan.
- 9. Logan County and the city of Napoleon have comprehensive plans. The cities of Fredonia, Gackle, and Lehr do not have comprehensive plans.**
- 10. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have continuity of operations plans, but are not in written documents. Central Valley Health District has a continuity of operations plan that includes Logan County. The Napoleon Fire Dept has bylaws that act as a continuity of operations plan.**
- 11. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon does not have crew camp ordinances.**
- 12. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have drought management plans.**
13. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have easements.
14. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have economic development plans through their local economic development authority/corporation. The county collects the revenue through mills and disperses it to each individual authority/corporation.
15. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have any dams with emergency action plans.
16. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon are included in the state of North Dakota's emergency operations plan.
17. Central Valley Health District maintains an evacuation and shelter plan that includes Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon.
- 18. Logan County and the cities of Gackle and Napoleon have FEMA Flood maps as they are enrolled in the National Flood Insurance Program (NFIP). The cities of Fredonia and Lehr are not enrolled and do not have flood maps.**
19. Logan County and the cities of Gackle and Napoleon have a flood insurance study. The cities of Fredonia and Lehr do not have a flood insurance study.
- 20. Logan County has a flood operations/management plan that is an annex of the county's local emergency operations plan. The county's flood operations/management plan includes the cities of Fredonia, Gackle, Lehr, and Napoleon.**
- 21. Logan County and the cities of Gackle and Napoleon have flood ordinances. The cities of Fredonia and Lehr do not have flood ordinances.**
22. Logan County and the cities of Gackle and Napoleon have a flood risk management feasibility study. The cities of Fredonia and Lehr do not have flood risk management feasibility study.
- 23. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have grain bin ordinances.**
- 24. Logan County has a multi-jurisdictional multi-hazard mitigation plan that is updated every five years. The cities of Fredonia, Gackle, Lehr, and Napoleon are included in this plan.**
25. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have a hazardous materials flow study through the N.D. Dept. of Emergency Services.

- 26. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have impact fees for new development.**
27. Logan County and the city of Napoleon have land use plans in their zoning ordinances. The cities of Fredonia, Gackle, and Lehr do not have land use plans.
28. Logan County has a local emergency operations plan. The cities of Fredonia, Gackle, Lehr, and Napoleon are included in the county's plan, but also have individual local emergency operations protocols. Central Valley Health District has a local emergency operation plan that includes Logan County and incorporated jurisdictions.
- 29. Logan County and the cities of Gackle and Napoleon are enrolled in the National Flood Insurance Program (NFIP).**
30. Logan County does not have noise control ordinances. The city of Napoleon has a noise control ordinance. The cities of Fredonia, Gackle, and Lehr do not have noise control ordinances.
- 31. Central Valley Health District maintains a pandemic influenza response plan. The cities of Fredonia, Gackle, Lehr, and Napoleon are included in the county's plan.**
32. The Logan County Commission serves as the planning and zoning commission. The city councils for the cities of Fredonia, Gackle, Lehr, and Napoleon serve as the planning and zoning commission.
- 33. Central Valley Health District maintains a point of dispensing (POD) plan. The cities of Fredonia, Gackle, Lehr, and Napoleon are included in this plan.**
34. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have a rural development guide.
- 35. Central Valley Health District maintains a shelter and mass care plan. The cities of Fredonia, Gackle, Lehr, and Napoleon are included in this plan.**
- 36. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have site plan review requirements.**
- 37. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon do not have storm water management plans.**
- 38. Logan County and the cities Fredonia, Gackle, Lehr, and Napoleon do not have a strategic plan. However, Central Valley Health District a strategic plan that includes Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon. The South Central Regional Council in Jamestown has a five-year strategic plan that includes Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon.**
39. Logan County and the city of Napoleon do not have subdivision ordinances in its zoning ordinances.
40. Logan County and the cities of Fredonia, Gackle, Lehr, and Napoleon have a transportation plan through the N.D. Dept. of Transportation.
- 41. Logan County and the cities Fredonia, Gackle, Lehr, and Napoleon do not have a water conservation plan.**
42. Logan County and the city of Napoleon have zoning ordinances. The cities of Fredonia, Gackle, and Lehr do not have zoning ordinances. All townships in Logan County have relinquished zoning authority to the county.

Table 7.1.4 – Planning and Regulatory Capabilities – Logan County, ND

Planning and Regulatory Mitigation Capability		Logan County	City of Fredonia	City of Gackle	City of Lehr	City of Napoleon
1	Abandoned Building/Nuisance Ordinance					
2	Building Codes	X	X	X	X	X
3	Building Permits	X	X			
4	Burn Bans	X	*	*	*	*
5	Capital Improvement Plan/Fund	X				X
6	Chief Building Official/Inspector/Board	*	*	*	*	*
7	Commercial Animal Feed Operation Ordinance	X				
8	Community Fire/Wildfire Protection Plan					
9	Comprehensive Plan	X				X
10	Continuity of Operations Plan	X	*	*	*	*
11	Crew Camp Ordinance	X				
12	Drought Management Plan					
13	Easements	X	X	X	X	X
14	Economic Development Plan	X	X	X	X	X
15	Emergency Action Plans (Dams)					
16	Emergency Operations Plan (State)	*	*	*	*	*
17	Evacuation and Shelter Plan	X	*	*	*	*
18	FEMA Flood Map	X		X		X
19	Flood Insurance Study	X		X		X
20	Flood Operations/Management Plan	X	*	*	*	*
21	Flood Ordinance	X		X		X
22	Flood Risk Management Feasibility Study	X		X		X
23	Grain Bin Ordinance					
24	Hazard Mitigation Plan	X	*	*	*	*
25	Hazardous Material Flow Study	*	*	*	*	*
26	Impact Fees					
27	Land Use Plan	X		X		X
28	Local Emergency Operations Plan	X	*	*	*	*
29	National Flood Insurance Program (NFIP)	X		X		X
30	Noise Control Ordinance					
31	Pandemic Influenza Response Plan	*	*	*	*	*
32	Planning Commission	X	X	X	X	X
33	Point of Dispensing (POD) Plan	*	*	*	*	*
34	Rural Development Guide					
35	Shelter and Mass Care Plan	*	*	*	*	*
36	Site Plan Review Requirements					
37	Storm Water Management Plan					
38	Strategic Plan	*	*	*	*	*
39	Subdivision Ordinance					
40	Transportation Plan	*	*	*	*	*
41	Water Conservation Plan					
42	Zoning	X		X		X

*Denotes planning and regulatory mitigation capability available through the county, contracted services, or an outside entity. ^ Denotes capability in progress.

Supplemental Planning and Regulatory Capabilities

Strategic plans for jurisdictions aside from incorporated cities such as townships can be used for mitigation purposes. In addition to strategic plans, townships that have zoning in place, including a zoning commission and a zoning administrator, can use zoning for mitigation purposes.

Integration of Mitigation Plan into Planning Mechanisms

To integrate the requirements of the mitigation plan into jurisdiction-specific planning mechanisms, such as comprehensive or capital improvement plans, incorporated cities will need to identify their current planning mechanisms, which elements of the mitigation plan to incorporate, and the method for doing so. The tables shown above in this chapter identify the current planning mechanisms for each county and incorporated city in the Logan County. Detailed narratives regarding these planning mechanisms are discussed for the counties in this chapter, but are shown in Chapter 8, Jurisdictions for incorporated cities.

The jurisdiction profiles in Chapter 8 will also supplement existing jurisdiction-specific plans for most all incorporated cities. However, all incorporated cities have some type of planning mechanism, such as building codes, ordinances and/or zoning. Those cities without plans (excluding planning mechanisms) will participate in county-wide planning initiatives such as the Logan County Emergency Operations Plan by providing risk assessment data or consider mitigation plan goals and mitigation strategies when updating zoning or implementing subdivision ordinances.

Current planning mechanisms, the mitigation plan elements incorporated and the method for incorporation are discussed after each mitigation project in Chapter 6, Mitigation Strategy and Chapter 8, Jurisdictions.

7.2 Mitigation Funding Sources

Funding sources from mitigation can come from a variety of resources. The following funding sources for the Federal Emergency Management Agency (FEMA) and other outlets are outlined below. These sources can fund and administer mitigation projects in addition to the local capabilities of the county and city jurisdictions. In addition to the financial capabilities of Logan County, the following local, regional, state and federal entities can be used to obtain funding for mitigation.

- Ambulance Districts;
- Electric Cooperatives;
- Extension Service;
- Federal Emergency Management Agency (FEMA);
- Fire Districts;
- N.D. Dept. of Public Health;
- N.D. Dept. of Emergency Services;
- Park Districts;
- School Districts;
- Townships, and
- Utility providers.

FEMA Funding Sources

Building Resilient Infrastructure and Communities (BRIC) Grant Program. The BRIC program is an annually funded, nationwide, competitive grant program. No disaster declaration is required. Federal funds will cover 75 percent of a project's cost up to \$3 million. As with the HMGP and FMA, a FEMA-approved local Hazard Mitigation Plan is required to be approved for funding under the BRIC program.

Hazard Mitigation Grant Program (HMGP). The HMGP is a post-disaster mitigation program. It is made available to states by FEMA after each Federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures. The HMGP can be used to fund cost-effective projects that will protect public or private property in an area covered by a federal disaster declaration or that will reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard prone areas, flood-proofing or elevation upgrades to reduce future damage, minor structural improvements and development of state or local standards. Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved Multi-Jurisdictional Multi-Hazard Mitigation Plan (this plan).

Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf.

Flood Mitigation Assistance (FMA) Program. The FMA combines the previous Repetitive Flood Claims and Severe Repetitive Loss Grants into one grant program. FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are

eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is 75 percent. At least 25 percent of the total eligible costs must be provided by a non-federal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At minimum, a FEMA-approved local flood mitigation plan is required before a project can be approved. FMA funds are distributed from FEMA to the state.

Readiness, Response and Recovery Directorate, Fire Management Assistance Grant Program. This program provides grants to states, tribal governments and local governments for the mitigation, management and control of any fire burning on publicly (non-federal) or privately-owned forest or grassland that threatens such destruction as would constitute a major disaster. The grants are made in the form of cost sharing with the federal share being 75 percent of total eligible costs. Grant approvals are made within 1 to 72 hours from time of request.

Fire Prevention and Safety Grants. The Fire Prevention and Safety Grants (FP&S) are part of the Assistance to Firefighters Grants, and are administered by FEMA. FP&S Grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death. Eligibility includes fire departments, national, regional, state, and local organizations, Native American tribal organizations, and/or community organizations recognized for their experience and expertise in fire prevention and safety programs and activities. Private non-profit and public organizations are also eligible. Interested applicants are advised to check the website periodically for announcements of grant availability. More information: <https://www.fema.gov/welcome-assistance-firefighters-grant-program>

Other Mitigation Funding Sources

Grant funding is available from a variety of federal and state agencies for training, equipment, and hazard mitigation activities. Several of these programs are described below.

Program 15.228: Wildland Urban Interface Community and Rural Fire Assistance. [This program](#) is designed to implement the National Fire Plan and assist communities at risk from catastrophic wildland fires. The program provides grants, technical assistance, and training for community programs that develop local capability, including: Assessment and planning, mitigation activities, and community and homeowner education and action; hazardous fuels reduction activities, including the training, monitoring or maintenance associated with such hazardous fuels reduction activities, on federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas; and, enhancement of knowledge and fire protection capability of rural fire districts through assistance in education and training, protective clothing and equipment purchase, and mitigation methods on a cost share basis.

Secure Rural Schools and Community Self-Determination Act - Title III- County Funds. The Self-Determination Act has recently been reauthorized and now includes specific language regarding the Firewise Communities program. Counties seeking funding under Title III must use the funds to perform work under the Firewise Communities program. Counties applying for Title III funds to implement Firewise activities can assist in all aspects of a community's recognition process, including conducting or assisting with community assessments, helping the community create an action plan, assisting with an annual Firewise Day, assisting with local wildfire mitigation projects, and communicating with the state

liaison and the national program to ensure a smooth application process. Counties that previously used Title III funds for other wildfire preparation activities such as the Fire Safe Councils or similar would be able to carry out many of the same activities as they had before. However, with the new language, counties would be required to show that funds used for these activities were carried out under the Firewise Communities program. More information: <https://tinyurl.com/67dthhg>

Community Planning Assistance for Wildfire. Established in 2015 by Headwaters Economics and Wildfire Planning International, Community Planning Assistance for Wildfire (CPAW) works with communities to reduce wildfire risks through improved land use planning. CPAW is a grant-funded program providing communities with professional assistance from foresters, planners, economists and wildfire risk modelers to integrate wildfire mitigation into the development planning process. All services and recommendations are site-specific and come at no cost to the community. More information: <http://planningforwildfire.org/what-we-do/>

Urban and Community Forestry (UCF) Program. A cooperative program of the U.S. Forest Service that focuses on the stewardship of urban natural resources. With 80 percent of the nation's population in urban areas, there are strong environmental, social, and economic cases to be made for the conservation of green spaces to guide growth and revitalize city centers and older suburbs. UCF responds to the needs of urban areas by maintaining, restoring, and improving urban forest ecosystems on more than 70 million acres. Through these efforts the program encourages and promotes the creation of healthier, more livable urban environments across the nation. These grant programs are focused on issues and landscapes of national importance and prioritized through state and regional assessments. More information: <http://www.fs.fed.us/managing-land/urban-forests/ucf>

Western Wildland Urban Interface Grants. The National Fire Plan (NFP) is a long-term strategy for reducing the effects of catastrophic wildfires throughout the nation. The Division of Forestry's NFP Program is implemented within the Division's Fire and Aviation Program through the existing USDA Forest Service, State & Private Forestry, State Fire Assistance Program.

Congress has provided increased funding assistance to states through the U.S. Forest Service State and Private Forestry programs since 2001. The focus of much of this additional funding was mitigating risk in WUI areas. In the West, the State Fire Assistance funding is available and awarded through a competitive process with emphasis on hazard fuel reduction, information and education, and community and homeowner action. This portion of the National Fire Plan was developed to assist interface communities manage the unique hazards they find around them. Long-term solutions to interface challenges require informing and educating people who live in these areas about what they and their local organizations can do to mitigate these hazards.

The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The Western States Wildland Urban Interface Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, reduction of hazardous fuels, restoration of fire-adapted ecosystems and promotion of community assistance. Information: <https://www.westernforesters.org/wui-grants>

U.S. Fish & Wildlife Service, Rural Fire Assistance Grants. Each year, the U.S. Fish & Wildlife Service (FWS) provides Rural Fire Assistance (RFA) grants to neighboring community fire departments to enhance local wildfire protection, purchase equipment, and train volunteer firefighters. Service fire

staff also assist directly with community projects. These efforts reduce the risk to human life and better permit FWS firefighters to interact and work with community fire organizations when fighting wildfires. The Department of the Interior (DOI) receives an appropriated budget each year for an RFA grant program. The maximum award per grant is \$20,000. The DOI assistance program targets rural and volunteer fire departments that routinely help fight fire on or near DOI lands. More information: http://www.fws.gov/fire/living_with_fire/rural_fire_assistance.shtml

Fire Management Assistance Program. This program is authorized under Section 420 of the Stafford Act. It allows for the mitigation, management, and control of fires burning on publicly or privately-owned forest or grasslands that threaten destruction that would constitute a major disaster. More information: <http://www.fema.gov/fire-management-assistance-grant-program>

NOAA Office of Education Grants. The Office of Education supports formal, informal and non-formal education projects and programs through competitively awarded grants and cooperative agreements to a variety of educational institutions and organizations in the United States. More information: <http://www.noaa.gov/office-education/grants>

NRCS Environmental Quality Incentives Program (EQUIP). The Environmental Quality Incentives Program, administered through the NRCS, is a cost-share program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland. Owners of land in agricultural or forest production or persons who are engaged in livestock, agricultural or forest production on eligible land and that have a natural resource concern on that land may apply to participate in EQUIP. Eligible land includes cropland, rangeland, pastureland, non-industrial private forestland and other farm or ranch lands. EQUIP is another funding mechanism for landowner fuel reduction projects. More information: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/equip/>

U.S. Department of Agriculture, Community Facilities Loans and Grants. Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required. More information: http://www.usda.gov/wps/portal/usda/usdahome?navid=GRANTS_LOANS

General Services Administration, Sale of Federal Surplus Personal Property. This program sells property no longer needed by the federal government. The program provides individuals, businesses and organizations the opportunity to enter competitive bids for purchase of a wide variety of personal property and equipment. Normally, there are no restrictions on the property purchased. More information: <http://www.gsa.gov/portal/category/21045>

Hazardous Materials Emergency Preparedness Grants. Grant funds are passed through to local emergency management offices and HazMat teams having functional and active LEPC groups. More information: <http://www.phmsa.dot.gov/hazmat/grants>

U.S. Department of Homeland Security. Enhances the ability of states, local and tribal jurisdictions, and other regional authorities in the preparation, prevention, and response to terrorist attacks and other disasters, by distributing grant funds. Localities can use grants for planning, equipment, training and exercise needs. These grants include but are not limited to areas of Critical Infrastructure Protection

Equipment and Training for First Responders, and Homeland Security Grants. More information: <http://www.dhs.gov/>

Community Development Block Grants (CDBG). The U.S. Department of Commerce administers the CDBG program which are intended to provide low and moderate-income households with viable communities, including decent housing, as suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during the times of “urgent need” (e.g. post disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. CDBG funds can be used to match FEMA grants. More Information:

<http://www.hud.gov/offices/cpd/communitydevelopment/programs/>

Building Blocks for Sustainable Communities. The EPA Office of Sustainable Communities sometimes offers grants to support activities that improve the quality of development and protect human health and the environment. When these grants are offered, they will always be announced on

www.grants.gov.

8. Jurisdictions

This chapter serves as a mini “Plan Within the Plan” and includes the following information for each incorporated city jurisdiction in Logan County:

- 1. Profile and Inventory**
 - Location
 - Population & Vulnerable Population
 - Housing Units and Household Size
 - Businesses
 - New and Future Development
- 2. Risk Assessment**
 - Score Summary
 - Hazard Scoring Notes
- 3. Mitigation Strategy**
 - Problem Statement
 - Mitigation Projects
- 4. Mitigation Capabilities**
 - Capability Definitions
- 5. Integration into Planning Mechanisms**
- 6. Plan Maintenance**

This information provides the basis for the risk assessment shown in each jurisdiction profile. Comparative statistics of each jurisdiction in Logan County are shown in Chapter 4, Profile and Inventory.

The incorporated cities in Logan County are shown alphabetically in the following chapter.

- 8.1: City of Fredonia
- 8.2: City of Gackle
- 8.3: City of Lehr
- 8.4: City of Napoleon

8.1 City of Fredonia, North Dakota

The following profile includes information specific to the city of Fredonia for mitigation planning purposes. The information included is as follows:

- Profile and Inventory;
- Risk Assessment;
- Hazard Scoring Notes;
- Mitigation Projects, and
- Capabilities for Mitigation.

Integration into Planning Mechanisms

The process for integration of the mitigation plan into existing planning mechanisms is discussed at the bottom of each mitigation project in section 8.1.3, and in Chapter 6, Mitigation Strategy.

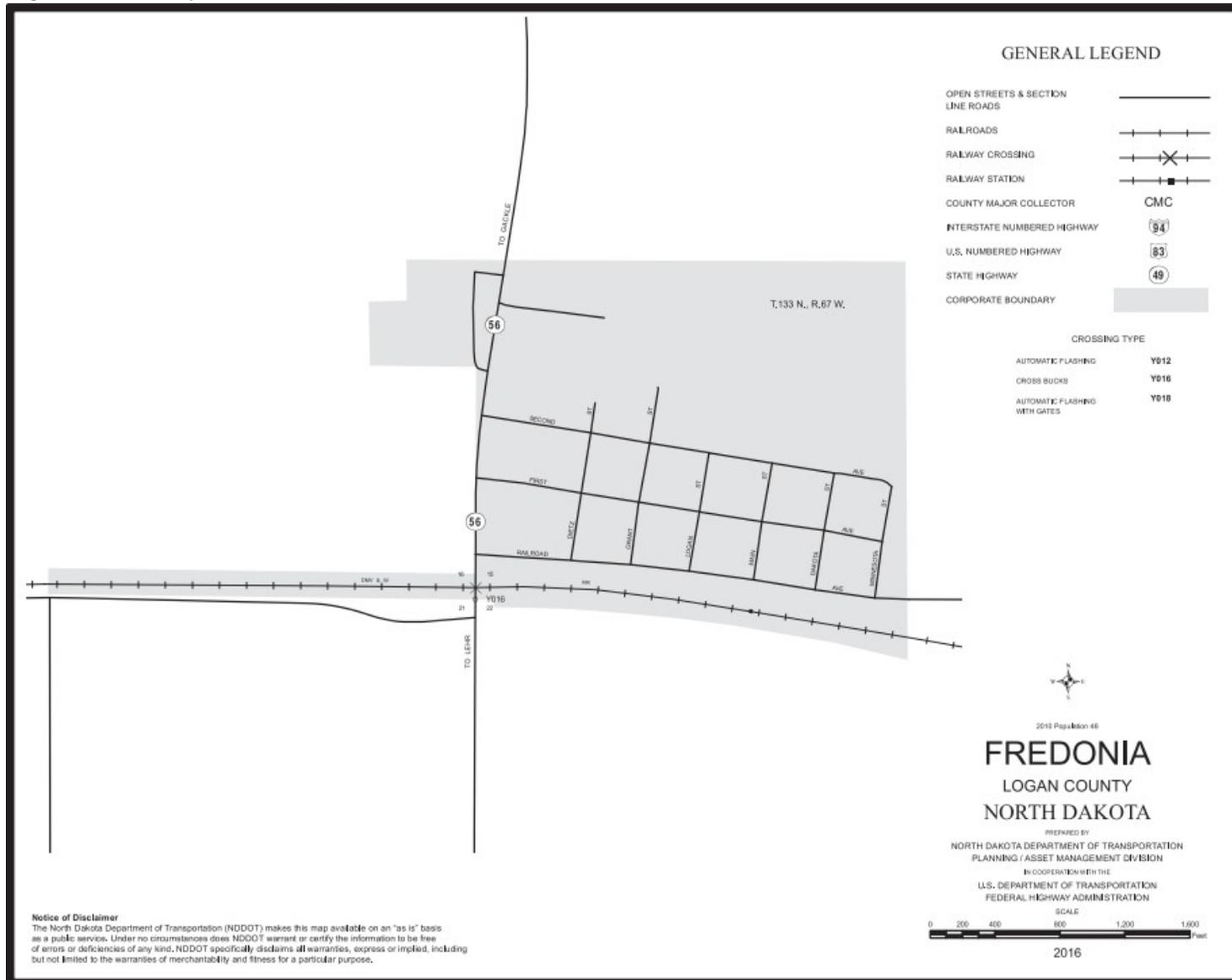
Plan Maintenance

Plan maintenance is shown in section 8.1.6.

Critical Facilities and Infrastructure

Figure 8.1.1 is a map of the city of Fredonia provided by the N.D. Dept. of Transportation.

Figure 8.1.1 – City of Fredonia, North Dakota



Source(s): N.D. Dept. of Transportation

8.1.1 Profile and Inventory

The location, total population, vulnerable populations, housing units and household size, businesses, critical facilities and infrastructure, new and future development, services, jurisdictional buildings, emergency response services and utilities are shown for the city of Fredonia. Detailed narratives follow each section heading to profile the city.

Detailed information on public buildings, services provided, emergency response services and utilities can be found can be found in Chapter 3, Profile and Inventory.

Location

The city of Fredonia is located the extreme southeast corner of Logan County at the intersection of N.D. Highways 13 and 56. The Dakota Missouri Valley & Western railroad traverses the city.

Population

Table 8.1.1 shows population trends for the city of Fredonia from 1920 to 2020. Per the 2020 U.S. Decennial Census, the city of Fredonia has a population of 38 people, which is a decrease of eight people (17.4 percent) from 46 people in 2010.

Table 8.1.1 – 1920 to 2020 City of Fredonia, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
296	394	309	268	141	100	82	66	51	46	38

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2016 to 2020 American Community Survey 5-Year Estimate, the population of the city of Fredonia consists of three individuals under the age of 20 and eight individuals aged 65 and older.

Daycares. There are no daycares in the city of Fredonia.

Poverty. Per the 2016 to 2020 American Community Survey 5-Year Estimate, there are two individuals in the city of Fredonia that live below the poverty line.

Public Schools. There are no public schools in the city of Fredonia.

Senior Housing Developments/Care Centers. There are no age-restricted, senior housing developments, or care centers in the city of Fredonia.

Housing Units and Household Size

The 2016 to 2020 American Community Survey 5-Year Estimate shows there is a total of 27 housing units in the city of Fredonia consisting of 22 single-family homes, five mobile/RV homes, and no multifamily homes.

The 2016 to 2020 American Community Survey 5-Year Estimate shows there are 19 households in the city of Fredonia resulting in an average household size of 1.53 people.

Businesses

Major employers in the city of Fredonia include Farmer’s Elevator Inc., Cenex/Fredonia Cooperative Oil Company, and Larson Grain Fertilizer Plant. Additional information on businesses and economic development can be obtained by contacting the Logan County Economic Development Coordinator.

New and Future Development

Analyzing development trends is important for mitigation to understand where projects may be needed in the future and funding is best allocated. New development is anything occurring since the 2017 and new and future development is anything planned, pending, and proposed development under construction.

New development in the city of Fredonia since 2017 includes:

- New early outdoor emergency notification system (siren) in 2017
- Single-family home demolished in 2021
- Abandoned businesses demolished in 2020
- Construction of the Larson Grain Dry Fertilizer Bins & Blender in 2019
- The city repaired drainage ditches and installed new culverts in 2018
- New sidewalks installed on main street in 2018

Future development in the city of Fredonia includes a new firehall.

Critical Facilities. The following facilities were identified as critical in the city of Fredonia.

- Home Plate Café (utilized as senior citizen center and shelter)
- Fredonia Fire Hall

Infrastructure. The following infrastructure was identified as critical in the city of Fredonia.

- The city of Fredonia has a sanitary sewer system with two lagoons and a lift station.
- The city of Fredonia does not have an inert landfill.
- The DMV&W railroad traverses the city.
- N.D. Highways 13 and 56 traverse the city.

Emergency Response Services. The following emergency response services were identified for the city of Fredonia.

- The Kulm Ambulance provides ambulance services to the city of Fredonia.
- The Fredonia Fire Protection District provides fire protection services to the city and surrounding rural areas.
- The Logan County Sherriff’s Office provides law enforcement services to the city of Fredonia.
- The nearest hospital is the Wishek Hospital in the city of Wishek in McIntosh County.
- Central Valley Health District located in the city of Jamestown provides public health services to the city of Fredonia and greater Logan County.

Services and Utilities. The following services are provided in the city of Fredonia.

- Gahner Sanitation provides garbage collection services to the city of Fredonia.
- The city of Fredonia has a sanitary sewer system consisting of two lagoons and a lift station. Some residents utilize septic systems.
- The city has a storm water system consisting of culverts and drainage ditches.
- The Napoleon Homestead is the official newspaper of the city of Fredonia.
- Southeast Water Users District provides drinking/potable water to the city of Fredonia.
- Electricity is provided by Montana-Dakota Utilities to the city of Fredonia.
- Natural gas is not available in the city of Fredonia.
- Fuel oil and propane are used as an alternative heating source and is provided by companies chosen by the individual consumer.
- Dickey Rural Network provides internet, phone, and TV.

8.1.2 Risk Assessment and Hazard Scoring Notes

Table 8.1.2 summarizes the risk assessment scoring of the city of Fredonia. The risk assessment and hazard scoring notes for each hazard specific to the city are shown in Table 8.1.2. Risk assessment notes for impact, frequency, likelihood and vulnerability ubiquitous for jurisdictions in Logan County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment Scoring Summary

Risk Assessment							Jurisdiction: City of Fredonia						
<u>Natural Hazard</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>							
Drought	4	3	4	4	2	13							
Fire – Urban/Structure Collapse	4	2	2	2	1	9							
Fire – Wildland (Rural)	4	2	4	2	1	11							
Flood	3	2	4	2	1	10							
Geologic Hazard	1	1	2	1	2	3							
Infectious Disease	4	4	4	4	1	15							
Severe Summer Weather	4	4	4	3	1	13							
Severe Winter Weather	4	4	4	4	2	13							
Space Weather	4	1	2	4	2	9							
<u>Adversarial Threats</u>													
Civil Disturbance	4	2	2	1	1	8							
Criminal, Terrorist or Nation-State Attack	4	2	2	1	1	8							
Cyberattack	2	1	1	1	1	4							
<u>Technological Threats</u>													
Dam Failure	1	1	1	1	1	3							
Hazardous Material Release	4	2	2	2	1	9							
Transportation Incident	3	2	2	2	1	8							

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment

Civil Disturbance			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities 		
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major incident • DAPL protesters were not active in the city 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Criminal, Terrorist, Nation-State Attack			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities • Threats to city water supply • Loss of Communication Systems • Disease Outbreak/Mass Infections 		
Frequency	<ul style="list-style-type: none"> • No occurrences • Miscellaneous property damage occurring in the city on an occasional basis 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	<ul style="list-style-type: none"> • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release 	<ul style="list-style-type: none"> • Human Injury/Death • School Closure • Loss of Communication Systems • Identity Theft – loss of wages and/or assets
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major attack 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • No public school • City records are on paper • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks • Elderly population relying largely on landlines for communication purposes, remote medical care and equipment monitoring 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • No public school • City records are on paper • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials

Table 8.1.3 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Dam Failure			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Crop Loss and Loss of Livestock • Delayed Emergency Response • Evacuation (Localized) • Loss of Critical Facilities and Infrastructure • Loss of Potable/Drinking Water • Loss of Power • Loss of Transportation Systems/Accessibility • Loss of Wildlife Habitat • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Loss of recreational activities and summer-time population resulting in economic loss • Possible temporary homeless population due to lack of facilities to shelter large numbers of people 		
Frequency	<ul style="list-style-type: none"> • Never an occurrence 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Likely</u> </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Likely</u>	<u>Less Likely</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Likely</u>	<u>Less Likely</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Vulnerable</u> </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Vulnerable</u>	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Vulnerable</u>	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

		Drought	
Impact	<ul style="list-style-type: none"> • Crop Loss • Loss of Economy • Loss of Livestock • Loss of Wildlife Habitat (decreased wildlife populations) • Increase in Wildland Fire Potential 	<ul style="list-style-type: none"> • Water quality compromised from stock dams • Diminished soil quality – salinity will increase • Negative impact on mental health of producers and fire responders – “community impact” • Local producers forced to sell off herds which can last for several years • Population loss as people moved away due to loss of economy 	
Frequency	<ul style="list-style-type: none"> • Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds • Severe Drought 2021/2022 	<ul style="list-style-type: none"> • End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020 	
Likelihood	<u>More Likely</u> <ul style="list-style-type: none"> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation 	<u>Less Likely</u> <ul style="list-style-type: none"> • Heavy precipitation 	
Vulnerability	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • City does not have a fire index sign • City does not have a water tower 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDDES • Advanced communications such as internet and TV 	

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Urban Fire/Structure Collapse			
Impact	<ul style="list-style-type: none"> • Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release <ul style="list-style-type: none"> • Human Injury/Death • Increase Fire Potential • Property damage on a significant scale if impacting downtown structures 		
Frequency	<ul style="list-style-type: none"> • Occurrences of structures/vehicles being impacted every five years 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • City does not have a water tower • Fire hall inadequate to meet the equipment and personnel needs of the fire department • Elevator and agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Fredonia Fire Department </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • City does not have a water tower • Fire hall inadequate to meet the equipment and personnel needs of the fire department • Elevator and agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Fredonia Fire Department
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • City does not have a water tower • Fire hall inadequate to meet the equipment and personnel needs of the fire department • Elevator and agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Fredonia Fire Department 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Rural & Wildland			
Impact	<ul style="list-style-type: none"> • Building Collapse • Crop Loss • Delayed Emergency Response • Evacuation (Localized) • Explosion • Increase Fire Potential • Loss of Power/Downed Power Lines • Mass Casualties • Losses could be on a significant scale if impacting a major producer or farmstead • Loss of farm equipment and assets • Loss of Livestock 		
Frequency	<ul style="list-style-type: none"> • Significant fire once every five years • Approximately four wildland fires occurring annually • Controlled burns becoming out of control approximately 25 percent of the time 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Lack of fire index sign • Fire hall inadequate to meet the equipment and personnel needs of the fire department </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Fredonia Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Lack of fire index sign • Fire hall inadequate to meet the equipment and personnel needs of the fire department 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Fredonia Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Lack of fire index sign • Fire hall inadequate to meet the equipment and personnel needs of the fire department 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Fredonia Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

	Flood	
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • Runoff from buildings causes overland flooding 	
Frequency	<ul style="list-style-type: none"> • Bi-annual occurrences of localized flooding of nearby township roads and highways • Overland flooding during wet years on railroad avenue 	<ul style="list-style-type: none"> • Flash flooding occurs from heavy precipitation
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Sanitary sewer lagoons located in a low-lying area 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance when needed
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City is not enrolled in the NFIP • City does not have flood ordinances • Sanitary sewer lagoons located in a low-lying area • Overland flooding during wet years on railroad avenue • Undersized culverts at Grant St. and Railroad Ave W, Grant St. and 1st Ave W, Dakota St. and 1st Ave W. 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance when needed • Radio-activated outdoor emergency siren • City fixed drainage ditch and installed new culverts in 2018

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

	Geologic Hazard	
Impact	<ul style="list-style-type: none"> • Delayed Emergency Response • Human Injury/Death • Loss of Economy 	<ul style="list-style-type: none"> • Loss of Power • Property Damage
Frequency	<ul style="list-style-type: none"> • No incidents involving geologic hazards in or near city limits 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done • Flat topography - no steep terrain where landslides could occur

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Hazardous Material Release			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response / Increased Fire Potential • Environmental Degradation • Evacuation (localized) • Explosion • Human Injury/Death • Loss of Economy • Loss of Potable Water • Loss of Power • Property Damage • Increased risk of HAZMAT release and/or transportation incidents due to increased oil train traffic and trucks 		
Frequency	<ul style="list-style-type: none"> • Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant 	<u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant 	<u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital or medical clinic in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Radio-activated outdoor emergency siren </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital or medical clinic in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Radio-activated outdoor emergency siren
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital or medical clinic in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Radio-activated outdoor emergency siren 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Infectious Disease	
Impact	<ul style="list-style-type: none"> • Crop Loss • Human Injury/Death • Livestock Loss • Loss of Economy • Mass Casualties <ul style="list-style-type: none"> • Strain on local medical resources (ambulance) • Loss of medical staff due to sickness • Loss of Potable Water • Financial cost to public health resources
Frequency	<ul style="list-style-type: none"> • Annual occurrences of death, primarily among the elderly • Occurrence of disease - 1 in 3 for people annually • Annual occurrences of influenza cases in the local population <ul style="list-style-type: none"> • The COVID-19 Pandemic of 2020 resulted in mass quarantine and sheltering of the local population and temporary closure of businesses
Likelihood	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>More Likely</u></p> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Dependent on weather for animals and crops • Presence of abandoned properties and overgrown lots </div> <div style="width: 45%;"> <p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities </div> </div>
Vulnerability	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Presence of abandoned properties and overgrown lots • No hospital or medical clinic • No vet clinic in city limits </div> <div style="width: 45%;"> <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities • Immunizations & medications of local population • No care center in the city • No public school </div> </div>

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

	Severe Summer Weather	
Impact	<ul style="list-style-type: none"> Blocked Roads Evacuation (Localized) Human Injury/Death – heat exhaustion Sewer Backup Shelter-in-place Vehicle Damage 	<ul style="list-style-type: none"> Loss of Livestock Loss of Crops Loss of Power/Downed Power Lines - Property Damage – repair of roofing, siding and drainage systems for homes
Frequency	<ul style="list-style-type: none"> Property damage from tornados/straight-line winds in summer 2017 and 2019 Property damage from severe storm in summer 2016 Windstorms occurring annually 	<ul style="list-style-type: none"> Annual occurrences of hailstorms Two or three significant storms producing damage to trees and property annually
Likelihood	<ul style="list-style-type: none"> Climatic patterns will result in numerous annual occurrences of the hazard 	
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> High elderly population Presence of mobile homes Aging infrastructure (roads and electrical systems) Lack of permanent and portable generators at fire hall and lift station Lacks building code enforcement Lack of official storm shelter Undersized culverts at Grant St. and Railroad Ave W, Grant St. and 1st Ave W, Dakota St. and 1st Ave W. 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> Advanced warning and notification such as internet and TV No public school Radio-activated outdoor emergency siren Logan County IPAWS City fixed drainage ditch and installed new culverts in 2018

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Severe Winter Weather			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Evacuation (Localized) • Human Injury/Death – wind chill • Property Damage – repair of roofing, siding and drainage systems for homes • Loss of Crops • Loss of Livestock • Loss of Power/Downed Power Lines • Sewer Backup • Shelter-in-place • Vehicle Damage • Infrastructure Degradation 		
Frequency	<ul style="list-style-type: none"> • March 2017 snowstorm resulted in blocked roads throughout the city • Spring snowstorm of 2019 • Annual occurrences of power loss from storms • Two or three significant blizzards producing damage to trees and property annually 		
Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 		
Vulnerability	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at fire hall and lift station • Lacks building code enforcement • Lack of official storm shelter • Snow drifts on 2nd Avenue block access into the city • Undersized culverts at Grant St. and Railroad Ave W, Grant St. and 1st Ave W, Dakota St. and 1st Ave W. </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • No public school • Radio-activated outdoor emergency siren • Logan County IPAWS • City fixed drainage ditch and installed new culverts in 2018 </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at fire hall and lift station • Lacks building code enforcement • Lack of official storm shelter • Snow drifts on 2nd Avenue block access into the city • Undersized culverts at Grant St. and Railroad Ave W, Grant St. and 1st Ave W, Dakota St. and 1st Ave W. 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • No public school • Radio-activated outdoor emergency siren • Logan County IPAWS • City fixed drainage ditch and installed new culverts in 2018
<u>More Vulnerable</u> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at fire hall and lift station • Lacks building code enforcement • Lack of official storm shelter • Snow drifts on 2nd Avenue block access into the city • Undersized culverts at Grant St. and Railroad Ave W, Grant St. and 1st Ave W, Dakota St. and 1st Ave W. 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • No public school • Radio-activated outdoor emergency siren • Logan County IPAWS • City fixed drainage ditch and installed new culverts in 2018 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Space Weather			
Impact	<ul style="list-style-type: none"> • Loss of operation of the city hall, fire hall, lift station, etc. • Loss/outage of medical devices at private residences • Property damage from sewer backups due to loss of lift station 		
Frequency	<ul style="list-style-type: none"> • Never a recorded occurrence in Logan County or North Dakota 		
Likelihood	<ul style="list-style-type: none"> • Dependent on solar activity and the 11-year solar cycle • Likely to occur once every 500 years per the 2018 N.D. Enhanced Mitigation MAOP 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at fire hall and lift station </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens • Lack of public school </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at fire hall and lift station 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens • Lack of public school
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at fire hall and lift station 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens • Lack of public school 		

Table 8.1.2 – City of Fredonia, North Dakota Jurisdiction Risk Assessment - Continued

Transportation Incident			
Impact	<ul style="list-style-type: none"> • Blocked roads from inadequate road clearing • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Delayed Emergency Response • HAZMAT Release • Livestock Loss • Business Interruptions • Property Damage • Could be catastrophic if involving a school bus filled with children and a truck carrying hazardous materials 		
Frequency	<ul style="list-style-type: none"> • Annual occurrences of accidents involving cars and/or farm equipment 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport
<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 13 and 56 • Presence of Tier II sites </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No public school • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 13 and 56 • Presence of Tier II sites 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No public school • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 13 and 56 • Presence of Tier II sites 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No public school • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		

8.1.3 Mitigation Strategy

The Logan County Multi-Jurisdictional Multi-Hazard Plan Update includes a mitigation strategy consisting of seven goals in Chapter 6. The following problem statement and mitigation projects address the mitigation needs of the city of Fredonia. It should be noted that some mitigation projects that pertain to all jurisdictions are included to encourage county-wide collaboration.

Problem Statement

The city of Fredonia lacks sources of backup power at critical facilities and infrastructure. The city's fire hall is inadequate to meet the equipment and personnel needs of the fire department. The city's sanitary sewer lagoons are in a low-lying area and are a risk to overland flooding, in addition to low-lying areas on Railroad Avenue and undersized culverts on Grant St. and Dakota St. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, construction of a new fire hall, engineering to retrofit/upgrade the sanitary sewer and storm water systems, and education and outreach are a priority for the city.

City of Fredonia Project 1: Install Permanent or Portable Generators at Critical Facilities and Infrastructure.

Description/Benefit		Test existing generators and create regularly scheduled maintenance system. Install new generators to establish source of backup power to maintain continued operation of the following critical facilities and infrastructure.					
		<ul style="list-style-type: none"> The city needs a portable generator for its lift station. The fire hall needs a permanent or portable generator to maintain continuous service of the fire department. 					
Hazard/Threat Addressed		All hazards					
Affected Jurisdiction(s)		City of Fredonia					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services, Public Works					
Partners		Emergency Management, Public Utilities					
Completion Timeframe		2 to 3 years	Cost	Project-specific			
Funding Source		Public Utilities, Regional Council, RD. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program. State Homeland Security grants.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>			<u>Plan Element Utilized</u>			<u>Process for Integration</u>	
Logan County LEOP Logan County Mitigation Plan Logan County THIRA			Capability Assessment, Hazard History, Risk Assessment			Include in city and/or fire department’s budget. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council or board.	

City of Fredonia Project 2: Conduct Engineering Studies to Retrofit and/or Upgrade Critical Facilities and Infrastructure.

Description/Benefit		<p>The city’s sanitary sewer system is in a low-lying area and upgraded culverts are needed to improve drainage for the storm water system. The city’s fire hall is inadequate to meet the equipment and personnel needs of the fire department. Engineering studies are needed to identify solutions to retrofit/upgrade both systems and the fire hall.</p> <p><u>Upgraded storm water culverts needed at the following locations:</u></p> <ul style="list-style-type: none"> • Grant St. and Railroad Ave W • Grant St. and 1st Ave W • Dakota St. and 1st Ave W <p>Construction of a new fire hall.</p>					
Hazard/Threat Addressed		All					
Affected Jurisdiction(s)		City of Fredonia					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services					
Partners		County Commission, Emergency Management, NDAC, NDLC, Regional Council					
Completion Timeframe		3 to 5 years	Cost	Project-specific			
Funding Source		FEMA’s Building Resilient Infrastructure and Communities (BRIC). Local budgets. NDDEQ. Prairie Dog Fund. DWR.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	2	2	3	3	1	3	19
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Commission studies through a formal bidding process. Select contractor. Apply for grant funding to execute or budget in local budgets.		

8.1.4 Mitigation Capability Assessment

Capability for mitigation is divided into four categories: administrative and technical, education and outreach, financial, and planning and regulatory. Each identified resource in the four categories can be used to implement mitigation strategies and access funding for projects. **Tables comparing the mitigation capabilities of the city of Fredonia with all other jurisdictions in Logan County can be found below and in Chapter 7, County Mitigation Capability Assessment.**

- Administrative and Technical: Identification of administrative and technical capabilities, which include staff, their skills and tools for mitigation planning to implement specific mitigation actions.
- Education and Outreach: Identification of education and outreach programs, and methods already in place to implement mitigation activities and communicate hazard-related information.
- Financial: Identification of access to or eligibility to use funding resources for hazard mitigation for jurisdictions.
- Planning and Regulatory: Jurisdictional plans, policies, codes, and ordinances adopted and in place that prevent and reduce the impacts of hazards.

City of Fredonia, North Dakota Mitigation Capabilities Summary

The following mitigation capabilities were identified as commonplace among all hazard and threats upon completion of the risk assessment for the city of Fredonia. More detailed information about the mitigation capabilities of the city of Fredonia in relation to Logan County and all other incorporated jurisdictions can be found in Chapter 7, Mitigation Capability Assessment.

2018 N.D. Enhanced Mitigation MAOP	Logan Co. Sherriff’s Office
Advanced communications: Internet & TV	MOUs
Central Valley Health District	NDDDES Fire Index Monitoring
Farm Services Agency	NDDOT Statewide Highway/Transportation Plan
Logan Co. LEOP	NDSU/Logan Co. Extension
Logan Co. Emergency Mgmt.	Fredonia City Council
Fredonia Rural Fire Protection District	Radio-activated emergency siren

8.1.5 Integration of Mitigation Plan into Planning Mechanisms

Integration of the plan into current planning mechanisms is critical in mitigation to communicate the needs of each jurisdiction to achieve an all-inclusive mitigation strategy. The process for integration of the mitigation plan is included after each mitigation project, which shows the planning mechanism utilized, the plan element used for integration and the process for integration.

8.1.6 Plan Maintenance

An important aspect of any useable plan is the maintenance and upkeep of the document. At any given time, planning, risk analysis, updating the situation assessment, research, coordinating, disaster response

or other activity is occurring. Plan maintenance ensures the plan will remain useful in the county for many years. A mitigation action progress report form to conduct plan maintenance is in Chapter 10 of this plan.

8.2 City of Gackle, North Dakota

The following profile includes information specific to the city of Gackle for mitigation planning purposes. The information included is as follows:

- Profile and Inventory;
- Risk Assessment;
- Hazard Scoring Notes;
- Mitigation Projects, and
- Capabilities for Mitigation.

Integration into Planning Mechanisms

The process for integration of the mitigation plan into existing planning mechanisms is discussed at the bottom of each mitigation project in section 8.2.3, in section 8.2.4, and in Chapter 6, Mitigation Strategy.

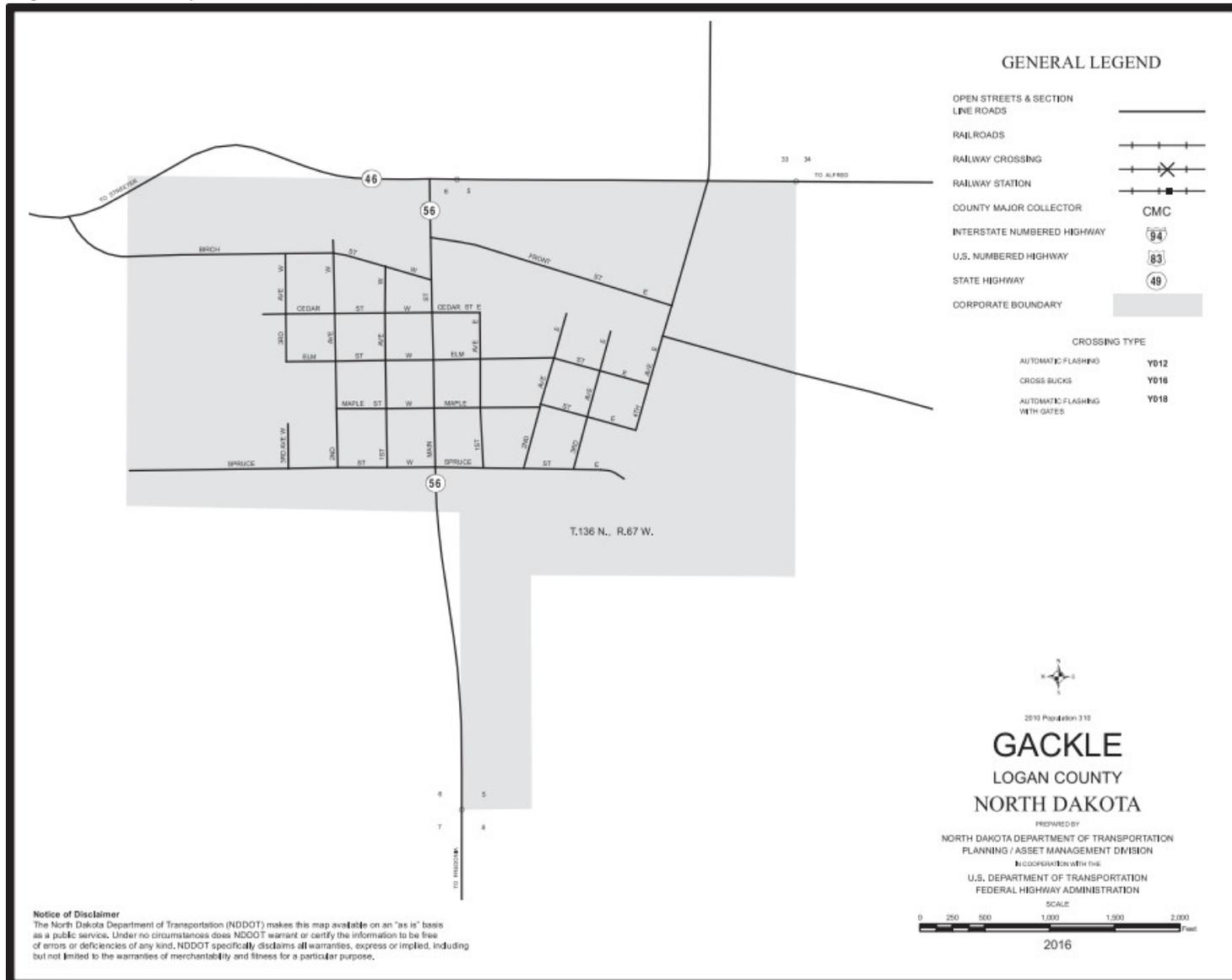
Plan Maintenance

Plan maintenance is shown in section 8.2.6.

Critical Facilities and Infrastructure

Figure 8.2.1 is a map of the city of Gackle provided by the N.D. Dept. of Transportation.

Figure 8.2.1 – City of Gackle, North Dakota



Source(s): N.D. Dept. of Transportation

8.2.1 Profile and Inventory

The location, total population, vulnerable populations, housing units and household size, businesses, critical facilities and infrastructure, new and future development, services, jurisdictional buildings, emergency response services and utilities are shown for the city of Gackle. Detailed narratives follow each section heading to profile the city.

Detailed information on public buildings, services provided, emergency response services and utilities can be found can be found in Chapter 3, Profile and Inventory.

Location

The city of Gackle is located at the intersection of N.D. Highways 46 and 56 in extreme northeast Logan county on its border with Stutsman County.

Population

Table 8.2.1 shows population trends for the city of Gackle from 1920 to 2020.

Per the 2020 U.S. Decennial Census, the city of Gackle has a population of 281 people, which is a decrease of 29 people (9.4 percent) from 310 people in 2010.

Table 8.2.1 – 1920 to 2020 City of Gackle, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
424	493	537	604	523	470	456	450	335	310	281

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2016 to 2020 American Community Survey 5-Year Estimate, the population of the city of Gackle consists of 47 individuals under the age of 20 and 99 individuals aged 65 and older.

Daycares. There is one daycare in the city of Gackle.

Poverty. Per the 2016 to 2020 American Community Survey 5-Year Estimate, there are 19 individuals in the city of Gackle that live below the poverty line.

Public Schools. There Gackle-Streeter Public School serves grades K-12.

Senior Housing Developments/Care Centers. The Gackle Care Center provides basic care services. There are no other age-restricted, senior housing developments, or care centers in the city of Gackle.

Housing Units and Household Size

The 2016 to 2020 American Community Survey 5-Year Estimate shows there is a total of 202 housing units in the city consisting of 188 single-family homes, two mobile/RV homes, and 12 multifamily homes.

The 2016 to 2020 American Community Survey 5-Year Estimate shows there are 108 households in the city of Gackle resulting in an average household size of 2.08 people.

Businesses

Major employers in the city of Gackle include the Gackle-Streeter Public School, Allied Energy, and Gackle Cooperative Oil Company. Additional information on businesses and economic development can be obtained by contacting the Logan County Economic Development Coordinator.

New and Future Development

Analyzing development trends is important for mitigation to understand where projects may be needed in the future and funding is best allocated. New development is anything occurring since the 2017 and new and future development is anything planned, pending, and proposed development under construction.

New development in the city of Gackle since 2017 includes:

- Removal of four abandoned homes
- Regrading of the dangerous incline in the city park and removal of trees throughout the city
- Demolishing of the UCC Church, former movie theater and another downtown building
- Installation of security camera surveillance systems at the Gackle Care Center, Gackle Ambulance & Fire Hall, and the Gackle-Streeter Public School
- Installation of security fencing around the elementary playground at the Gackle-Streeter Public School
- Installation of door access control system at the Gackle-Streeter Public School

Future development in the city of Gackle includes:

- Outdoor emergency siren at the city park near the school

Critical Facilities. The following facilities were identified as critical in the city of Gackle.

- Gackle City Hall
- Gackle Fire Hall
- Gackle-Streeter Public School
- Logan County Shop
- N.D. Dept. of Transportation Shop
- U.S. Post Office

Infrastructure. The following infrastructure was identified as critical in the city of Gackle.

- The city of Gackle has a sanitary sewer system.
- The city of Gackle does not have an inert landfill.
- N.D. Highways 46 and 56 traverse the city.

Emergency Response Services. The following emergency response services were identified in the city of Gackle.

- The Gackle Ambulance Service provides ambulance services to the city of Gackle.
- The Gackle Fire Protection District provides fire protection services to the city and surrounding rural areas.
- The Logan County Sherriff's Office provides law enforcement services to the city of Gackle.
- The nearest hospital is the Jamestown Regional Medical Center in the city of Jamestown.
- Central Valley Health District located in the city of Jamestown provides public health services to the city of Gackle and greater Logan County.

Services and Utilities. The following services are provided in the city of Gackle.

- The city of Gackle provides its own municipal garbage collection service.
- The city of Gackle maintains an inert landfill.
- The city of Gackle has a sanitary sewer system consisting of three cells and two lift stations. Some residents utilize septic systems.
- The city has a storm water system consisting of culverts and drainage ditches.
- The Napoleon Homestead is the official newspaper of the city of Gackle.
- Southeast Water Users District provides drinking/potable water to the city of Gackle.
- Electricity is provided by Otter Tail Power.
- Natural gas is not available in the city of Gackle.
- Fuel oil and propane are used as an alternative heating source and is provided by companies chosen by the individual consumer.
- Daktel provides internet, phone, and TV.

8.2.2 Risk Assessment and Hazard Scoring Notes

Table 8.2.2 summarizes the risk assessment scoring of the city of Gackle. The risk assessment and hazard scoring notes for each hazard specific to the city are shown in Table 8.2.2. Risk assessment notes for impact, frequency, likelihood and vulnerability ubiquitous for jurisdictions in Logan County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment Scoring Summary

Risk Assessment							Jurisdiction: City of Gackle						
<u>Natural Hazard</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>							
Drought	4	3	4	3	2	12							
Fire – Urban/Structure Collapse	4	2	2	3	2	9							
Fire – Wildland (Rural)	4	3	4	3	2	12							
Flood	3	3	4	3	1	12							
Geologic Hazard	1	1	2	1	2	3							
Infectious Disease	4	4	4	4	2	14							
Severe Summer Weather	4	4	4	3	1	13							
Severe Winter Weather	4	4	4	3	2	12							
Space Weather	4	1	2	4	2	9							
<u>Adversarial Threats</u>													
Civil Disturbance	4	2	2	2	1	9							
Criminal, Terrorist or Nation-State Attack	4	2	2	2	1	9							
Cyberattack	4	2	2	2	2	8							
<u>Technological Threats</u>													
Dam Failure	1	1	1	1	1	3							
Hazardous Material Release	4	2	2	2	1	9							
Transportation Incident	3	2	3	3	2	9							

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment

Civil Disturbance			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities 		
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major incident • DAPL protesters were not active in the city 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route • Gackle-Streeter Public School </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route • Gackle-Streeter Public School 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure
<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route • Gackle-Streeter Public School 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route • Gackle-Streeter Public School </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure • <i>Satellite Logan County Sheriff's Office at Gackle City Hall (anticipated for 2023)</i> </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route • Gackle-Streeter Public School 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure • <i>Satellite Logan County Sheriff's Office at Gackle City Hall (anticipated for 2023)</i>
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Criminal, Terrorist, Nation-State Attack			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities • Threats to city water supply • Loss of Communication Systems • Disease Outbreak/Mass Infections 		
Frequency	<ul style="list-style-type: none"> • No occurrences • Miscellaneous property damage occurring in the city on an occasional basis 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure • Gackle-Streeter Public School installed upgraded security camera system and door access control system • <i>Satellite Logan County Sheriff's Office at Gackle City Hall (anticipated for 2023)</i> </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage • Lack of access control barriers during 4th of July parade route 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • No railroad infrastructure • Gackle-Streeter Public School installed upgraded security camera system and door access control system • <i>Satellite Logan County Sheriff's Office at Gackle City Hall (anticipated for 2023)</i>
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	<ul style="list-style-type: none"> • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release 	<ul style="list-style-type: none"> • Human Injury/Death • School Closure • Loss of Communication Systems • Identity Theft – loss of wages and/or assets
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major attack 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks • Gackle-Streeter Public School 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • City records are on paper • No pipelines • No railroad infrastructure
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks • Elderly population relying largely on landlines for communication purposes, remote medical care and equipment monitoring • Gackle-Streeter Public School 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • City records are on paper • No pipelines • No railroad infrastructure

Table 8.2.3 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Dam Failure					
Impact	<ul style="list-style-type: none"> • Blocked Roads • Crop Loss and Loss of Livestock • Delayed Emergency Response • Evacuation (Localized) • Loss of Critical Facilities and Infrastructure • Loss of Potable/Drinking Water • Loss of Power • Loss of Transportation Systems/Accessibility • Loss of Wildlife Habitat • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Loss of recreational activities and summer-time population resulting in economic loss • Possible temporary homeless population due to lack of facilities to shelter large numbers of people 				
Frequency	<ul style="list-style-type: none"> • Never an occurrence 				
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><u>More Likely</u></td> <td style="width: 50%; border: none;"><u>Less Likely</u></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Likely</u>	<u>Less Likely</u>		<ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Likely</u>	<u>Less Likely</u>				
	<ul style="list-style-type: none"> • No dams present in the vicinity of the city 				
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><u>More Vulnerable</u></td> <td style="width: 50%; border: none;"><u>Less Vulnerable</u></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Vulnerable</u>	<u>Less Vulnerable</u>		<ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Vulnerable</u>	<u>Less Vulnerable</u>				
	<ul style="list-style-type: none"> • No dams present in the vicinity of the city 				

Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Drought			
Impact	<ul style="list-style-type: none"> • Crop Loss • Loss of Economy • Loss of Livestock • Loss of Wildlife Habitat (decreased wildlife populations) • Increase in Wildland Fire Potential • Water quality compromised from stock dams • Diminished soil quality – salinity will increase • Negative impact on mental health of producers and fire responders – “community impact” • Local producers forced to sell off herds which can last for several years • Population loss as people moved away due to loss of economy 		
Frequency	<ul style="list-style-type: none"> • Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds • Severe Drought 2021/2022 • End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Heavy precipitation </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation 	<u>Less Likely</u> <ul style="list-style-type: none"> • Heavy precipitation
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • City does not have a fire index sign </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDDES • Advanced communications such as internet and TV • City has a 50,000-gallon water tower </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • City does not have a fire index sign 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDDES • Advanced communications such as internet and TV • City has a 50,000-gallon water tower
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Urban Fire/Structure Collapse			
Impact	<ul style="list-style-type: none"> • Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release <ul style="list-style-type: none"> • Human Injury/Death • Increase Fire Potential • Property damage on a significant scale if impacting downtown structures 		
Frequency	<ul style="list-style-type: none"> • Occurrences of structures/vehicles being impacted every five years 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • Agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites • Fire department lacks a side-by-side with water tank </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Gackle Fire Department • Permanent generator at Gackle Ambulance/Fire Hall • City has a 50,000-gallon water tower </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • Agriculture-related infrastructure in city limits could cause a large fire • Presence of Tier II sites • Fire department lacks a side-by-side with water tank 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Gackle Fire Department • Permanent generator at Gackle Ambulance/Fire Hall • City has a 50,000-gallon water tower
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Rural & Wildland			
Impact	<ul style="list-style-type: none"> • Building Collapse • Crop Loss • Delayed Emergency Response • Evacuation (Localized) • Explosion • Increase Fire Potential • Loss of Power/Downed Power Lines • Mass Casualties • Losses could be on a significant scale if impacting a major producer or farmstead • Loss of farm equipment and assets • Loss of Livestock 		
Frequency	<ul style="list-style-type: none"> • Significant fire once every five years • Approximately four wildland fires occurring annually • Controlled burns becoming out of control approximately 25 percent of the time 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • No railroad infrastructure </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • No railroad infrastructure
<u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • No railroad infrastructure 		
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Flood			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • Runoff from buildings causes overland flooding 		
Frequency	<ul style="list-style-type: none"> • Bi-annual occurrences of localized flooding of nearby township roads and highways • Overland flooding during wet years on railroad avenue • Flash flooding occurs from heavy precipitation 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Inadequate water way/drainage ditch through the city park results blocking Maple St. near the school </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance regularly </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Inadequate water way/drainage ditch through the city park results blocking Maple St. near the school 	<u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance regularly
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City is not enrolled in the NFIP • City does not have flood ordinances • Inadequate water way/drainage ditch through the city park results blocking Maple St. near the school • Lack of permanent/portable generators for city water pump station (includes control panel) • Lack of permanent generator at Gackle-Streeter Public School </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance regularly • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center • Logan County IPAWS </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City is not enrolled in the NFIP • City does not have flood ordinances • Inadequate water way/drainage ditch through the city park results blocking Maple St. near the school • Lack of permanent/portable generators for city water pump station (includes control panel) • Lack of permanent generator at Gackle-Streeter Public School 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance regularly • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center • Logan County IPAWS
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

	Geologic Hazard	
Impact	<ul style="list-style-type: none"> • Delayed Emergency Response • Human Injury/Death • Loss of Economy 	<ul style="list-style-type: none"> • Loss of Power • Property Damage
Frequency	<ul style="list-style-type: none"> • Four frost heaves on N.D. Highway 46 just east of the city of Gackle were reported and documented by the N.D. Dept. of Transportation on March 1, 2017. N.D. Highway 46 is on the county line with neighboring Stutsman County. 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done • Flat topography - no steep terrain where landslides could occur

Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Hazardous Material Release			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response / Increased Fire Potential • Environmental Degradation • Evacuation (localized) • Explosion • Human Injury/Death • Loss of Economy • Loss of Potable Water • Loss of Power • Property Damage • Increased risk of HAZMAT release and/or transportation incidents due to increased oil train traffic and trucks 		
Frequency	<ul style="list-style-type: none"> • Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • No railroad infrastructure </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant 	<u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • No railroad infrastructure
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Lack of security fencing around anhydrous plant • Fire department lacks a side-by-side with water tank • Lack of signage for truck route through/around the city • N.D. Highways 46 and 56 </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • No railroad infrastructure • Radio-activated outdoor emergency siren • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center • Logan County IPAWS • South Central Health, Gackle Clinic </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Lack of security fencing around anhydrous plant • Fire department lacks a side-by-side with water tank • Lack of signage for truck route through/around the city • N.D. Highways 46 and 56 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • No railroad infrastructure • Radio-activated outdoor emergency siren • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center • Logan County IPAWS • South Central Health, Gackle Clinic
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Infectious Disease			
Impact	<ul style="list-style-type: none"> • Crop Loss • Human Injury/Death • Livestock Loss • Loss of Economy • Mass Casualties • Strain on local medical resources (ambulance) • Loss of medical staff due to sickness • Loss of Potable Water • Financial cost to public health resources 		
Frequency	<ul style="list-style-type: none"> • Annual occurrences of death, primarily among the elderly • Occurrence of disease - 1 in 3 for people annually • Annual occurrences of influenza cases in the local population • The COVID-19 Pandemic of 2020 resulted in mass quarantine and sheltering of the local population and temporary closure of businesses 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Dependent on weather for animals and crops • Presence of abandoned properties and overgrown lots • Gackle Care Center • Gackle-Streeter Public School </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Dependent on weather for animals and crops • Presence of abandoned properties and overgrown lots • Gackle Care Center • Gackle-Streeter Public School 	<u>Less Likely</u> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Presence of abandoned properties and overgrown lots • No hospital in city limits • No vet clinic in city limits • Gackle Care Center • Gackle-Streeter Public School </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities • Immunizations & medications of local population • South Central Health, Gackle Clinic • Gackle Ambulance </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Presence of abandoned properties and overgrown lots • No hospital in city limits • No vet clinic in city limits • Gackle Care Center • Gackle-Streeter Public School 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities • Immunizations & medications of local population • South Central Health, Gackle Clinic • Gackle Ambulance
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Severe Summer Weather			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Evacuation (Localized) • Human Injury/Death – heat exhaustion • Sewer Backup • Shelter-in-place Vehicle Damage • Loss of Livestock • Loss of Crops • Loss of Power/Downed Power Lines - • Property Damage – repair of roofing, siding and drainage systems for homes 		
Frequency	<ul style="list-style-type: none"> • Property damage from tornados/straight-line winds in summer 2017 and 2019 • Property damage from severe storm in summer 2016 • Windstorms occurring annually • Annual occurrences of hailstorms • Two or three significant storms producing damage to trees and property annually 		
Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Gackle-Streeter Public School • Lack of permanent/portable generators for city water pump station (includes control panel) • Lack of permanent generator at Gackle-Streeter Public School • Lacks building code enforcement • Lack of official storm shelter with generator </td> <td style="width: 50%; vertical-align: top;"> <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency siren • Logan County IPAWS • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center </td> </tr> </table>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Gackle-Streeter Public School • Lack of permanent/portable generators for city water pump station (includes control panel) • Lack of permanent generator at Gackle-Streeter Public School • Lacks building code enforcement • Lack of official storm shelter with generator 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency siren • Logan County IPAWS • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Severe Winter Weather			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Evacuation (Localized) • Human Injury/Death – wind chill • Property Damage – repair of roofing, siding and drainage systems for homes • Loss of Crops • Loss of Livestock • Loss of Power/Downed Power Lines • Sewer Backup • Shelter-in-place • Vehicle Damage • Infrastructure Degradation 		
Frequency	<ul style="list-style-type: none"> • March 2017 snowstorm resulted in blocked roads throughout the city • Spring snowstorm of 2019 • Annual occurrences of power loss from storms • Two or three significant blizzards producing damage to trees and property annually 		
Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 		
Vulnerability	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Gackle-Streeter Public School • Lack of permanent/portable generators for city water pump station (includes control panel) • Lack of permanent generator at Gackle-Streeter Public School • Lacks building code enforcement • Lack of official storm shelter with generator </td> <td style="width: 50%; vertical-align: top;"> <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency siren • Logan County IPAWS • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center </td> </tr> </table>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Gackle-Streeter Public School • Lack of permanent/portable generators for city water pump station (includes control panel) • Lack of permanent generator at Gackle-Streeter Public School • Lacks building code enforcement • Lack of official storm shelter with generator 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency siren • Logan County IPAWS • Permanent generator at Gackle Ambulance/Fire Hall • Permanent generator at Gackle Care Center
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Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Space Weather			
Impact	<ul style="list-style-type: none"> • Loss of operation of the city hall, fire hall, lift station, etc. • Loss/outage of medical devices at private residences • Property damage from sewer backups due to loss of lift station 		
Frequency	<ul style="list-style-type: none"> • Never a recorded occurrence in Logan County or North Dakota 		
Likelihood	<ul style="list-style-type: none"> • Dependent on solar activity and the 11-year solar cycle • Likely to occur once every 500 years per the 2018 N.D. Enhanced Mitigation MAOP 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent/portable generators for city water pump station (includes control panel) • Gackle-Streeter Public School </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent/portable generators for city water pump station (includes control panel) • Gackle-Streeter Public School 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent/portable generators for city water pump station (includes control panel) • Gackle-Streeter Public School 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens 		

Table 8.2.2 – City of Gackle, North Dakota Jurisdiction Risk Assessment - Continued

Transportation Incident			
Impact	<ul style="list-style-type: none"> • Blocked roads from inadequate road clearing • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Delayed Emergency Response • HAZMAT Release • Livestock Loss • Business Interruptions • Property Damage • Could be catastrophic if involving a school bus filled with children and a truck carrying hazardous materials 		
Frequency	<ul style="list-style-type: none"> • Annual occurrences of accidents involving cars and/or farm equipment 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport
<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 46 and 56 • Presence of Tier II sites • Gackle-Streeter Public School • Lack of signage for truck route through/around the city </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No pipelines • No railroad infrastructure </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 46 and 56 • Presence of Tier II sites • Gackle-Streeter Public School • Lack of signage for truck route through/around the city 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No pipelines • No railroad infrastructure
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8.2.3 Mitigation Strategy

The Logan County Multi-Jurisdictional Multi-Hazard Plan Update includes a mitigation strategy consisting of seven goals in Chapter 6. The following problem statement and mitigation projects address the mitigation needs of the city of Gackle. It should be noted that some mitigation projects that pertain to all jurisdictions are included to encourage county-wide collaboration.

Problem Statement

The city of Gackle lacks sources of backup power at critical facilities and infrastructure. The city's waterway/drainage ditch traversing through the city park lack adequate culverts and results in blockage of Maple St. N.D. Highway 46 east of the city is impacted by frost heaves resulting in loss of transportation accessibility. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, engineering to retrofit/upgrade the storm water system, retrofit/upgrade of N.D. Highway 46 east of the city, and education and outreach are a priority for the city.

City of Gackle Project 1: Install Permanent or Portable Generators at Critical Facilities and Infrastructure.

Description/Benefit		Test existing generators and create regularly scheduled maintenance system. Install new generators to establish source of backup power to maintain continued operation of the following critical facilities and infrastructure.					
		<ul style="list-style-type: none"> • City water pump station (includes control panel) • Gackle-Streeter Public School (\$38,000 for OTPCO to install primary wire from transformer bay to the transfer switch) • City of Gackle (portable only) • Gackle City Hall/future Logan County Sheriff’s Office Satellite 					
Hazard/Threat Addressed		All hazards					
Affected Jurisdiction(s)		City of Gackle					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services, Public Works					
Partners		Emergency Management, Public Utilities					
Completion Timeframe		2 to 3 years	Cost	Project-specific. Sensitive to supply-chain.			
Funding Source		Public Utilities, Regional Council, RD. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program. State Homeland Security grants.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	3	4	4	5	3	5	29
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>			<u>Plan Element Utilized</u>			<u>Process for Integration</u>	
Logan County LEOP Logan County Mitigation Plan Logan County THIRA			Capability Assessment, Hazard History, Risk Assessment			Include in city and/or fire department’s budget. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council or board.	

City of Gackle Project 2: Conduct Engineering Study to Retrofit and/or Upgrade Critical Facilities and Infrastructure.

Description/Benefit		The city’s storm water system through the city park needs upgraded culverts to improve drainage. Elm St. to Spruce St., which includes Maple St, collects water near the Gackle-Streeter Public School becomes blocked by overland flooding preventing access for emergency services and the public. An engineering study is needed to identify solutions to retrofit/upgrade the system.					
Hazard/Threat Addressed		Flood, Severe Summer Weather, Severe Winter Weather					
Affected Jurisdiction(s)		City of Gackle					
Project Status		New					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services, Gackle-Streeter Public School					
Partners		County Commission, Emergency Management, NDACo, NDLC, Regional Council, DWR					
Completion Timeframe		2 to 3 years	Cost	Project-specific			
Funding Source		FEMA’s Building Resilient Infrastructure and Communities (BRIC). Local budgets. NDDEQ. Prairie Dog Fund. DWR.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	4	5	5	1	4	28
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Solicit competitive bids. Select contractor. Apply for grant funding to execute or budget in local budgets.		

City of Gackle Project 3: Support the N.D. Dept. of Transportation’s Efforts to Mitigation Frost Heaves on N.D. Highway 46.

Description/Benefit		<p>Four frost heaves on N.D. Highway 46 just east of the city of Gackle were reported and documented by the N.D. Dept. of Transportation on March 1, 2017. The heaves result in a reduction and/or overall loss of transportation accessibility limiting access for emergency services and disrupting economic activity.</p> <p>An engineering study is needed to identify solutions to retrofit/upgrade and mitigate the roadway.</p> <p>The N.D. Dept. of Transportation is planning to resurface N.D. Highway 36 from U.S. Highway 281 to N.D. Highway 30.</p>					
Hazard/Threat Addressed		Flood, Geologic Hazard, Severe Winter Weather,					
Affected Jurisdiction(s)		City of Gackle and greater Logan County					
Project Status		New					
Priority		High					
Responsible Agency		NDDOT					
Partners		County Commission, City Council(s), Emergency Management, Emergency Services					
Completion Timeframe		TBD	Cost		Project-specific		
Funding Source		NDDOT.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	3	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>			<u>Plan Element</u>			<u>Process for Integration</u>	
Logan County LEOP Logan County Mitigation Plan Logan County THIRA			Capability Assessment, Hazard History, Risk Assessment			Contact the NDDOT to inquire about the prospect of implementing mitigation measures. Incorporate into city and county plans.	

8.1.4 Mitigation Capability Assessment

Capability for mitigation is divided into four categories: administrative and technical, education and outreach, financial, and planning and regulatory. Each identified resource in the four categories can be used to implement mitigation strategies and access funding for projects. **Tables comparing the mitigation capabilities of the city of Gackle with all other jurisdictions in Logan County can be found below and in Chapter 7, County Mitigation Capability Assessment.**

- Administrative and Technical: Identification of administrative and technical capabilities, which include staff, their skills and tools for mitigation planning to implement specific mitigation actions.
- Education and Outreach: Identification of education and outreach programs, and methods already in place to implement mitigation activities and communicate hazard-related information.
- Financial: Identification of access to or eligibility to use funding resources for hazard mitigation for jurisdictions.
- Planning and Regulatory: Jurisdictional plans, policies, codes, and ordinances adopted and in place that prevent and reduce the impacts of hazards.

City of Gackle, North Dakota Mitigation Capabilities Summary

The following mitigation capabilities were identified as commonplace among all hazard and threats upon completion of the risk assessment for the city of Gackle. More detailed information about the mitigation capabilities of the city of Gackle in relation to Logan County and all other incorporated jurisdictions can be found in Chapter 7, Mitigation Capability Assessment.

2018 N.D. Enhanced Mitigation MAOP	Logan Co. Sherriff’s Office
Advanced Communications: Internet & TV	MOUs
Central Valley Health District	NDDDES Fire Index Monitoring
Farm Services Agency	NDDOT Statewide Highway/Transportation Plan
Logan Co. LEOP	NDSU/Logan Co. Extension
Logan Co. Emergency Mgmt.	Gackle City Council
Gackle Fire Protection District	Zoning
Radio-activated emergency siren	Comprehensive Plan

8.2.5 Integration of Mitigation Plan into Planning Mechanisms

Integration of the plan into current planning mechanisms is critical in mitigation to communicate the needs of each jurisdiction to achieve an all-inclusive mitigation strategy. The process for integration of the mitigation plan is included after each mitigation project, which shows the planning mechanism utilized, the plan element used for integration and the process for integration.

8.2.6 Plan Maintenance

An important aspect of any useable plan is the maintenance and upkeep of the document. At any given time, planning, risk analysis, updating the situation assessment, research, coordinating, disaster response or other activity is occurring. Plan maintenance ensures the plan will remain useful in the county for many years. A mitigation action progress report form to conduct plan maintenance is in Chapter 10 of this plan.

8.3 City of Lehr, North Dakota

The following profile includes information specific to the city of Lehr for mitigation planning purposes. The information included is as follows:

- Profile and Inventory;
- Risk Assessment;
- Hazard Scoring Notes;
- Mitigation Projects, and
- Capabilities for Mitigation.

Integration into Planning Mechanisms

The process for integration of the mitigation plan into existing planning mechanisms is discussed at the bottom of each mitigation project in section 8.3.3, in section 8.3.4, and in Chapter 6, Mitigation Strategy.

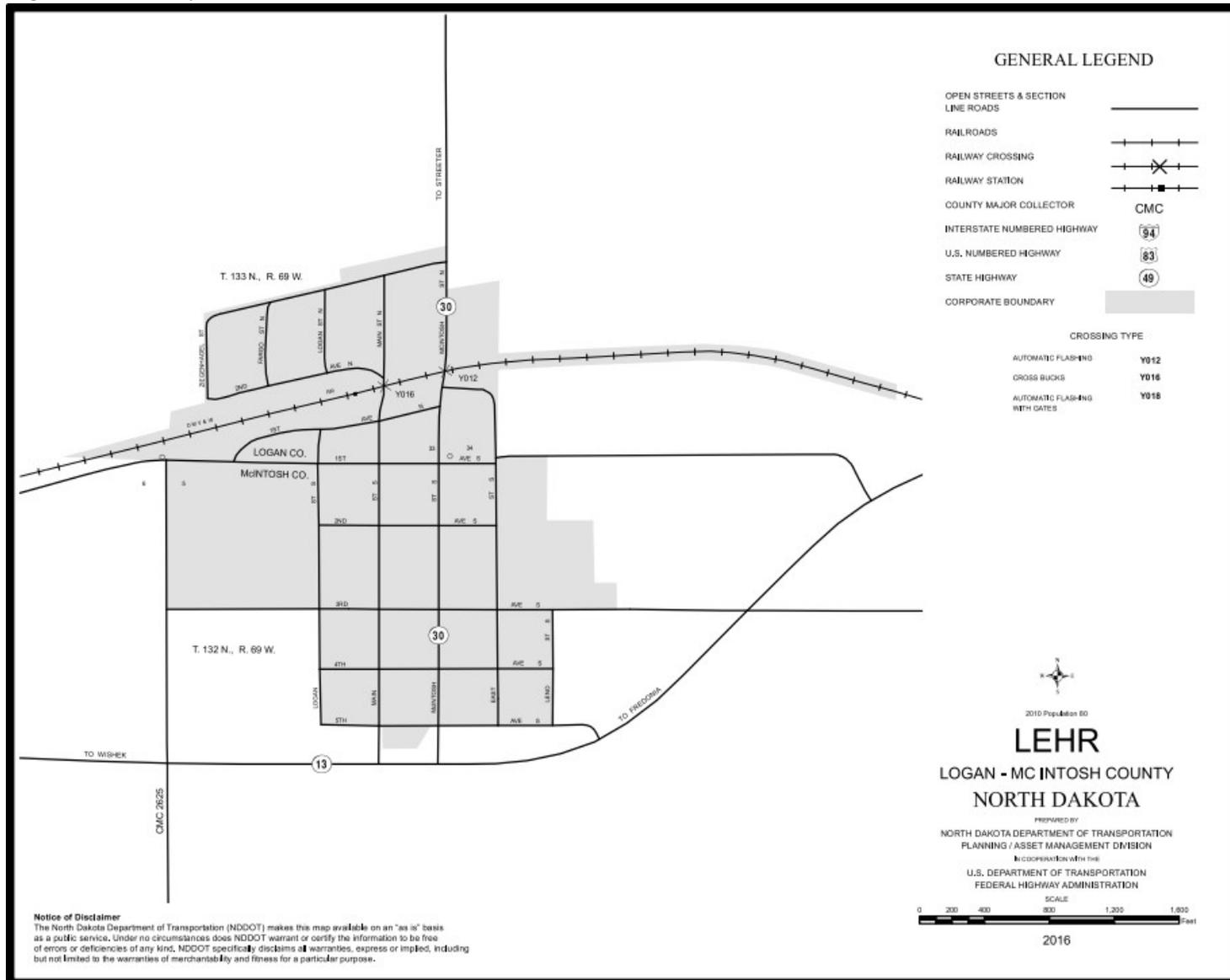
Plan Maintenance

Plan maintenance is shown in section 8.3.6.

Critical Facilities and Infrastructure

Figure 8.3.1 is a map of the city of Lehr provided by the N.D. Dept. of Transportation.

Figure 8.3.1 – City of Lehr, North Dakota



Source(s): N.D. Dept. of Transportation

8.3.1 Profile and Inventory

The location, total population, vulnerable populations, housing units and household size, businesses, critical facilities and infrastructure, new and future development, services, jurisdictional buildings, emergency response services and utilities are shown for the city of Lehr. Detailed narratives follow each section heading to profile the city.

Detailed information on public buildings, services provided, emergency response services and utilities can be found can be found in Chapter 3, Profile and Inventory.

Location

The city of Lehr is located the extreme southeast corner of Logan County at the intersection of N.D. Highways 13 and 30. The Dakota Missouri Valley & Western railroad traverses the city. The city is in both Logan and McIntosh Counties.

Population

Table 8.3.1 shows population trends for the city of Lehr from 1920 to 2020.

Per the 2020 U.S. Decennial Census, the city of Lehr has a population of 81 people, which is an increase of one person (1.3 percent) from 80 people in 2010.

Table 8.3.1 – 1920 to 2020 City of Lehr, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
362	458	536	394	381	287	254	191	114	80	81

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2016 to 2020 American Community Survey 5-Year Estimate, the population of the city of Lehr (Logan County part) consists of no individuals under the age of 20 and five individuals aged 65 and older.

Daycares. There are no daycares in the city of Lehr.

Poverty. Per the 2016 to 2020 American Community Survey 5-Year Estimate, there is one individual in the city of Lehr (Logan County part) that lives below the poverty line.

Public Schools. There are no public schools in the city of Lehr.

Senior Housing Developments/Care Centers. There are no age-restricted, senior housing developments, or care centers in the city of Lehr.

Housing Units and Household Size

The 2016 to 2020 American Community Survey 5-Year Estimate shows there is a total of 34 housing units in the city of Lehr (Logan County part) consisting of 34 single-family homes, no mobile/RV homes, and no multifamily homes in the city of Lehr.

The 2016 to 2020 American Community Survey 5-Year Estimate shows there are nine households in the city of Lehr (Logan County part) resulting in an average household size of 1.22 people.

Businesses

Major employers in the city of Lehr includes JKuntz Construction. Additional information on businesses and economic development can be obtained by contacting the Logan County Economic Development Coordinator.

New and Future Development

Analyzing development trends is important for mitigation to understand where projects may be needed in the future and funding is best allocated. New development is anything occurring since the 2017 and new and future development is anything planned, pending, and proposed development under construction.

New development in the city of Lehr since 2017 includes:

- Demolishing of the old bar
- Two hunting lodges were constructed in 2021 (one in Logan County one in McIntosh County)

No future development was identified at the time of this plan update for the city of Lehr.

Critical Facilities. The following facilities were identified as critical in the city of Lehr.

- Lehr City Hall
- Lehr Fire Hall/Shelter
- Logan County Shop
- U.S. Post Office

Infrastructure. The following infrastructure was identified as critical in the city of Lehr.

- The city of Lehr has a sanitary sewer system with
- The city of Lehr does not have an inert landfill.
- The DMV&W railroad traverses the city.
- N.D. Highways 13 and 30 traverse the city.

Emergency Response Services. The following emergency response services were identified in the city of Lehr.

- Wishek Ambulance Service provides ambulance services to the city of Lehr.
- The Lehr Fire District provides fire protection services to the city and surrounding rural areas.
- The Logan County Sherriff's Office and the McIntosh County Sheriff's Office provides law enforcement services to the city of Lehr.
- The nearest hospital is the Wishek Hospital in the city of Wishek in neighboring McIntosh County.

Chapter 8

- Central Valley Health District located in the city of Jamestown provides public health services to the city of Lehr (Logan County part).

Services and Utilities. The following services are provided in the city of Lehr.

- Gahner Sanitation provides garbage collection services to the city of Lehr.
- The city of Lehr maintains an inert landfill.
- The city of Lehr has a sanitary sewer system with three lagoon cells and one lift station. No residents utilize septic systems.
- The city has a storm water system consisting of culverts and drainage ditches.
- The Wishek Star is the official newspaper of the city of Lehr.
- The city of Lehr provides its own drinking/potable water to city residents.
- Electricity is provided by Montana-Dakota Utilities.
- Natural gas is not available in the city of Lehr.
- Fuel oil and propane are used as an alternative heating source and is provided by companies chosen by the individual consumer.
- Bektel provides internet, phone, and TV.

8.3.2 Risk Assessment and Hazard Scoring Notes

Table 8.3.2 summarizes the risk assessment scoring of the city of Lehr. The risk assessment and hazard scoring notes for each hazard specific to the city are shown in Table 8.3.2. Risk assessment notes for impact, frequency, likelihood and vulnerability ubiquitous for jurisdictions in Logan County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment Scoring Summary

Risk Assessment							Jurisdiction: City of Lehr
<u>Natural Hazard</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>	
Drought	4	3	4	3	2	12	
Fire – Urban/Structure Collapse	4	2	2	2	2	8	
Fire – Wildland (Rural)	4	2	4	2	2	10	
Flood	3	2	4	2	1	10	
Geologic Hazard	1	1	2	1	2	3	
Infectious Disease	4	4	4	4	1	15	
Severe Summer Weather	4	4	4	3	1	13	
Severe Winter Weather	4	4	4	3	2	12	
Space Weather	4	1	2	4	2	9	
<u>Adversarial Threats</u>							
Civil Disturbance	4	2	2	2	1	9	
Criminal, Terrorist or Nation-State Attack	4	2	2	1	1	8	
Cyberattack	3	2	2	1	1	7	
<u>Technological Threats</u>							
Dam Failure	1	1	1	1	1	3	
Hazardous Material Release	4	2	2	2	1	9	
Transportation Incident	3	2	3	3	2	9	

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment

Civil Disturbance			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities 		
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major incident • DAPL protesters were not active in the city 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Criminal, Terrorist, Nation-State Attack			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities • Threats to city water supply • Loss of Communication Systems • Disease Outbreak/Mass Infections 		
Frequency	<ul style="list-style-type: none"> • No occurrences • Miscellaneous property damage occurring in the city on an occasional basis 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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<u>More Vulnerable</u> <ul style="list-style-type: none"> • Lack of local active/continuous law enforcement coverage 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	<ul style="list-style-type: none"> • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release 	<ul style="list-style-type: none"> • Human Injury/Death • School Closure • Loss of Communication Systems • Identity Theft – loss of wages and/or assets
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major attack 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • No public school • City records are on paper • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks • Elderly population relying largely on landlines for communication purposes, remote medical care and equipment monitoring 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • No public school • City records are on paper • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials

Table 8.3.3 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Dam Failure					
Impact	<ul style="list-style-type: none"> • Blocked Roads • Crop Loss and Loss of Livestock • Delayed Emergency Response • Evacuation (Localized) • Loss of Critical Facilities and Infrastructure • Loss of Potable/Drinking Water • Loss of Power • Loss of Transportation Systems/Accessibility • Loss of Wildlife Habitat • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Loss of recreational activities and summer-time population resulting in economic loss • Possible temporary homeless population due to lack of facilities to shelter large numbers of people 				
Frequency	<ul style="list-style-type: none"> • Never an occurrence 				
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><u>More Likely</u></td> <td style="width: 50%; border: none;"><u>Less Likely</u></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Likely</u>	<u>Less Likely</u>		<ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Likely</u>	<u>Less Likely</u>				
	<ul style="list-style-type: none"> • No dams present in the vicinity of the city 				
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><u>More Vulnerable</u></td> <td style="width: 50%; border: none;"><u>Less Vulnerable</u></td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Vulnerable</u>	<u>Less Vulnerable</u>		<ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Vulnerable</u>	<u>Less Vulnerable</u>				
	<ul style="list-style-type: none"> • No dams present in the vicinity of the city 				

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Drought			
Impact	<ul style="list-style-type: none"> • Crop Loss • Loss of Economy • Loss of Livestock • Loss of Wildlife Habitat (decreased wildlife populations) • Increase in Wildland Fire Potential • Water quality compromised from stock dams • Diminished soil quality – salinity will increase • Negative impact on mental health of producers and fire responders – “community impact” • Local producers forced to sell off herds which can last for several years • Population loss as people moved away due to loss of economy 		
Frequency	<ul style="list-style-type: none"> • Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds • Severe Drought 2021/2022 • End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Heavy precipitation </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation 	<u>Less Likely</u> <ul style="list-style-type: none"> • Heavy precipitation
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • Lack of adequate grass rig at fire department • City obtains water from two municipal wells </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDDES • Advanced communications such as internet and TV • Fire index sign at fire hall • City has a 30,000-gallon water tower • Fire hall has permanent generator • City obtains water from two municipal wells </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • Lack of adequate grass rig at fire department • City obtains water from two municipal wells 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDDES • Advanced communications such as internet and TV • Fire index sign at fire hall • City has a 30,000-gallon water tower • Fire hall has permanent generator • City obtains water from two municipal wells
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Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Urban Fire/Structure Collapse			
Impact	<ul style="list-style-type: none"> • Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release <ul style="list-style-type: none"> • Human Injury/Death • Increase Fire Potential • Property damage on a significant scale if impacting downtown structures 		
Frequency	<ul style="list-style-type: none"> • Occurrences of structures/vehicles being impacted every five years 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire 	<u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses
<u>More Likely</u> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire 	<u>Less Likely</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • Fire hall inadequate to meet the equipment and personnel needs of the fire department </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Lehr Fire Department • City has a 30,000-gallon water tower • Fire hall has permanent generator </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • Fire hall inadequate to meet the equipment and personnel needs of the fire department 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Lehr Fire Department • City has a 30,000-gallon water tower • Fire hall has permanent generator
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Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Rural & Wildland			
Impact	<ul style="list-style-type: none"> • Building Collapse • Crop Loss • Delayed Emergency Response • Evacuation (Localized) • Explosion • Increase Fire Potential • Loss of Power/Downed Power Lines • Mass Casualties • Losses could be on a significant scale if impacting a major producer or farmstead • Loss of farm equipment and assets • Loss of Livestock 		
Frequency	<ul style="list-style-type: none"> • Significant fire once every five years • Approximately four wildland fires occurring annually • Controlled burns becoming out of control approximately 25 percent of the time 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Fire hall inadequate to meet the equipment and personnel needs of the fire department • Lack of adequate grass rig at fire department • Presence of WUI Intermix </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Lehr Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Fire index sign at fire hall • Fire hall has permanent generator </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Fire hall inadequate to meet the equipment and personnel needs of the fire department • Lack of adequate grass rig at fire department • Presence of WUI Intermix 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Lehr Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Fire index sign at fire hall • Fire hall has permanent generator
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Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Flood			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • Runoff from buildings causes overland flooding 		
Frequency	<ul style="list-style-type: none"> • Bi-annual occurrences of localized flooding of nearby township roads and highways • Overland flooding during wet years on railroad avenue • Flash flooding occurs from heavy precipitation 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Sanitary sewer lagoons located in a low-lying area </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance when needed </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Sanitary sewer lagoons located in a low-lying area 	<u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance when needed
<u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Sanitary sewer lagoons located in a low-lying area 	<u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance when needed 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City is not enrolled in the NFIP • City does not have flood ordinances • Sanitary sewer lagoons located in a low-lying area • Undersized culvert at intersection of Main St. N and 2nd Ave N. • No culverts on east side of Main St. north of the county line </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance when needed </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City is not enrolled in the NFIP • City does not have flood ordinances • Sanitary sewer lagoons located in a low-lying area • Undersized culvert at intersection of Main St. N and 2nd Ave N. • No culverts on east side of Main St. north of the county line 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance when needed
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Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

	Geologic Hazard	
Impact	<ul style="list-style-type: none"> • Delayed Emergency Response • Human Injury/Death • Loss of Economy 	<ul style="list-style-type: none"> • Loss of Power • Property Damage
Frequency	<ul style="list-style-type: none"> • No incidents involving geologic hazards in or near city limits 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done • Flat topography - no steep terrain where landslides could occur

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Hazardous Material Release			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response / Increased Fire Potential • Environmental Degradation • Evacuation (localized) • Explosion • Human Injury/Death • Loss of Economy • Loss of Potable Water • Loss of Power • Property Damage • Increased risk of HAZMAT release and/or transportation incidents due to increased oil train traffic and trucks 		
Frequency	<ul style="list-style-type: none"> • Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant 	<u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant 	<u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital or medical clinic in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Manually-activated outdoor emergency siren </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Manually-activated outdoor emergency siren </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital or medical clinic in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Manually-activated outdoor emergency siren 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Manually-activated outdoor emergency siren
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital or medical clinic in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Manually-activated outdoor emergency siren 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Manually-activated outdoor emergency siren 		

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

	Infectious Disease	
Impact	<ul style="list-style-type: none"> • Crop Loss • Human Injury/Death • Livestock Loss • Loss of Economy • Mass Casualties 	<ul style="list-style-type: none"> • Strain on local medical resources (ambulance) • Loss of medical staff due to sickness • Loss of Potable Water • Financial cost to public health resources
Frequency	<ul style="list-style-type: none"> • Annual occurrences of death, primarily among the elderly • Occurrence of disease - 1 in 3 for people annually • Annual occurrences of influenza cases in the local population 	<ul style="list-style-type: none"> • The COVID-19 Pandemic of 2020 resulted in mass quarantine and sheltering of the local population and temporary closure of businesses
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Dependent on weather for animals and crops • Presence of abandoned properties and overgrown lots 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Presence of abandoned properties and overgrown lots • No hospital or medical clinic • No vet clinic in city limits 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities • Immunizations & medications of local population • No care center in the city • No public school

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

	Severe Summer Weather	
Impact	<ul style="list-style-type: none"> Blocked Roads Evacuation (Localized) Human Injury/Death – heat exhaustion Sewer Backup Shelter-in-place Vehicle Damage 	<ul style="list-style-type: none"> Loss of Livestock Loss of Crops Loss of Power/Downed Power Lines - Property Damage – repair of roofing, siding and drainage systems for homes
Frequency	<ul style="list-style-type: none"> Property damage from tornados/straight-line winds in summer 2017 and 2019 Property damage from severe storm in summer 2016 Windstorms occurring annually 	<ul style="list-style-type: none"> Annual occurrences of hailstorms Two or three significant storms producing damage to trees and property annually
Likelihood	<ul style="list-style-type: none"> Climatic patterns will result in numerous annual occurrences of the hazard 	
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> High elderly population Presence of mobile homes Aging infrastructure (roads and electrical systems) Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse Lacks building code enforcement Lack of official storm shelter with heating systems and generator Manually-activated outdoor emergency siren 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> Advanced warning and notification such as internet and TV No public school Manually-activated outdoor emergency siren Logan County IPAWS

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Severe Winter Weather			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Evacuation (Localized) • Human Injury/Death – wind chill • Property Damage – repair of roofing, siding and drainage systems for homes • Loss of Crops • Loss of Livestock • Loss of Power/Downed Power Lines • Sewer Backup • Shelter-in-place • Vehicle Damage • Infrastructure Degradation 		
Frequency	<ul style="list-style-type: none"> • March 2017 snowstorm resulted in blocked roads throughout the city • Spring snowstorm of 2019 • Annual occurrences of power loss from storms • Two or three significant blizzards producing damage to trees and property annually 		
Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 		
Vulnerability	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse • Lacks building code enforcement • Lack of official storm shelter with heating systems and generator • Manually-activated outdoor emergency siren </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • No public school • Manually-activated outdoor emergency siren • Logan County IPAWS </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse • Lacks building code enforcement • Lack of official storm shelter with heating systems and generator • Manually-activated outdoor emergency siren 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • No public school • Manually-activated outdoor emergency siren • Logan County IPAWS
<u>More Vulnerable</u> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse • Lacks building code enforcement • Lack of official storm shelter with heating systems and generator • Manually-activated outdoor emergency siren 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • No public school • Manually-activated outdoor emergency siren • Logan County IPAWS 		

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Space Weather			
Impact	<ul style="list-style-type: none"> • Loss of operation of the city hall, fire hall, lift station, etc. • Loss/outage of medical devices at private residences • Property damage from sewer backups due to loss of lift station 		
Frequency	<ul style="list-style-type: none"> • Never a recorded occurrence in Logan County or North Dakota 		
Likelihood	<ul style="list-style-type: none"> • Dependent on solar activity and the 11-year solar cycle • Likely to occur once every 500 years per the 2018 N.D. Enhanced Mitigation MAOP 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens • Lack of public school </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens • Lack of public school
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at city hall (to be used as a shelter) and pumphouse 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens • Lack of public school 		

Table 8.3.2 – City of Lehr, North Dakota Jurisdiction Risk Assessment - Continued

Transportation Incident			
Impact	<ul style="list-style-type: none"> • Blocked roads from inadequate road clearing • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Delayed Emergency Response • HAZMAT Release • Livestock Loss • Business Interruptions • Property Damage • Could be catastrophic if involving a school bus filled with children and a truck carrying hazardous materials 		
Frequency	<ul style="list-style-type: none"> • Annual occurrences of accidents involving cars and/or farm equipment 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport
<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 13 and 30 • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No public school • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 13 and 30 • Presence of Tier II sites 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No public school • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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8.3.3 Mitigation Strategy

The Logan County Multi-Jurisdictional Multi-Hazard Plan Update includes a mitigation strategy consisting of seven goals in Chapter 6. The following problem statement and mitigation projects address the mitigation needs of the city of Lehr. It should be noted that some mitigation projects that pertain to all jurisdictions are included to encourage county-wide collaboration.

Problem Statement

The city of Lehr lacks sources of backup power at critical facilities and infrastructure. The city's fire hall is inadequate to meet the equipment and personnel needs of the fire department. The city's sanitary sewer lagoons are in a low-lying area and are a risk to overland flooding. The city's storm water system is inadequate and results in overland flooding. The city's outdoor emergency siren is manually-activated. The city lacks an official storm shelter. The city does not have zoning ordinances. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, construction of an addition to the fire hall, engineering to retrofit/upgrade the sanitary sewer and storm water systems, installation of an upgraded outdoor emergency siren, and education and outreach and planning and regulatory capabilities are a priority for the city.

City of Lehr Project 1: Install Permanent or Portable Generators at Critical Facilities and Infrastructure.

Description/Benefit		Test existing generators and create regularly scheduled maintenance system. Install new generators to establish source of backup power to maintain continued operation of the following critical facilities and infrastructure.					
		<ul style="list-style-type: none"> • Vet’s Hall and/or City Hall (to be used as a shelter(s)) • Pumphouse 					
Hazard/Threat Addressed		All hazards					
Affected Jurisdiction(s)		City of Lehr					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services, Public Works					
Partners		Emergency Management, Public Utilities					
Completion Timeframe		2 to 3 years			Cost	Project-specific	
Funding Source		Public Utilities, Regional Council, RD. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program. State Homeland Security grants.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>			<u>Plan Element Utilized</u>			<u>Process for Integration</u>	
Logan County LEOP Logan County Mitigation Plan Logan County THIRA			Capability Assessment, Hazard History, Risk Assessment			Include in city and/or fire department’s budget. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council or board.	

City of Lehr Project 2: Conduct Engineering Study to Retrofit and/or Upgrade Critical Facilities and Infrastructure.

Description/Benefit		<p>The city’s sanitary sewer system is in a low-lying area and upgraded culverts are needed to improve drainage for the city’s storm water system. The city’s fire hall is inadequate to meet the equipment and personnel needs of the fire department.</p> <p>Engineering studies are needed to identify solutions to retrofit/upgrade both systems and the fire hall.</p> <ul style="list-style-type: none"> • Upgraded culverts at Main St. N and 2nd Ave N • Installation of culverts on east side of Main St. north of the county line • Construction of a fire hall addition or new fire hall altogether 					
Hazard/Threat Addressed		All					
Affected Jurisdiction(s)		City of Lehr					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services					
Partners		County Commission, Emergency Management, NDAC, NDLC, Regional Council					
Completion Timeframe		3 to 5 years	Cost	Project-specific			
Funding Source		FEMA’s Building Resilient Infrastructure and Communities (BRIC). Local budgets. NDDEQ. Prairie Dog Fund. DWR.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	2	3	3	1	3	21
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Commission studies through a formal bidding process. Select contractor. Apply for grant funding to execute or budget in local budgets.		

City of Lehr Project 3: Install Dispatch-Activated Outdoor Emergency Siren.

Description/Benefit	The city of Lehr has a manually-activated outdoor emergency siren and needs to upgrade to a radio-activated siren.						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	City of Lehr						
Project Status	New						
Priority	Very High						
Responsible Agency	City Council(s), Emergency Services						
Partners	County Commission, Emergency Management, NDACo, NDLC, Regional Council						
Completion Timeframe	2 to 3 years				Cost	Up to \$25,000 for a new siren	
Funding Source	Local budgets. N.D. League of Cities. State Homeland Security Grants. NDDDES. 9-1-1 funds (McIntosh County)						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	3	5	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Include in city and/or fire department’s capital improvement plan. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council or board.		

City of Lehr Project 4: Adopt Zoning Ordinances.

Description/Benefit	The city of Lehr needs zoning ordinances to regulate existing, and new and future development. A list of plans, policies, codes and ordinances is shown in Chapter 7, Capability Assessment.						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	City of Lehr						
Project Status	New						
Priority	Medium/High						
Responsible Agency	City Council(s), Public Works						
Partners	Emergency Management, Emergency Services, NDACo, NDDC, NDLC						
Completion Timeframe	2 years.	Cost	\$0 to \$25,000 / Staff-time				
Funding Source	Local budgets. State and federal grants.						
Values: 1 is low (negative impact and/or too costly) – Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	4	3	5	3	5	29
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
All		Capability Assessment, Hazard History, Risk Assessment			Develop, review, and approve by city council.		

8.1.4 Mitigation Capability Assessment

Capability for mitigation is divided into four categories: administrative and technical, education and outreach, financial, and planning and regulatory. Each identified resource in the four categories can be used to implement mitigation strategies and access funding for projects. **Tables comparing the mitigation capabilities of the city of Lehr with all other jurisdictions in Logan County can be found below and in Chapter 7, County Mitigation Capability Assessment.**

- Administrative and Technical: Identification of administrative and technical capabilities, which include staff, their skills and tools for mitigation planning to implement specific mitigation actions.
- Education and Outreach: Identification of education and outreach programs, and methods already in place to implement mitigation activities and communicate hazard-related information.
- Financial: Identification of access to or eligibility to use funding resources for hazard mitigation for jurisdictions.
- Planning and Regulatory: Jurisdictional plans, policies, codes, and ordinances adopted and in place that prevent and reduce the impacts of hazards.

City of Lehr, North Dakota Mitigation Capabilities Summary

The following mitigation capabilities were identified as commonplace among all hazard and threats upon completion of the risk assessment for the city of Lehr. More detailed information about the mitigation capabilities of the city of Lehr in relation to Logan County and all other incorporated jurisdictions can be found in Chapter 7, Mitigation Capability Assessment.

2018 N.D. Enhanced Mitigation MAOP	Logan Co. Sherriff’s Office
Advanced communications: Internet & TV	MOUs
Central Valley Health District	NDDDES Fire Index Monitoring
Farm Services Agency	NDDOT Statewide Highway/Transportation Plan
Logan Co. LEOP	NDSU/Logan Co. Extension
Logan Co. Emergency Mgmt.	Lehr City Council
Lehr Rural Fire Protection District	Radio-activated emergency siren

8.1.5 Integration of Mitigation Plan into Planning Mechanisms

Integration of the plan into current planning mechanisms is critical in mitigation to communicate the needs of each jurisdiction to achieve an all-inclusive mitigation strategy. The process for integration of the mitigation plan is included after each mitigation project, which shows the planning mechanism utilized, the plan element used for integration and the process for integration.

8.1.6 Plan Maintenance

An important aspect of any useable plan is the maintenance and upkeep of the document. At any given time, planning, risk analysis, updating the situation assessment, research, coordinating, disaster response or other activity is occurring. Plan maintenance ensures the plan will remain useful in the county for

many years. A mitigation action progress report form to conduct plan maintenance is in Chapter 10 of this plan.

8.4 City of Napoleon, North Dakota

The following profile includes information specific to the city of Napoleon for mitigation planning purposes. The information included is as follows:

- Profile and Inventory;
- Risk Assessment;
- Hazard Scoring Notes;
- Mitigation Projects, and
- Capabilities for Mitigation.

Integration into Planning Mechanisms

The process for integration of the mitigation plan into existing planning mechanisms is discussed at the bottom of each mitigation project in section 8.4.3, in section 8.4.4, and in Chapter 6, Mitigation Strategy.

Plan Maintenance

Plan maintenance is shown in section 8.4.6.

Critical Facilities and Infrastructure

Figure 8.4.1 is a map of the city of Napoleon provided by the N.D. Dept. of Transportation.

8.4.1 Profile and Inventory

The location, total population, vulnerable populations, housing units and household size, businesses, critical facilities and infrastructure, new and future development, services, jurisdictional buildings, emergency response services and utilities are shown for the city of Napoleon. Detailed narratives follow each section heading to profile the city.

Detailed information on public buildings, services provided, emergency response services and utilities can be found can be found in Chapter 3, Profile and Inventory.

Location

The city of Napoleon, the Logan County Seat, is located at the intersection of N.D. Highways 3 and 34 in northwestern Logan County. The Dakota Missouri Valley & Western railroad traverses the city.

Population

Table 8.4.1 shows population trends for the city of Napoleon from 1920 to 2020.

Per the 2020 U.S. Decennial Census, the city of Napoleon has a population of 749 people, which is a decrease of 43 people (5.4 percent) from 792 people in 2010.

Table 8.4.1 – 1920 to 2020 City of Napoleon, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
554	709	982	1,070	1,078	1,036	1,103	930	857	792	749

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2016 to 2020 American Community Survey 5-Year Estimate, the population of the city of Napoleon consists of 167 individuals under the age of 20 and 216 individuals aged 65 and older.

Daycares. There is one daycare in the city of Napoleon called Fettig Daycare.

Poverty. Per the 2016 to 2020 American Community Survey 5-Year Estimate, there are 39 individuals in the city of Napoleon that live below the poverty line.

Public Schools. The Napoleon Public School serves grades K-12.

Senior Housing Developments/Care Centers. The Napoleon Care Center provides 36 long-term care beds and eight basic care beds. There are no other age-restricted, senior housing developments, or care centers in the city of Napoleon.

Housing Units and Household Size

The 2016 to 2020 American Community Survey 5-Year Estimate shows there is a total of 456 housing units in the city consisting of 404 single-family homes, 28 mobile/RV homes, and 24 multifamily homes.

The 2016 to 2020 American Community Survey 5-Year Estimate shows there are 380 households in the city of Napoleon resulting in an average household size of 1.96 people.

Businesses

Major employers in the city of Napoleon include Cenex Harvest States, Green Iron Equipment, the Napoleon Public School, and Dakota Frontier Cooperative. Additional information on businesses and economic development can be obtained by contacting the Logan County Economic Development Coordinator.

New and Future Development

Analyzing development trends is important for mitigation to understand where projects may be needed in the future and funding is best allocated. New development is anything occurring since the 2017 and new and future development is anything planned, pending, and proposed development under construction.

New development in the city of Napoleon since 2017 includes:

- One new-single family home

Future development in the city of Napoleon includes:

- New water tower scheduled for completion November/December 2022
- New care center (Wentz Living Center) schedule to open March 2023
- West side water and sewer project and drain tile Spring of 2022
- New office building on Main Street

Critical Facilities. The following facilities were identified as critical in the city of Napoleon.

- Logan County Courthouse
- Napoleon Ambulance/Fire Hall
- Napoleon City Hall/Police Station/Public Works
- Napoleon Public School

Infrastructure. The following infrastructure was identified as critical in the city of Napoleon.

- The city of Napoleon has a sanitary sewer system with two lagoon cells.
- The city of Napoleon has an inert and solid waste landfill.
- The DMV&W railroad traverses the city.
- N.D. Highways 3 and 34 intersect at the city.

Emergency Response Services. The following emergency response services were identified in the city of Napoleon.

- The Napoleon Ambulance Services provides ambulance services to the city of Napoleon and surrounding areas.

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- The Napoleon Fire Protection District provides fire protection services to the city and surrounding rural areas.
- The Napoleon Police Department and the Logan County Sherriff's Office provides law enforcement services to the city of Napoleon.
- The nearest hospital is South Central Health, Wishek Hospital in the city of Wishek in neighboring McIntosh County.
- Central Valley Health District is in the city of Jamestown and provides public health services to the city of Napoleon and greater Logan County.

Services and Utilities. The following services are provided in the city of Napoleon.

- The city provides municipal garbage collection services to the city of Napoleon.
- The city of Napoleon maintains an inert and solid waste landfill.
- The city of Napoleon has a sanitary sewer system with two lagoon cells. Some residents utilize septic systems.
- The city has a storm water system consisting of culverts, drainage ditches, and underground pipes.
- The Napoleon Homestead is the official newspaper of the city of Napoleon.
- The city provides its own drinking/potable water through three municipal wells; two primary and one secondary.
- Electricity is provided by Montana-Dakota Utilities.
- Natural gas is not available in the city of Napoleon.
- Fuel oil and propane are used as an alternative heating source and is provided by companies chosen by the individual consumer.
- Bektel provides internet, phone, and TV.

8.4.2 Risk Assessment and Hazard Scoring Notes

Table 8.4.2 summarizes the risk assessment scoring of the city of Napoleon. The risk assessment and hazard scoring notes for each hazard specific to the city are shown in Table 8.4.2. Risk assessment notes for impact, frequency, likelihood and vulnerability ubiquitous for jurisdictions in Logan County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment Scoring Summary

Risk Assessment							Jurisdiction: City of Napoleon						
<u>Natural Hazard</u>	<u>Impact</u>	<u>Frequency</u>	<u>Likelihood</u>	<u>Vulnerability</u>	<u>Capabilities</u>	<u>Total</u>							
Drought	4	3	4	3	3	11							
Fire – Urban/Structure Collapse	4	3	3	3	2	11							
Fire – Wildland (Rural)	4	3	4	4	2	13							
Flood	4	3	4	4	3	12							
Geologic Hazard	1	1	2	1	2	3							
Infectious Disease	4	4	4	4	3	13							
Severe Summer Weather	4	4	4	3	3	11							
Severe Winter Weather	4	4	4	3	2	12							
Space Weather	4	1	2	4	2	9							
<u>Adversarial Threats</u>													
Civil Disturbance	4	2	2	2	2	8							
Criminal, Terrorist or Nation-State Attack	4	2	2	3	2	9							
Cyberattack	4	3	2	2	2	9							
<u>Technological Threats</u>													
Dam Failure	1	1	1	1	1	3							
Hazardous Material Release	4	2	3	3	2	10							
Transportation Incident	3	2	3	3	2	9							

(Formula: Impact + Frequency + Likelihood + Vulnerability – Capabilities = Total)

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment

Civil Disturbance			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities 		
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major incident • DAPL protesters were not active in the city 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Criminal, Terrorist, Nation-State Attack			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – Tier II Sites and transportation incidents • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities • Threats to city water supply • Loss of Communication Systems • Disease Outbreak/Mass Infections 		
Frequency	<ul style="list-style-type: none"> • No occurrences • Miscellaneous property damage occurring in the city on an occasional basis 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Likely</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Likely</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
<u>More Vulnerable</u> <ul style="list-style-type: none"> • Napoleon Public School • Napoleon City Hall/Police Station 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Small town with no major regional/state attractions • Sparse population • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials 		

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	<ul style="list-style-type: none"> • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release 	<ul style="list-style-type: none"> • Human Injury/Death • School Closure • Loss of Communication Systems • Identity Theft – loss of wages and/or assets
Frequency	<ul style="list-style-type: none"> • Never an occurrence of a major attack 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks • Napoleon Public School • Napoleon City Hall/Police Station 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • No public school • City records are on paper • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Small town with lack of technological infrastructure to defend against cyber attacks • Elderly population relying largely on landlines for communication purposes, remote medical care and equipment monitoring • Napoleon Public School • Napoleon City Hall/Police Station • City records are digital 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Lack of major financial institutions or communication infrastructure • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials

Table 8.4.3 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Dam Failure			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Crop Loss and Loss of Livestock • Delayed Emergency Response • Evacuation (Localized) • Loss of Critical Facilities and Infrastructure • Loss of Potable/Drinking Water • Loss of Power • Loss of Transportation Systems/Accessibility • Loss of Wildlife Habitat • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Loss of recreational activities and summer-time population resulting in economic loss • Possible temporary homeless population due to lack of facilities to shelter large numbers of people 		
Frequency	<ul style="list-style-type: none"> • Never an occurrence 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Likely</u> </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Likely</u>	<u>Less Likely</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Likely</u>	<u>Less Likely</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Vulnerable</u> </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city </td> </tr> </table>	<u>More Vulnerable</u>	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city
<u>More Vulnerable</u>	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No dams present in the vicinity of the city 		

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

		Drought	
Impact	<ul style="list-style-type: none"> • Crop Loss • Loss of Economy • Loss of Livestock • Loss of Wildlife Habitat (decreased wildlife populations) • Increase in Wildland Fire Potential 	<ul style="list-style-type: none"> • Water quality compromised from stock dams • Diminished soil quality – salinity will increase • Negative impact on mental health of producers and fire responders – “community impact” • Local producers forced to sell off herds which can last for several years • Population loss as people moved away due to loss of economy 	
Frequency	<ul style="list-style-type: none"> • Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds • Severe Drought 2021/2022 	<ul style="list-style-type: none"> • End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Heavy precipitation 	
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • City obtains water from three city-owned wells; two primary and one secondary • Ambulance/fire hall lacks a permanent generator • City not connected to rural water system 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDDES • Advanced communications such as internet and TV • Fire index sign at Logan County Courthouse • City has a 60,000-gallon capacity (50,000-gallon bulb and 10,000-gallon stem), gravity-fed water tower. <i>The city is in the process of installing a new water tower on the southwest side of the city that will have a 300,000-gallon capacity scheduled for installation spring 2023.</i> • City obtains water from three city-owned wells; two primary and one secondary 	

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Urban Fire/Structure Collapse			
Impact	<ul style="list-style-type: none"> • Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release <ul style="list-style-type: none"> • Human Injury/Death • Increase Fire Potential • Property damage on a significant scale if impacting downtown structures 		
Frequency	<ul style="list-style-type: none"> • Occurrences of structures/vehicles being impacted every five years 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>More Likely</u></p> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire </td> <td style="width: 50%; vertical-align: top;"> <p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses </td> </tr> </table>	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Elevator and agriculture-related infrastructure in city limits could cause a large fire 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • Ambulance/fire hall lacks a permanent generator • City obtains water from three city-owned wells; two primary and one secondary • City not connected to rural water system </td> <td style="width: 50%; vertical-align: top;"> <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Napoleon Fire Department • City has a 60,000-gallon capacity (50,000-gallon bulb and 10,000-gallon stem), gravity-fed water tower. <i>The city is in the process of installing a new water tower on the southwest side of the city that will have a 300,000-gallon capacity scheduled for installation spring 2023.</i> • City obtains water from three city-owned wells; two primary and one secondary </td> </tr> </table>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of abandoned properties • Ambulance/fire hall lacks a permanent generator • City obtains water from three city-owned wells; two primary and one secondary • City not connected to rural water system 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services • Napoleon Fire Department • City has a 60,000-gallon capacity (50,000-gallon bulb and 10,000-gallon stem), gravity-fed water tower. <i>The city is in the process of installing a new water tower on the southwest side of the city that will have a 300,000-gallon capacity scheduled for installation spring 2023.</i> • City obtains water from three city-owned wells; two primary and one secondary
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Fire – Rural & Wildland			
Impact	<ul style="list-style-type: none"> • Building Collapse • Crop Loss • Delayed Emergency Response • Evacuation (Localized) • Explosion • Increase Fire Potential • Loss of Power/Downed Power Lines • Mass Casualties • Losses could be on a significant scale if impacting a major producer or farmstead • Loss of farm equipment and assets • Loss of Livestock 		
Frequency	<ul style="list-style-type: none"> • Significant fire once every five years • Approximately four wildland fires occurring annually • Controlled burns becoming out of control approximately 25 percent of the time 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • Presence of Tier II sites 	<u>Less Likely</u> <ul style="list-style-type: none"> • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Ambulance/fire hall lacks a permanent generator • City obtains water from three city-owned wells; two primary and one secondary • City not connected to rural water system • Presence of WUI Intermix </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Napoleon Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Fire index sign at Logan County Courthouse </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • Presence of Tier II sites • Ambulance/fire hall lacks a permanent generator • City obtains water from three city-owned wells; two primary and one secondary • City not connected to rural water system • Presence of WUI Intermix 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Removal of CRP • Summer and winter weather with heavy precipitation • MOUs with neighboring fire departments • Burn bans by county emergency management for areas outside city limits • Napoleon Fire Department • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Fire index sign at Logan County Courthouse
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Flood			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • Runoff from buildings causes overland flooding 		
Frequency	<ul style="list-style-type: none"> • Bi-annual occurrences of localized flooding of nearby township roads and highways • Overland flooding during wet years on railroad avenue • Flash flooding occurs from heavy precipitation 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Sanitary sewer lagoons located in a low-lying area • Wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance when needed </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Sanitary sewer lagoons located in a low-lying area • Wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table 	<u>Less Likely</u> <ul style="list-style-type: none"> • Dry seasons and low precipitation • City performs storm water maintenance when needed
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City flood ordinances are outdated • Lacks adequate floodplain administration • Sanitary sewer lagoons located in a low-lying area • Wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance when needed • City enrolled in NFIP • City has flood ordinances </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • City flood ordinances are outdated • Lacks adequate floodplain administration • Sanitary sewer lagoons located in a low-lying area • Wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Alternate routes were identified for townships roads • City performs storm water maintenance when needed • City enrolled in NFIP • City has flood ordinances
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

	Geologic Hazard	
Impact	<ul style="list-style-type: none"> • Delayed Emergency Response • Human Injury/Death • Loss of Economy 	<ul style="list-style-type: none"> • Loss of Power • Property Damage
Frequency	<ul style="list-style-type: none"> • No incidents involving geologic hazards in or near city limits 	
Likelihood	<p><u>More Likely</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Likely</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done
Vulnerability	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • No Abandoned Mine Lands located near city limits • No expansive or shifting soils • PSC has an AML reclamation project aimed at recovering AMLs – work has been done • Flat topography - no steep terrain where landslides could occur

Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Hazardous Material Release			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Delayed Emergency Response / Increased Fire Potential • Environmental Degradation • Evacuation (localized) • Explosion <ul style="list-style-type: none"> • Human Injury/Death • Loss of Economy • Loss of Potable Water • Loss of Power • Property Damage • Increased risk of HAZMAT release and/or transportation incidents due to increased oil train traffic and trucks 		
Frequency	<ul style="list-style-type: none"> • Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant 	<u>Less Likely</u> <ul style="list-style-type: none"> • Private companies have HAZMAT certifications • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials
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Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Lack of outdoor emergency siren coverage at city park • N.D. Highways 3 and 34 • Lack of generator at Napoleon Ambulance/Fire Hall </td> <td style="width: 50%; border: none; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Radio--activated outdoor emergency sirens • South Central Health, Napoleon Clinic </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • No hospital in city limits • Presence of Tier II sites • Presence of fertilizer plant and anhydrous plant • Lack of outdoor emergency siren coverage at city park • N.D. Highways 3 and 34 • Lack of generator at Napoleon Ambulance/Fire Hall 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Fire departments have some HAZMAT training • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • Radio--activated outdoor emergency sirens • South Central Health, Napoleon Clinic
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Infectious Disease			
Impact	<ul style="list-style-type: none"> • Crop Loss • Human Injury/Death • Livestock Loss • Loss of Economy • Mass Casualties • Strain on local medical resources (ambulance) • Loss of medical staff due to sickness • Loss of Potable Water • Financial cost to public health resources 		
Frequency	<ul style="list-style-type: none"> • Annual occurrences of death, primarily among the elderly • Occurrence of disease - 1 in 3 for people annually • Annual occurrences of influenza cases in the local population • The COVID-19 Pandemic of 2020 resulted in mass quarantine and sheltering of the local population and temporary closure of businesses 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Dependent on weather for animals and crops • Presence of abandoned properties and overgrown lots </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Growing elderly population • Small population of children without immunization • Agriculture economy • Dependent on weather for animals and crops • Presence of abandoned properties and overgrown lots 	<u>Less Likely</u> <ul style="list-style-type: none"> • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Severe Summer Weather			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Evacuation (Localized) • Human Injury/Death – heat exhaustion • Sewer Backup • Shelter-in-place Vehicle Damage • Loss of Livestock • Loss of Crops • Loss of Power/Downed Power Lines - • Property Damage – repair of roofing, siding and drainage systems for homes 		
Frequency	<ul style="list-style-type: none"> • Property damage from tornados/straight-line winds in summer 2017 and 2019 • Property damage from severe storm in summer 2016 • Windstorms occurring annually • Annual occurrences of hailstorms • Two or three significant storms producing damage to trees and property annually 		
Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at Napoleon Ambulance/Fire Hall, Napoleon Public School, lift station and water tower • Lacks building code enforcement • Lack of official storm shelter with generator • Napoleon Care Center • Napoleon Public School • Logan County Courthouse • Lack of outdoor emergency siren coverage at city park </td> <td style="width: 50%; vertical-align: top;"> <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency sirens • Logan County IPAWS </td> </tr> </table>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at Napoleon Ambulance/Fire Hall, Napoleon Public School, lift station and water tower • Lacks building code enforcement • Lack of official storm shelter with generator • Napoleon Care Center • Napoleon Public School • Logan County Courthouse • Lack of outdoor emergency siren coverage at city park 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency sirens • Logan County IPAWS
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Severe Winter Weather			
Impact	<ul style="list-style-type: none"> • Blocked Roads • Evacuation (Localized) • Human Injury/Death – wind chill • Property Damage – repair of roofing, siding and drainage systems for homes • Loss of Crops • Loss of Livestock • Loss of Power/Downed Power Lines • Sewer Backup • Shelter-in-place • Vehicle Damage • Infrastructure Degradation 		
Frequency	<ul style="list-style-type: none"> • March 2017 snowstorm resulted in blocked roads throughout the city • Spring snowstorm of 2019 • Annual occurrences of power loss from storms • Two or three significant blizzards producing damage to trees and property annually 		
Likelihood	<ul style="list-style-type: none"> • Climatic patterns will result in numerous annual occurrences of the hazard 		
Vulnerability	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at Napoleon Ambulance/Fire Hall, Napoleon Public School, lift station and water tower • Lacks building code enforcement • Lack of official storm shelter with generator • Napoleon Care Center • Napoleon Public School • Logan County Courthouse • Lack of outdoor emergency siren coverage at city park </td> <td style="width: 50%; vertical-align: top;"> <p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency sirens • Logan County IPAWS </td> </tr> </table>	<p><u>More Vulnerable</u></p> <ul style="list-style-type: none"> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • Lack of permanent and portable generators at Napoleon Ambulance/Fire Hall, Napoleon Public School, lift station and water tower • Lacks building code enforcement • Lack of official storm shelter with generator • Napoleon Care Center • Napoleon Public School • Logan County Courthouse • Lack of outdoor emergency siren coverage at city park 	<p><u>Less Vulnerable</u></p> <ul style="list-style-type: none"> • Advanced warning and notification such as internet and TV • Radio-activated outdoor emergency sirens • Logan County IPAWS
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Space Weather			
Impact	<ul style="list-style-type: none"> • Loss of operation of the city hall, fire hall, lift station, etc. • Loss/outage of medical devices at private residences • Property damage from sewer backups due to loss of lift station 		
Frequency	<ul style="list-style-type: none"> • Never a recorded occurrence in Logan County or North Dakota 		
Likelihood	<ul style="list-style-type: none"> • Dependent on solar activity and the 11-year solar cycle • Likely to occur once every 500 years per the 2018 N.D. Enhanced Mitigation MAOP 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at Napoleon Ambulance/Fire Hall, Napoleon Public School, lift station and water tower • Lack of faraday cages around digital/technological infrastructure at courthouse, city hall/police station, and public school </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent and portable generators at Napoleon Ambulance/Fire Hall, Napoleon Public School, lift station and water tower • Lack of faraday cages around digital/technological infrastructure at courthouse, city hall/police station, and public school 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • Local food production/households with gardens
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Table 8.4.2 – City of Napoleon, North Dakota Jurisdiction Risk Assessment - Continued

Transportation Incident			
Impact	<ul style="list-style-type: none"> • Blocked roads from inadequate road clearing • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities <ul style="list-style-type: none"> • Delayed Emergency Response • HAZMAT Release • Livestock Loss • Business Interruptions • Property Damage • Could be catastrophic if involving a school bus filled with children and a truck carrying hazardous materials 		
Frequency	<ul style="list-style-type: none"> • Annual occurrences of accidents involving cars and/or farm equipment 		
Likelihood	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic </td> <td style="width: 50%; vertical-align: top;"> <u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport </td> </tr> </table>	<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport
<u>More Likely</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic 	<u>Less Likely</u> <ul style="list-style-type: none"> • No commercial passenger airport 		
Vulnerability	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 3 and 34 • Presence of Tier II sites </td> <td style="width: 50%; vertical-align: top;"> <u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • N.D. Highway 3 had shoulder widening/improvements conducted in 2019 </td> </tr> </table>	<u>More Vulnerable</u> <ul style="list-style-type: none"> • Intoxicated drivers • High truck traffic from agriculture-related traffic • N.D. Highways 3 and 34 • Presence of Tier II sites 	<u>Less Vulnerable</u> <ul style="list-style-type: none"> • No commercial passenger airport • Presence of designated truck routes through city limits • Fire departments have some HAZMAT training • Logan County IPAWS • No pipelines • Level II railroad infrastructure transporting only grain, not hazardous materials • N.D. Highway 3 had shoulder widening/improvements conducted in 2019
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8.4.3 Mitigation Strategy

The Logan County Multi-Jurisdictional Multi-Hazard Plan Update includes a mitigation strategy consisting of seven goals in Chapter 6. The following problem statement and mitigation projects address the mitigation needs of the city of Napoleon. It should be noted that some mitigation projects that pertain to all jurisdictions are included to encourage county-wide collaboration.

Problem Statement

The city of Napoleon lacks sources of backup power at critical facilities and infrastructure. The city’s wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table. The city’s storm water system is inadequate and results in overland flooding. The city’s outdoor emergency siren is manually-activated. The city lacks an official storm shelter. The city’s planning and regulatory capabilities need to be updated. With little to no additional capabilities, the city is dependent on outside sources for mitigation.

Installation of generators for backup power, engineering to retrofit/upgrade the storm water systems, support for the USACE Section 594 Grant Award, upgrading and expanding of outdoor emergency siren, and education and outreach and planning and regulatory capabilities are a priority for the city.

City of Napoleon Project 1: Install Permanent or Portable Generators at Critical Facilities and Infrastructure.

Description/Benefit		Test existing generators and create regularly scheduled maintenance system. Install new generators to establish source of backup power to maintain continued operation of the following critical facilities and infrastructure.					
		<ul style="list-style-type: none"> • Napoleon Ambulance/Fire Hall • Napoleon Public School • City of Napoleon lift station and water tower • City of Napoleon for city water wells and general use (portable only) • BEK Communication service office in city of Napoleon 					
Hazard/Threat Addressed		All hazards					
Affected Jurisdiction(s)		City of Napoleon					
Project Status		New/Ongoing and Continue					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services, Public Works					
Partners		Emergency Management, Public Utilities					
Completion Timeframe		2 to 3 years	Cost	Project-specific. Sensitive to supply chain.			
Funding Source		Public Utilities, Regional Council, RD. FEMA’s Building Resilient Infrastructure and Communities (BRIC) Grant Program. State Homeland Security grants. USDA RD.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	5	5	35
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>			<u>Plan Element Utilized</u>			<u>Process for Integration</u>	
Logan County LEOP Logan County Mitigation Plan Logan County THIRA			Capability Assessment, Hazard History, Risk Assessment			Include in city and/or fire department’s budget. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council or board.	

City of Napoleon Project 2: Conduct Engineering Study to Retrofit and/or Upgrade Storm Water Drainage System.

Description/Benefit		The city’s storm water system is inadequate and contributes to overland flooding which blocks access for emergency services and limits economic activity. Overland flooding occurs at the following locations in the city:					
		<ul style="list-style-type: none"> • N.D. Highway 3 near the intersection of Main St. and DMV&W Railroad • 4th St. West and G Ave W • North of G Ave E near its intersection with N.D. Highway 3 and continues east to 8th St. E before turning south and then west and impacting residential areas near 6th St. E and C Ave E, which then splits and goes north and south • Near intersection of Lake Ave E and 7th St. E and flows westward along A Ave E • Lake Ave E between 4th St. E and 5th St. E flowing north toward A Ave E near the Napoleon Care Center 					
Hazard/Threat Addressed		Flood (overland), HAZMAT, Infectious Disease, Severe Summer Weather, Severe Winter Weather (All)					
Affected Jurisdiction(s)		City of Napoleon and greater Logan County					
Project Status		New					
Priority		Very High					
Responsible Agency		City Council(s), Emergency Services, Public Works					
Partners		County Commission, Emergency Management, NDACo, NDLC, Regional Council					
Completion Timeframe		2 to 3 years			Cost	Project-specific	
Funding Source		FEMA’s Building Resilient Infrastructure and Communities (BRIC). Local budgets. NDDEQ. Prairie Dog Fund. DWR.					
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	4	4	3	4	30
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Solicit project cost estimate. Apply for grant funding to execute or budget in local budgets.		

City of Napoleon Project 3: Upgrade and Expand Outdoor Early Warning System(s).

Description/Benefit	The city of Napoleon has three existing radio-activated outdoor emergency sirens. The siren at the courthouse needs to be upgraded. A new radio-activated emergency siren needs to be installed at the city park due to the presence of the community pool, camping areas, Golden Age Hall, basketball courts, playground, and recreation areas.						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	City of Napoleon						
Project Status	New						
Priority	Very High						
Responsible Agency	City Council(s), Emergency Services						
Partners	County Commission, Emergency Management, NDAC0, NDLC, Regional Council						
Completion Timeframe	2 to 3 years				Cost	Up to \$25,000 for a new siren	
Funding Source	Local budgets. N.D. League of Cities. State Homeland Security Grants. NDDDES. 9-1-1 funds.						
Values: 1 is low (negative impact and/or too costly) -- Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	3	5	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
Logan County LEOP Logan County Mitigation Plan Logan County THIRA		Capability Assessment, Hazard History, Risk Assessment			Include in city and/or fire department’s capital improvement plan. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council or board.		

City of Napoleon Project 4: Update/Expand Existing and/or Create New Planning and Regulatory Capabilities to Address Existing and New Development to Strengthen Local Planning Processes.

Description/Benefit	<p>The city of Napoleon needs to update its capital improvement plan to complement or become an annex to the city’s strategic plan to strategize investments in critical facilities and infrastructure.</p> <p>The city’s comprehensive plan and zoning ordinances need updating.</p> <p>The city’s continuity of operations plan and building permits should be evaluated annually.</p> <p>A list of plans, policies, codes and ordinances is shown in Chapter 7, Capability Assessment.</p>						
Hazard/Threat Addressed	All						
Affected Jurisdiction(s)	City of Napoleon						
Project Status	New						
Priority	Medium/High						
Responsible Agency	City Council(s), Public Works						
Partners	Emergency Management, Emergency Services, NDACo, NDDC, NDLC						
Completion Timeframe	2 years for capital improvement plan. Ongoing for all others.		Cost	\$0 to \$25,000 / Staff-time			
Funding Source	Local budgets. State and federal grants.						
Values: 1 is low (negative impact and/or too costly) – Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	4	4	3	5	3	5	29
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
All		Capability Assessment, Hazard History, Risk Assessment			Develop, review, and approve by city council.		

City of Napoleon Project 5: Support the USACE Section 594 Grant Award to Retrofit/Upgrade the City’s Wastewater System.

Description/Benefit		<p>The city of Napoleon’s wastewater system suffers from excessive ground water infiltration due to the extremely high ground water table. The wastewater system is not designed to handle the infiltration and it overloads the system. The main issues are that the extra flow has prematurely worn-out pumps, takes up capacity in the wastewater treatment system, and has caused sewage backups into homes. The city received grant funding from the USACE to rehabilitate and upgrade the system and related infrastructure.</p> <p>The grant funding received is in the amount of \$4,300,000.00. The cost share is 75 federal and 25 local. The USACE share is \$3,000,000.00. The local cost share is being funded through USDA RD grant in the amount of \$410,000.00 with the remainder covered through a USDA RD Loan of \$890,000.00.</p>					
Hazard/Threat Addressed		Flood, Severe Summer Weather, Severe Winter Weather					
Affected Jurisdiction(s)		City of Napoleon					
Project Status		New					
Priority		Very High					
Responsible Agency		City Council(s), Moore Engineering					
Partners		Public Works, USACE, USDA RD					
Completion Timeframe		2 to 3 years	Cost	\$4,300,000.00			
Funding Source		USACE Section 594 Grant Program. Local share is \$1,300,000.00 funded through USDA RD grants and loans.					
Values: 1 is low (negative impact and/or too costly) – Value of 5 is high (positive impact/higher benefit compared to cost)							
Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
5	5	5	5	5	3	5	33
Integration of Mitigation Plan Requirements into Local Planning Mechanisms							
<u>Planning Mechanisms Utilized</u>		<u>Plan Element</u>			<u>Process for Integration</u>		
All		Capability Assessment, Hazard History, Risk Assessment			Work with Moore Engineering through engineering and design, procurement, construction, and project close-out.		

8.4.4 Mitigation Capability Assessment

Capability for mitigation is divided into four categories: administrative and technical, education and outreach, financial, and planning and regulatory. Each identified resource in the four categories can be used to implement mitigation strategies and access funding for projects. **Tables comparing the mitigation capabilities of the city of Napoleon with all other jurisdictions in Logan County can be found below and in Chapter 7, County Mitigation Capability Assessment.**

- Administrative and Technical: Identification of administrative and technical capabilities, which include staff, their skills and tools for mitigation planning to implement specific mitigation actions.
- Education and Outreach: Identification of education and outreach programs, and methods already in place to implement mitigation activities and communicate hazard-related information.
- Financial: Identification of access to or eligibility to use funding resources for hazard mitigation for jurisdictions.
- Planning and Regulatory: Jurisdictional plans, policies, codes, and ordinances adopted and in place that prevent and reduce the impacts of hazards.

City of Napoleon, North Dakota Mitigation Capabilities Summary

The following mitigation capabilities were identified as commonplace among all hazard and threats upon completion of the risk assessment for the city of Napoleon. More detailed information about the mitigation capabilities of the city of Napoleon in relation to Logan County and all other incorporated jurisdictions can be found in Chapter 7, Mitigation Capability Assessment.

2018 N.D. Enhanced Mitigation MAOP	Logan Co. Sherriff’s Office
Advanced Communications: Internet & TV	MOUs
Central Valley Health District	NDDDES Fire Index Monitoring
Farm Services Agency	NDDOT Statewide Highway/Transportation Plan
Logan Co. LEOP	NDSU/Logan Co. Extension
Logan Co. Emergency Mgmt.	Napoleon City Council
Napoleon Fire Protection District	Zoning
Radio-activated emergency siren	Comprehensive Plan

8.4.5 Integration of Mitigation Plan into Planning Mechanisms

Integration of the plan into current planning mechanisms is critical in mitigation to communicate the needs of each jurisdiction to achieve an all-inclusive mitigation strategy. The process for integration of the mitigation plan is included after each mitigation project, which shows the planning mechanism utilized, the plan element used for integration and the process for integration.

8.4.6 Plan Maintenance

An important aspect of any useable plan is the maintenance and upkeep of the document. At any given time, planning, risk analysis, updating the situation assessment, research, coordinating, disaster response or other activity is occurring. Plan maintenance ensures the plan will remain useful in the county for

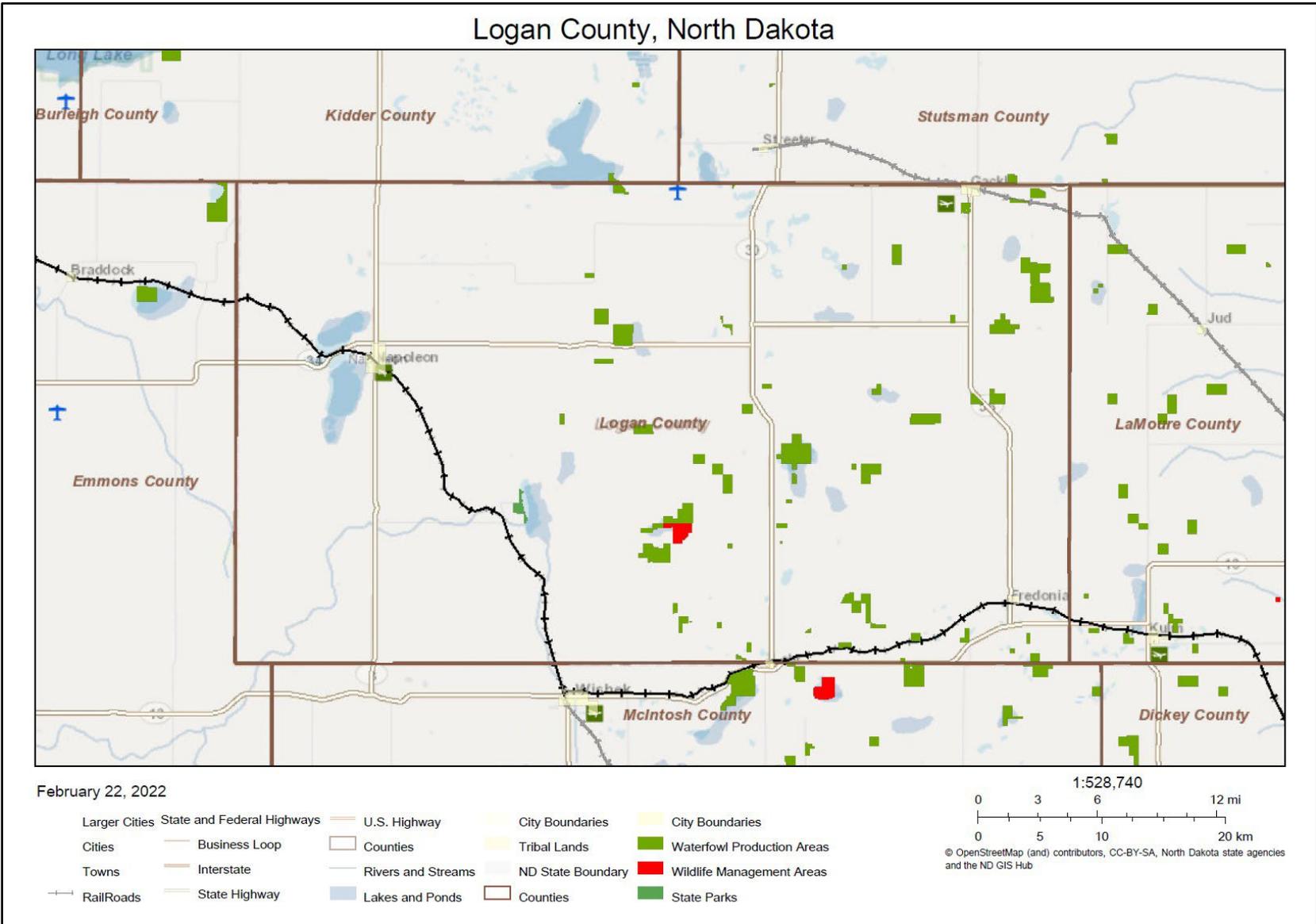
many years. A mitigation action progress report form to conduct plan maintenance is in Chapter 10 of this plan.

9. Maps

Maps provide visual illustrations of the geography of the Logan County and assist in mitigation by providing details of the inventory of the county, where critical facilities and infrastructure are located, geographic coverage of emergency services, and each incorporated jurisdiction. Maps are drawings, depictions, and illustrations and are referred to as figures in planning documents.

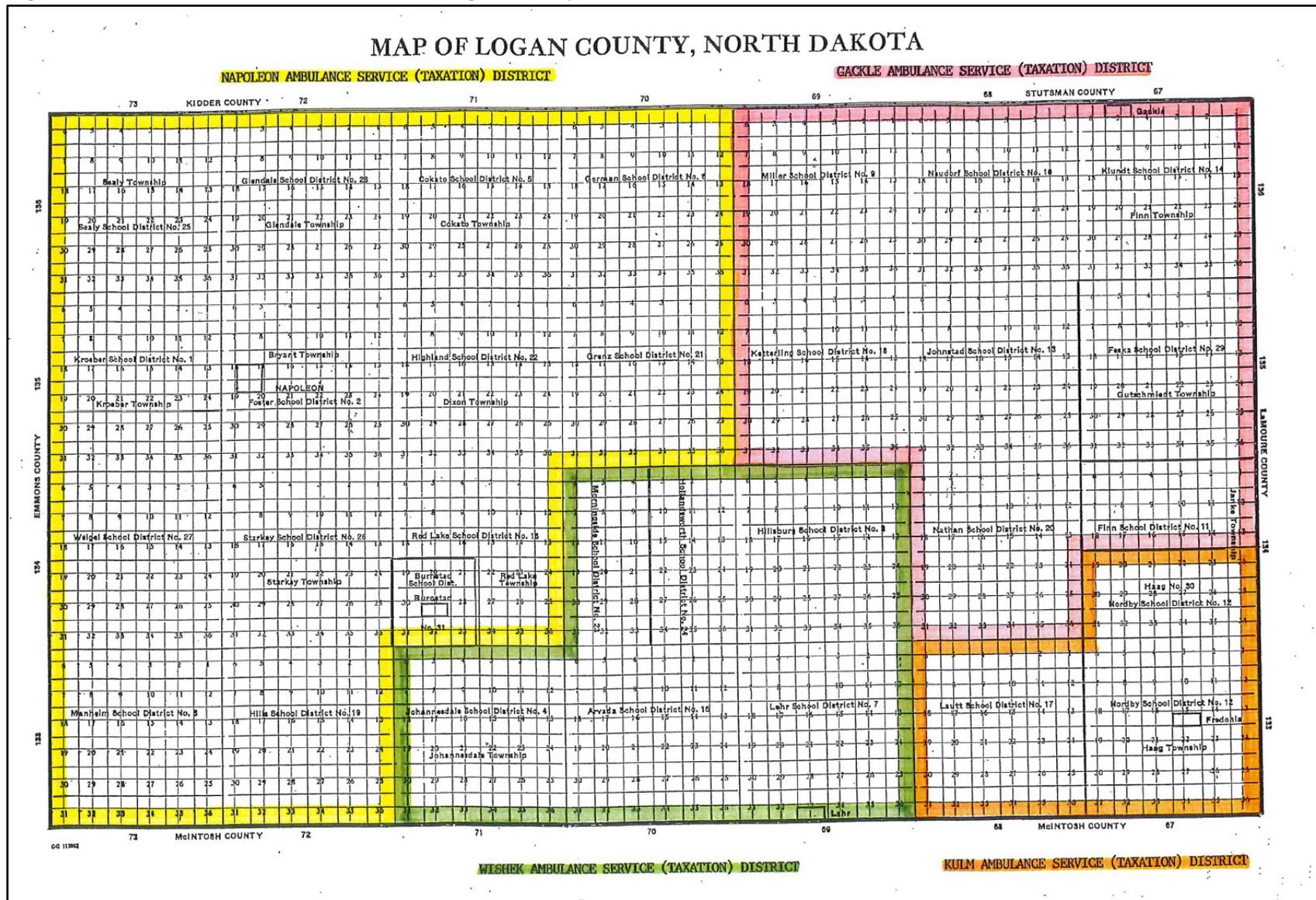
- Figure 9.1 – Logan County, North Dakota Base Map
- Figure 9.2 – Logan County, North Dakota Base Map – N.D. Dept. of Transportation
- Figure 9.3 – Ambulance Districts/Services in Logan County, North Dakota
- Figure 9.4 – Fire Departments/Districts in Logan County, North Dakota
- Figure 9.5 – School Districts in Logan County, North Dakota
- Figure 9.6 – Communication Towers in Logan County, North Dakota

Figure 9.1 – Logan County, North Dakota



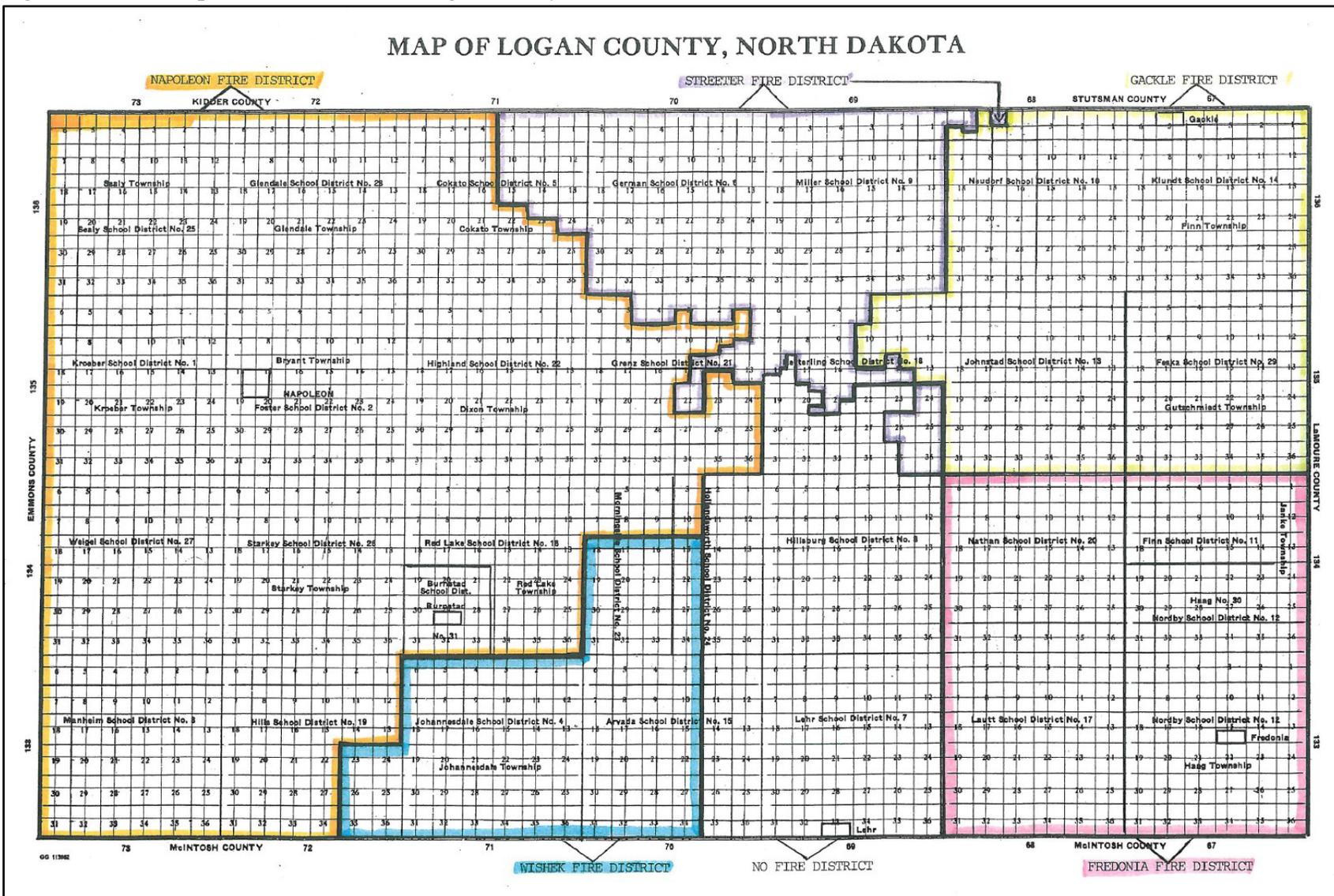
Source: N.D. Geographic Information Systems

Figure 9.3 – Ambulance Districts/Services in Logan County, North Dakota



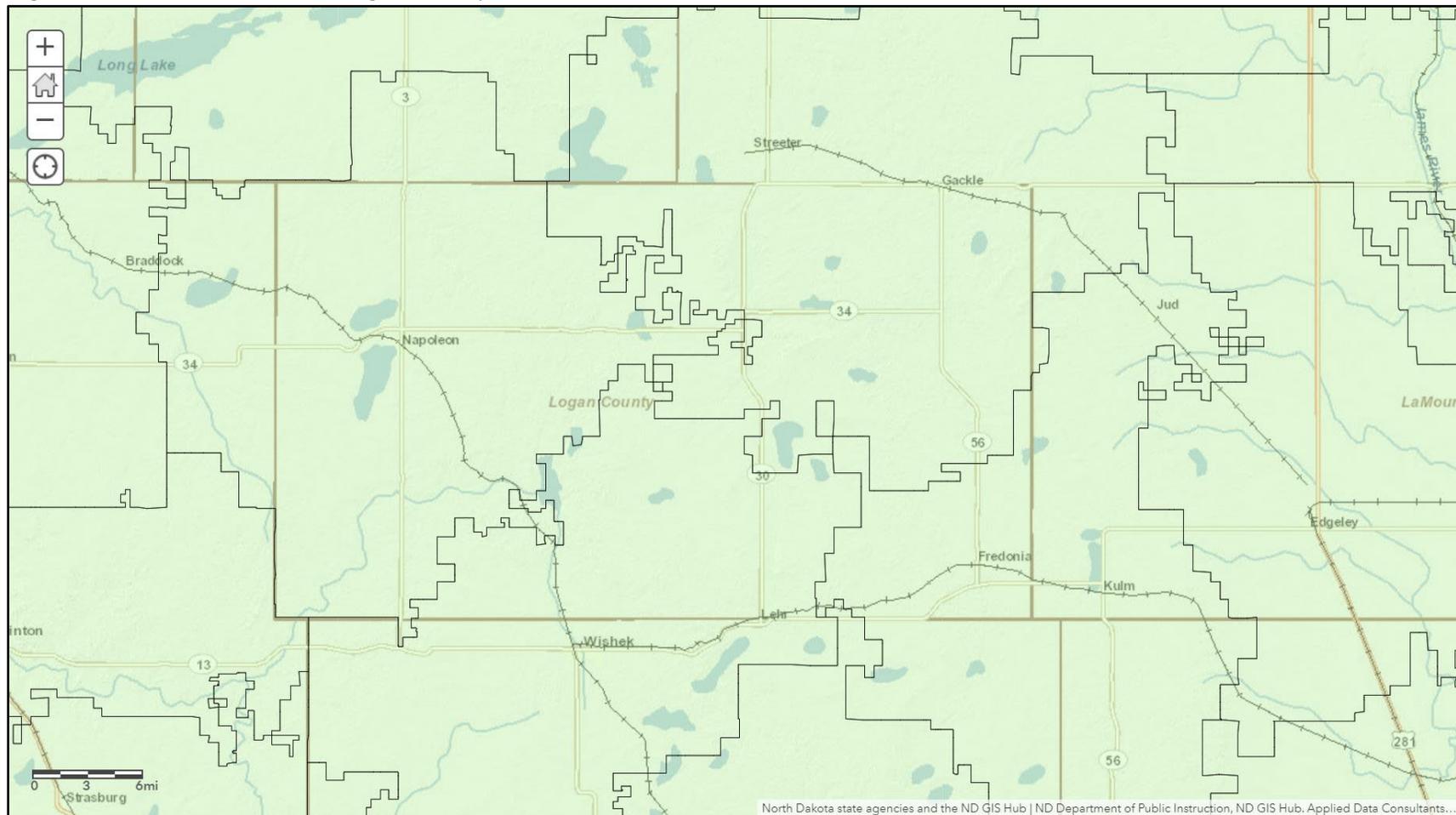
Source: Logan County Tax Equalization

Figure 9.4 – Fire Departments/Districts in Logan County, North Dakota



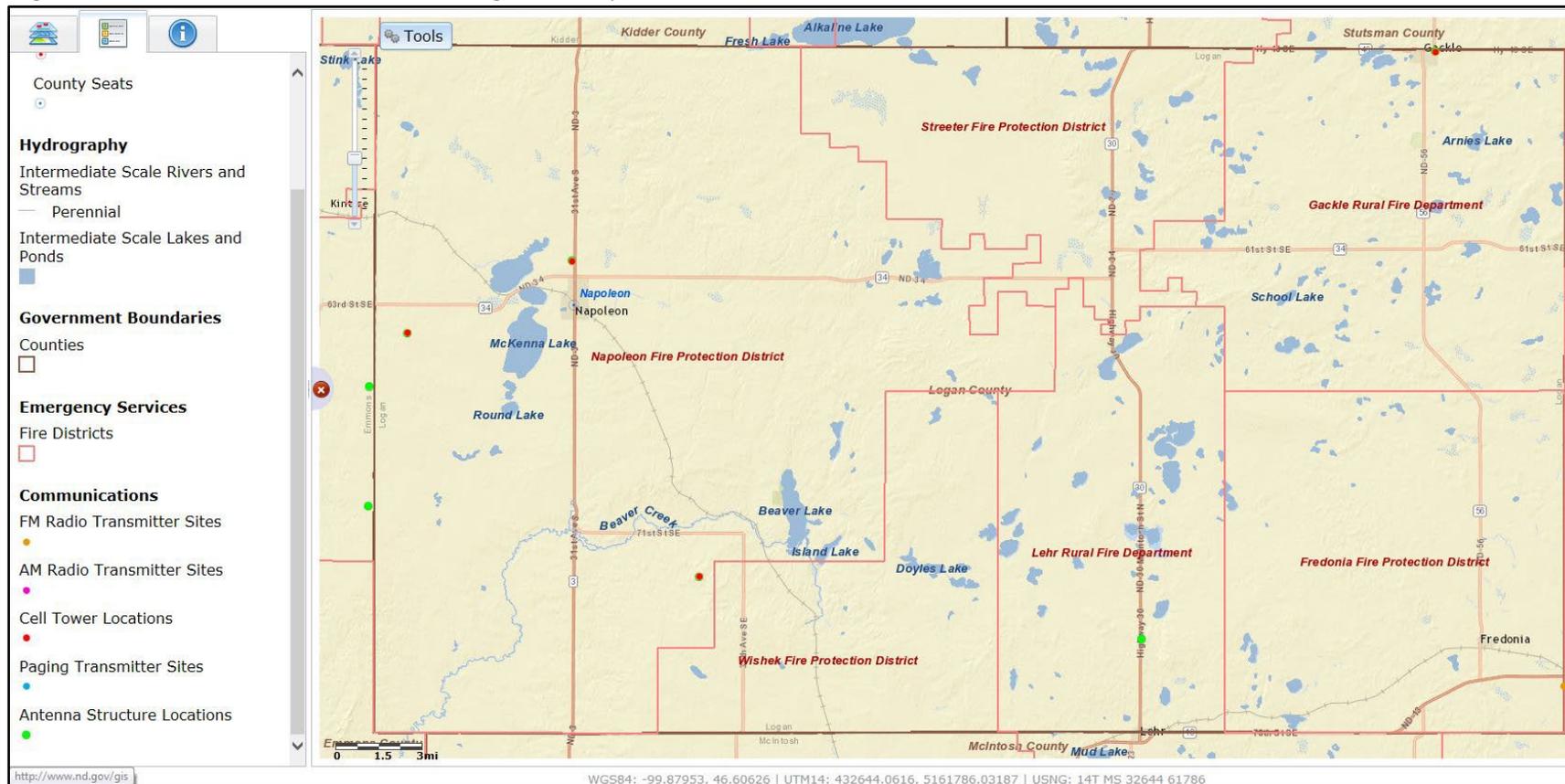
Source: Logan County Tax Equalization

Figure 9.5 – School Districts in Logan County, North Dakota



Source: N.D. Geographic Information Systems

Figure 9.6 – Communication Towers in Logan County, North Dakota



Source: N.D. Geographic Information Systems

10. Plan Maintenance

Mitigation planning for Logan County, North Dakota is continuous. An important aspect of any useable plan is the maintenance and upkeep of the document. At any given time, planning, risk analysis, updating the risk assessment, research, coordinating, disaster response or other activity is occurring. Thus, ensuring the plan will remain useful is critical.

Plan Monitoring

Logan County's emergency manager and the LEPC are responsible for monitoring, evaluating and updating the plan. All disaster and emergency incidents will be evaluated for general and specific hazard history and mitigation strategy recommendations to be added to the plan.

The plan will be updated and submitted to the N.D. Dept. of Emergency Services and FEMA within five years to assure the county maintains a FEMA-approved multi-jurisdictional multi-hazard mitigation plan.

Plan Evaluation

At its February meeting each year, each county commission, city council/commission and emergency response entity will review actions taken on mitigation projects and losses due to hazards in the past year.

- **A Mitigation Action Progress Report Form for reporting of annual mitigation actions taken and losses due to hazards is included in this chapter for Logan County.**
- **The annual reports are due back to each respective emergency manager by March 15.**

The comments about the plan, project implementation, and information will be shared through each jurisdiction's minutes, and these minutes will be sent to county emergency management. The emergency manager will share this information with the Logan County Commission. Emergency services and the public health department will be encouraged to inform emergency management of incidents constantly and consistently as they occur so that the data can be immediately considered to better understand the risks in the county and enable accurate updating of hazard information to include in hazard mitigation efforts.

Public Involvement

The public will be informed of the opportunity to comment on plan updates through the advertising of the jurisdiction meetings. The plan will be available to the public at the Logan County Courthouse and at the city halls in each of the jurisdictions. During plan updates, the plan will also be on the emergency management website for Logan County. The public is encouraged to share input on the plan.

10.1 Logan County, N.D. Mitigation Action Progress Report Form

The Mitigation Action Progress Report Form is part of the annual review of hazard impacts, mitigation projects and reporting of data to the emergency manager. Please complete to maintain the mitigation plan for Logan County. Include date and location of incident(s), and photographs or other documentation.

Additional information can be included and attached to this form on a separate page.

Return to: Logan County Emergency Manager
301 Broadway
Napoleon, ND 58561

Due: March 15

List injuries or property losses due to hazards in past year:

List new vulnerable areas that need to be addressed:

Identify what actions on jurisdiction’s mitigation projects were taken in past year:

If no action, why:

First & Last Name	
Title & Jurisdiction Represented	
Date (MM/DD/YYYY)	
Contact Info (Email & Phone)	