2021 Foster County, North Dakota Multi-Jurisdictional Multi-Hazard Mitigation Plan

Foster County, North Dakota

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1. Introduction

Executive Summary

The updating of the Foster 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 Foster 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 Foster County consists of 33 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 372 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 2015 plan were revised based on information gathered at jurisdictional workshops and Steering Committee meetings.

Foster County

Foster 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. Small 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 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; 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.

Background

The Foster County Multi-Jurisdictional Multi-Hazard Mitigation Plan (MHMP) was developed and received approval from the Federal Management Agency (FEMA) in 2021. This plan update is the second update to the mitigation plan for Foster 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 Foster 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 Foster 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 Foster County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

2. Planning Process

The planning process chapter outlines how the plan was updated to meet mitigation planning requirements. The chapter summarizes all steering committee and hazard/threat meetings, and jurisdictional workshops.

No need for anyone to worry about this chapter other than the plan contractor.

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

Foster 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 Foster 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

Foster 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 Foster County pertaining to these disasters.

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

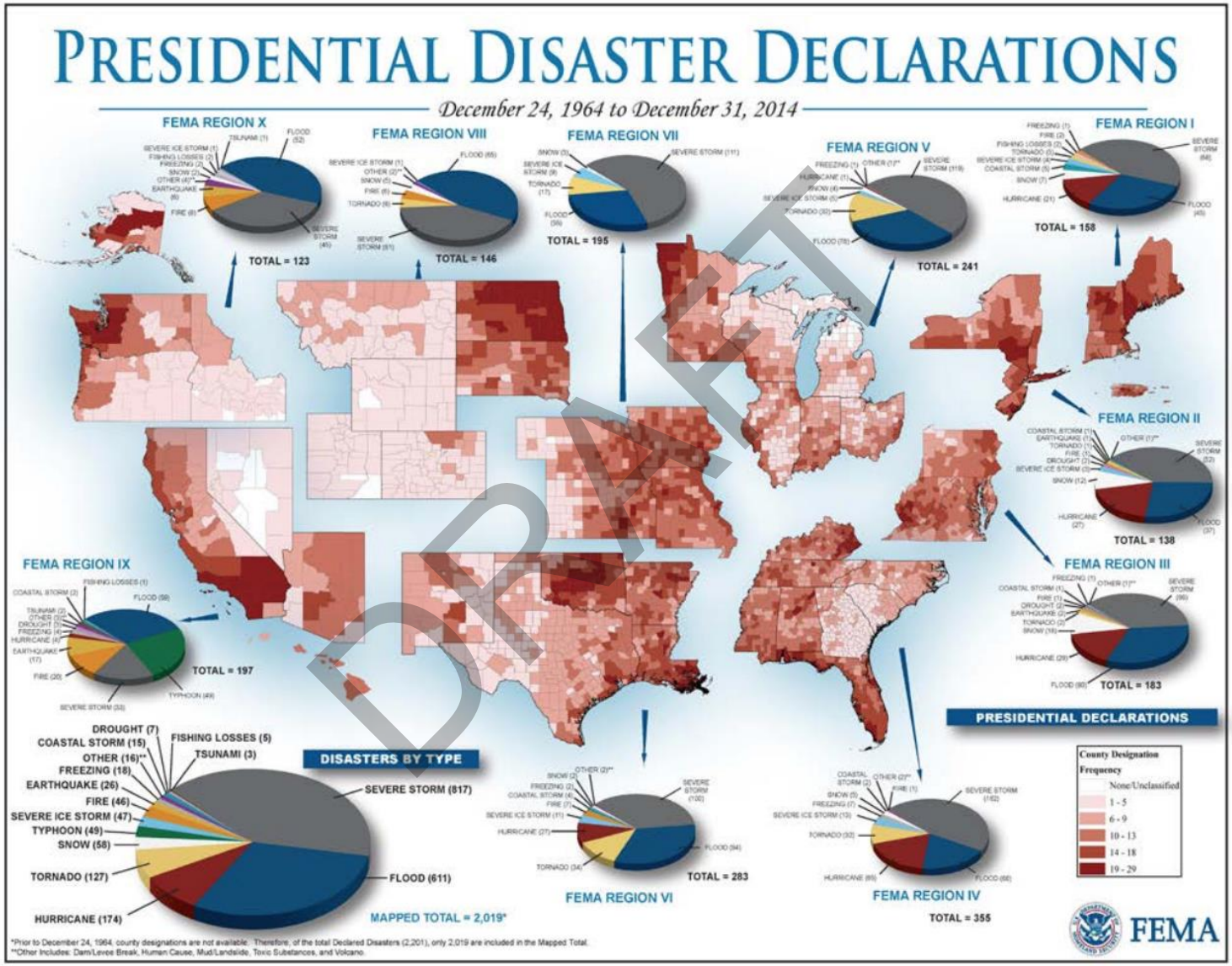
- Foster County has been impacted by 12 flood disasters, six severe storm(s) disasters, two biological disasters, and one coastal storm (Hurricane Katrina Evacuation) since 1953 for a total of 21 declared disasters. Flooding accounts for or is a factor in 76 percent of disasters declared (16) in Foster County.

- Of the 21 disaster declarations involving Foster 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 Foster County.

- The COVID-19 Pandemic and Flooding were the most recent presidential disaster declarations for Foster 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 Foster 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

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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 Foster County and incorporated city jurisdictions, and is also shown in Chapter 8, Jurisdictions.

Table 4.3 – Foster County Jurisdiction Risk Assessment Scoring Summary

Risk Assessment			**Jurisdiction:**	**Foster County, North Dakota**		
Hazard/Threat	Impact	Frequency	Likelihood	Vulnerability	Capabilities	**Total**
Civil Disturbance	4	1	2	2	2	**7**
Criminal, Terrorist or Nation-State Attack	4	1	2	2	2	**7**
Cyberattack	4	2	4	2	2	**10**
Dam Failure	2	1	2	2	1	**6**
Drought	4	2	4	4	3	**11**
Fire – Urban/Structure Collapse	4	2	2	3	2	**9**
Fire – Wildland (including Rural)	4	3	4	2	2	**11**
Flood	4	2	4	3	3	**10**
Geologic Hazard	1	2	2	2	2	**5**
Hazardous Material Release	4	2	4	4	2	**12**
Infectious Disease – Human	4	4	4	3	4	**11**
Infectious Disease – Animal & Plant	4	4	4	4	4	**12**
Severe Summer Weather	4	4	4	2	3	**11**
Severe Winter Weather	4	4	4	2	3	**11**
Space Weather	4	1	2	4	2	**9**
Transportation Accident	4	2	3	2	2	**9**

Risk Assessment			**Jurisdiction:**	**City of Carrington, North Dakota**		
Hazard/Threat	Impact	Frequency	Likelihood	Vulnerability	Capabilities	**Total**
Civil Disturbance	3	1	2	3	2	**7**
Criminal, Terrorist or Nation-State Attack	4	2	2	2	2	**8**
Cyberattack	4	3	4	2	2	**11**
Dam Failure	2	1	2	2	1	**6**
Drought	4	2	4	3	3	**10**
Fire – Urban/Structure Collapse	4	2	2	2	3	**7**
Fire – Wildland (including Rural)	4	3	4	2	2	**11**
Flood	4	2	4	3	3	**10**
Geologic Hazard	1	2	2	2	2	**5**
Hazardous Material Release	4	2	4	4	2	**12**
Infectious Disease	4	4	4	4	3	**13**
Severe Summer Weather	4	4	4	2	3	**11**
Severe Winter Weather	4	4	4	2	3	**11**
Space Weather	4	1	2	4	2	**9**
Transportation Accident	4	3	3	4	2	**12**

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

Table 4.3 – Foster County Jurisdiction Risk Assessment Scoring Summary - Continued

Risk Assessment			**Jurisdiction:**	**City of Glenfield, North Dakota**		
Hazard/Threat	Impact	Frequency	Likelihood	Vulnerability	Capabilities	**Total**
Civil Disturbance	4	1	2	2	1	**8**
Criminal, Terrorist or Nation-State Attack	4	2	2	2	1	**11**
Cyberattack	4	2	4	3	1	**12**
Dam Failure	1	1	1	1	1	**3**
Drought	4	2	4	3	2	**11**
Fire – Urban/Structure Collapse	4	2	2	2	2	**8**
Fire – Wildland (including Rural)	4	3	4	2	2	**11**
Flood	4	2	4	3	2	**11**
Geologic Hazard	1	2	2	2	2	**5**
Hazardous Material Release	4	2	2	4	1	**13**
Infectious Disease	4	4	4	4	2	**14**
Severe Summer Weather	4	4	4	3	1	**13**
Severe Winter Weather	4	4	4	3	1	**13**
Space Weather	4	1	2	4	2	**9**
Transportation Accident	4	2	3	3	1	**11**

Risk Assessment			**Jurisdiction:**	**City of Grace City, North Dakota**		
Hazard/Threat	Impact	Frequency	Likelihood	Vulnerability	Capabilities	**Total**
Civil Disturbance	4	1	2	2	1	**8**
Criminal, Terrorist or Nation-State Attack	4	2	2	2	1	**11**
Cyberattack	2	1	3	2	1	**7**
Dam Failure	1	1	1	1	1	**3**
Drought	4	2	4	2	1	**11**
Fire – Urban/Structure Collapse	4	2	2	4	1	**11**
Fire – Wildland (including Rural)	4	2	3	4	1	**12**
Flood	4	2	2	3	3	**8**
Geologic Hazard	1	2	2	2	2	**5**
Hazardous Material Release	4	2	2	3	1	**11**
Infectious Disease	4	4	4	3	1	**14**
Severe Summer Weather	4	4	4	3	1	**13**
Severe Winter Weather	4	4	4	3	1	**13**
Space Weather	4	1	2	4	2	**9**
Transportation Accident	4	2	3	3	1	**11**

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

Table 4.3 – Foster County Jurisdiction Risk Assessment Scoring Summary - Continued

Risk Assessment			**Jurisdiction:**	**City of McHenry, North Dakota**		
Hazard/Threat	Impact	Frequency	Likelihood	Vulnerability	Capabilities	**Total**
Civil Disturbance	4	1	2	1	1	**7**
Criminal, Terrorist or Nation-State Attack	4	2	2	2	1	**11**
Cyberattack	3	1	3	2	1	**8**
Dam Failure	1	1	1	1	1	**3**
Drought	4	2	4	2	1	**11**
Fire – Urban/Structure Collapse	4	1	2	2	2	**9**
Fire – Wildland (including Rural)	4	1	3	2	1	**9**
Flood	4	3	4	4	1	**14**
Geologic Hazard	1	2	2	2	2	**5**
Hazardous Material Release	4	1	2	2	1	**8**
Infectious Disease	4	4	4	3	1	**14**
Severe Summer Weather	4	4	4	3	1	**13**
Severe Winter Weather	4	4	4	3	1	**13**
Space Weather	4	1	2	4	2	**9**
Transportation Accident	4	2	3	2	1	**10**

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 Foster County – most likely targeting critical facilities such as the Carrington Public School, Foster County Courthouse, CHI-St. Alexius Health Carrington Medical Center, or Midkota 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 plan can be accessed by following the link:

2018 North Dakota Enhanced Mitigation Mission Area Operations Plan

History

According to the Foster County Sheriff's Office and the Carrington Police Department, no incidents of civil disturbance have occurred in Foster County.

One significant civil disturbance event occurred in North Dakota that garnered national and international attention and activated mutual aid with Foster 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.

There have been no declared disasters or emergencies pertaining to a civil disturbance in Foster County.

Probability

The probability of a hazard or threat is how likely it is 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 school, or government facilities like the Foster County Courthouse/Foster County Law Enforcement Center.

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 Foster County and/or 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. 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 – Foster County Civil Disturbance Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	1	2	2	2	**7**
City of Carrington	3	1	2	3	2	**7**
City of Glenfield	4	1	2	2	1	**8**
City of Grace City	4	1	2	2	1	**8**
City of McHenry	4	1	2	1	1	**7**

(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 Foster 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 4.1.2 – Foster County Civil Disturbance Risk Assessment

Impact	• Blocked Roads • Delayed Emergency Response • HAZMAT Release • Human Injury/Death • Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Mass Casualties/Fatalities	**The following impacts were realized to Foster County through mutual aid during the DAPL protest between September 2016 and February 2017:** • **Personnel Costs: $162,086.06** • **Personnel Costs (Backfill Only): $14,420.08** • **Transportation Costs: $7,786.27** • **Food/Lodging Costs: $21,675.06** • **Materials Costs: $1,396.65**
Frequency	• Never an occurrence in Foster County	
Likelihood	More likely • Presence of pipelines transporting hazardous materials • 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 resulting from the COVID-19 pandemic • Presence of three separate railroads	Less likely • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or significant tourist attraction • Lack of major television station in Foster County
Vulnerability	More vulnerable • Presence of pipelines transporting hazardous materials • 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 resulting from the COVID-19 pandemic • **Presence of BNSF, CP Railway, and RRVW railroads Funding of extreme groups by "Dark Money" from billionaires/crowd-funding websites**	Less vulnerable • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or a significant tourist attraction • Lack of major television station in Foster County • Foster County Sheriff's Office • Carrington Police Department
Capability	• 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 Foster County Courthouse/Foster County Law Enforcement Center, Carrington City Hall, public schools, or buildings supporting emergency services such as fire and ambulance 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 like CHI-St. Alexius Health Carrington Medical Center is and infrastructure such as electric power, water/wastewater facilities, railroads, and pipelines are vulnerable to the threat.

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.

Data Limitations and Other Key Documents

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

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)
- Foster County Evacuation and Shelter Plan
- Foster County Local Emergency Operations Plan
- Foster County Shelter and Mass Care Plan
- Foster 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.
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 Foster County – most likely targeting critical facilities such as the Foster County Courthouse, CHI-St. Alexius Health Carrington Medical Center, and public schools, or infrastructure such chemical, energy, or oil and gas. Culturally and environmentally sensitive areas can also be a target.

For more information regarding criminal, terrorist, or nation/state attack 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

History

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

- In response to the terrorist attacks on September 11, 2001, public schools in Foster County implemented controlled access by only allowing all students, staff, and visitors to enter and exit through one entrance.
- In 2008/2009, a family living in rural northern Stutsman County had a family member that drowned. The dive team from the Jamestown Fire Department responded to the incident to search for the individual. The family suspects the incident was not an accident. The response to this incident forced Foster County to expend funds from its emergency fund.
- The Foster County Courthouse implemented controlled access measures through the building in 2016/2017. All staff and visitors are required to enter through the main entrance.
- In the spring of 2021, the Carrington Police Department was contacted by the Federal Bureau of Investigation (FBI) of a city resident making terroristic threats toward the President of the United States of America.

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 Foster County or nearby. Table 4.2.1 shows vandalism and theft claims paid on critical facilities insured by the state in Foster County between 1989 and 2018.

Table 4.2.1 – 1989 to 2018 Vandalism and Theft Claims Paid on Critical Facilities Insured by State

Jurisdiction	State Agencies	Adjutant General	State Universities	Local Governments	School Districts	Total
Foster Co.	$0	$0	$0	$1,127	$12,824	**$13,951**

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, zero paid to the adjutant general, zero paid to state universities, $1,127 paid to local governments, and $12,824 paid to school districts in Foster County for a total of $13,951.

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

Probability

The probability of a hazard or threat is how likely it is 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, Foster County was 18th densest county in North Dakota with 5.3 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.

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 Foster 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 fatalities. With the economy of Foster County largely based on agriculture and manufacturing, an incident involving the agriculture sector or at a manufacturing facility such as Dakota Pasta Growers has the potential to be disastrous and large in 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.

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.

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 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.

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 – Foster County Criminal, Terrorist or Nation-State/Attack Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	1	2	2	2	**7**
City of Carrington	4	2	2	2	2	**8**
City of Glenfield	4	2	2	2	1	**11**
City of Grace City	4	2	2	2	1	**11**
City of McHenry	4	2	2	2	1	**11**

(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 Foster 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 – Foster County Criminal, Terrorist or Nation-State Attack Risk Assessment

Impact	• 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	• 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**
Frequency	• Never an occurrence in Foster County	
Likelihood	<u>More likely</u> • 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 BNSF, CP Railway, and RRVW railroads**	<u>Less likely</u> • Sparse population • County not located near a major metropolitan population, international airport, stadiums or tourist attractions • N.D. State and Local Intelligence Center (SLIC)
Vulnerability	<u>More vulnerable</u> • 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 the county and state** • **Presence of BNSF, CP Railway, and RRVW railroads** • **Presence of U.S. Highway 52/281 and N.D. Highways 20 and 200**	<u>Less vulnerable</u> • Sparse population • County not located near a major metropolitan population, international airport, stadiums or tourist attractions • N.D. State and Local Intelligence Center (SLIC) • Better security has been implemented at public schools and the Foster County Courthouse • Foster County Sheriff's Office • Carrington Police Department

Capability	• 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 attacks as any government building can be targeted. Facilities supporting functions key to daily operations of the county, such as the Foster County Courthouse, Carrington City Hall, public schools, or buildings supporting emergency services such as fire and ambulance 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 civil disturbance is imminent. Critical facilities like CHI-St. Alexius Health Carrington Medical Center is and infrastructure such as electric power, water/wastewater facilities, railroads, and pipelines are vulnerable to the threat.

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.

Agriculture. The agricultural industry, with its increasing mechanization and industrialization, is not always located in urban areas, but are 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 vulnerabilities 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 from this plan will be incorporated in the update of the following documents.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Foster County Local Emergency Operations Plan
- Foster 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 Foster 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 Foster County – most likely targeting information databases at critical facilities and infrastructure such as the Foster 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

History

According to information technology support for Foster County and the Foster County Sheriff's Office, the following cyberattacks have occurred.

- In June 2021, an email was sent to all employees at the Foster County Courthouse from a commissioner asking for assistance to retrieve money and gift cards. The email came from an email address not belonging to that commissioner.

2018 N.D. Enhanced Mitigation MAOP

According to the 2018 N.D. Enhanced Mitigation MAOP, the following Cyberattack events occurred either in Foster 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 Foster 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 are 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 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.

- Lloyd's 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 – Foster County Cyberattack Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	2	4	2	2	**10**
City of Carrington	4	3	4	2	2	**11**
City of Glenfield	4	2	4	3	1	**12**
City of Grace City	2	1	3	2	1	**7**
City of McHenry	3	1	3	2	1	**8**

(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 Foster 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, such as the Foster County Courthouse, Carrington City Hall, CHI-St. Alexius Health Carrington Medical Center, state agencies located in Foster County, and public school districts would be the most vulnerable to a cyberattack.

A summary of publicly-owned buildings and property in Foster 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, public works infrastructure for the city of Carrington such as drinking/potable water and wastewater treatment systems are also vulnerable to the threat due to the use of SCADA systems.

Table 4.3.2 – Foster County Cyberattack Risk Assessment

Impact	• 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	• **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**
Frequency	• 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.	• **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** • Starting Winter 2020 and into Spring and Summer 2021, a spam attack has been occurring on the email accounts of county commissioners and employees
Likelihood	<u>More likely</u> • 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	<u>Less likely</u> • 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 • Foster County is fully migrated over to NDIT's Cortex XDR security package and replaced switches in 2020

Table 4.3.2 – Foster County Cyberattack Risk Assessment - Continued

Vulnerability	More vulnerable • **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	Less vulnerable • NDIT has a Cyberattack Incident Response Plan that covers Foster 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 • Foster County is fully migrated over to NDIT's Cortex XDR security package and replaced switches in 2020 • **Carrington Public School and Midkota Public School have firewalls through NDIT**
Capability	• See Chapter 7 for a list of capabilities to address cyberattack • Carrington Public Schools Technology Plan (includes a statement on cybersecurity) • Foster County Cyberattack Response Plan • Midkota Public School Technology Plan (includes a statement on cybersecurity) • NDIT Cyberattack Incident Response Plan - includes Foster 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)
- Carrington Public Schools Cyberattack Response Plan
- Foster County Cyberattack Response Plan
- Foster County Local Emergency Operations Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- Midkota Public Schools 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 Foster 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.

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

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.

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, Foster County Emergency Management, and U.S. Army Corps of Engineers (USACE), no incidents have dam failure have occurred in Foster County.

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

List of Dams – Foster County

- Table 4.4.1 lists the high hazards dams and its respective inundation area(s) in Foster County. The inundation area(s) are based on the Probable Maximum Flood (PMF) elevation, which would be a catastrophic dam failure event involving water spilling over the crest of each respective dam. According to the State Water Commission there are approximately 18 dams in Foster County. Detailed information on dams in Foster County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

- Due to homeland security purposes, limited information is shown regarding high hazard dams in Foster County. Per the 2018 N.D. Enhanced Mitigation MAOP, there are no high-hazard or significant hazard dams physically located in Foster County.

Additional information can be accessed by contacting the State Water Commission, Foster County Emergency Management, or USACE.

Probability

The probability of a hazard or threat is how likely it is it will happen. Based on dam failure history for Foster County and the presence of dams, the probability of dam failure is unlikely. The 2018 N.D. Enhanced Mitigation MAOP lists Foster County as having low vulnerability to dam failure. However, if a failure occurred at the Sykeston Dam in neighboring Wells County, areas of Foster County could be impacted.

Figure 4.4.1 illustrates the location of dams by hazard potential in Foster County. The information was provided by the USACE, National Inventory of Dams, which highlights five dams in Foster County. The average age of the dams shown is 70 years and none provide hydropower. **All five dams are regulated by state agencies.**

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 Foster 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 Foster County is limited.

Vulnerabilities of Publicly-Owned Buildings and Property

There are no publicly-owned buildings and property vulnerable to dam failure in Foster 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. Major transportation routes such as U.S. Highway 52/281 and railroad infrastructure.

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

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 Foster County can be eliminated if prohibited in the small amount of areas dam failure impact potential.

Risk Assessment

Table 4.4.1 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 4.4.1 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.

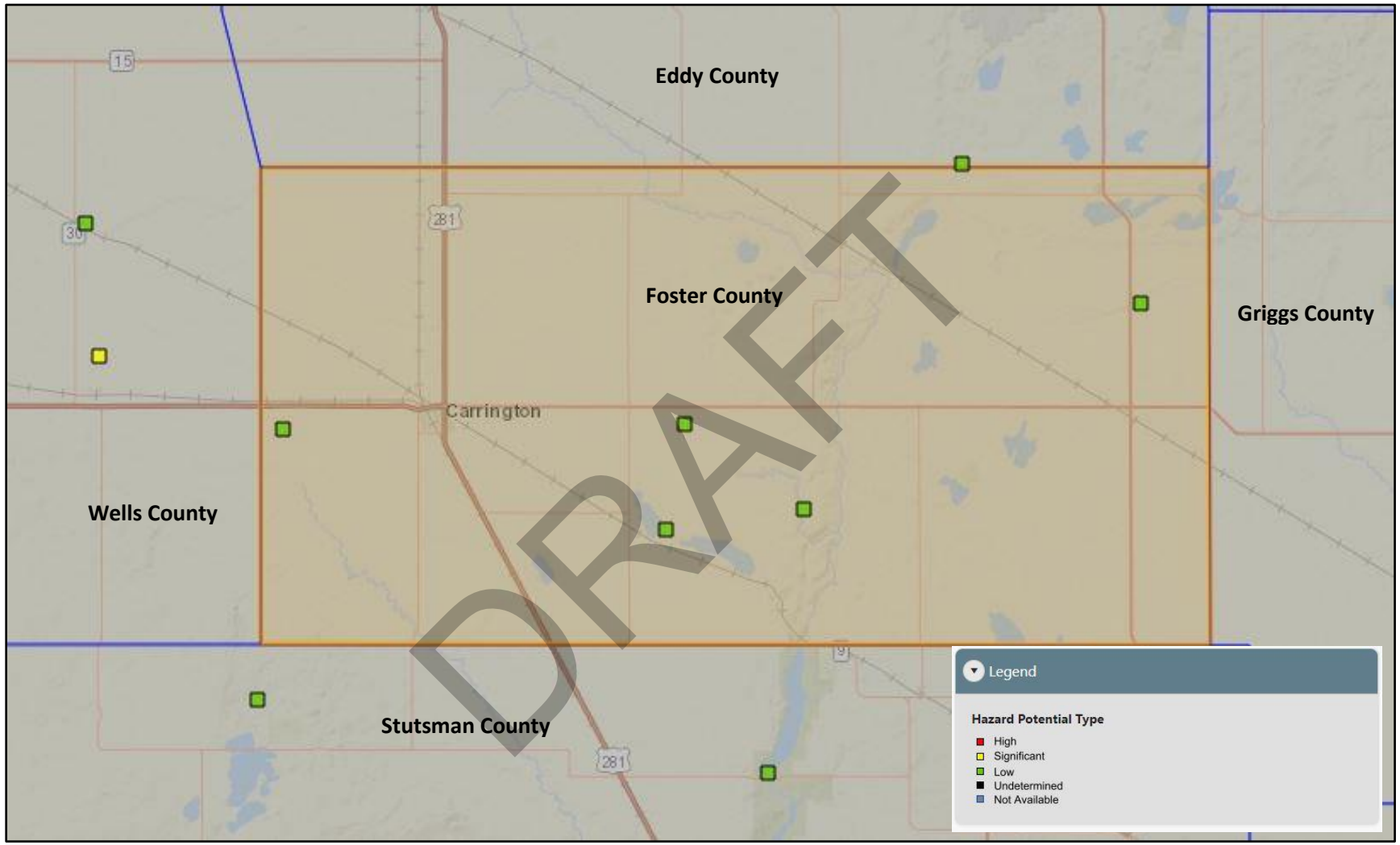
Table 4.4.1 – Foster County Dam Failure Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	2	1	2	2	1	**6**
City of Carrington	2	1	2	2	1	**6**
City of Glenfield	1	1	1	1	1	**3**
City of Grace City	1	1	1	1	1	**3**
City of McHenry	1	1	1	1	1	**3**

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

Table 4.4.2 provides information on the specific impact, frequency, likelihood, vulnerability and capability of dam failure in Foster 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 4.4.1 – Foster County Dams by Hazard Potential Type



Source(s): USACE, National Inventory of Dams

Table 4.4.3 – Foster County Dam Failure Risk Assessment

Impact	• 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**	• 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	• Never an occurrence	
Likelihood	<u>More likely</u> • 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**	<u>Less likely</u> • Dry periods of weather with little to no rain or lack of heavy snow fall • State agencies ongoing and continuous maintenance
Vulnerability	<u>More vulnerable</u> • Tier II sites and pipelines located in inundation areas • Lack of alternative housing or shelters to house displaced residents • Dover Dam west of the city of Carrington • Tollefson Dam east of the city of Carrington	<u>Less vulnerable</u> • Annual and ongoing dam inspections & routine maintenance • Foster County Nixle-Everbridge
Capability	• See Chapter 7 for a list of capabilities to address dam failure.	

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 Foster County have an EAP.

- 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP)
- Foster County Comprehensive Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- Foster County Zoning Ordinances
- Foster County Public Health District Evacuation and Shelter Plan
- Foster County Public Health District Local Emergency Operations Plan
- Foster County Public Health District Shelter and Mass Care 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.

- **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.
- **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.
- **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 Foster County

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.

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

Information on the history of drought in Foster County was obtained from the National Climatic Data Center (NCDC); 2018 N.D. Enhanced Mitigation MAOP; the USDA, Risk Management Agency; Palmer Drought Severity Index (PDSI), and Foster County Emergency Management and profile meeting participants. A detailed hazard history for Foster 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 Foster 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, 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 no permitted without a presidential declaration. Since 1976, Foster County has been included in 30 drought declared disasters or emergencies, of which 13 were state declared emergency orders, one was presidential, and 16 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 Foster County.

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

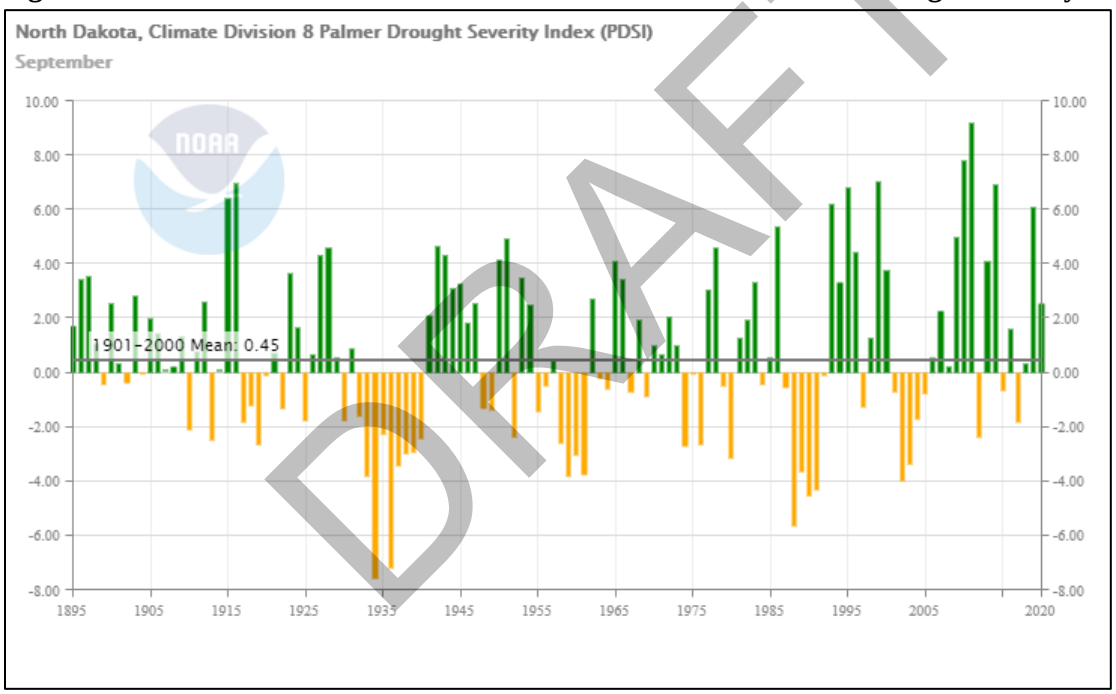
- Crop loss from drought is tracked by the U.S. Dept. of Agriculture, Risk Management Agency (RMA). The RMA provides data on the crop type affected, damage cause description, determined acres, and indemnity amount. The damage-cause description identifies the cause of damage and the number of acres lost 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, Foster County experienced 152 incidents of crop loss due to drought impacting approximately 186,726.94 acres of crops totaling $13,202,665.42 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 Foster County experienced multi-year droughts in the 1930s, 1950s, 1980s, and 2000s.

Figure 4.5.1 – 1895 to 2020 North Dakota Climate Division 8 Palmer Drought Severity Index



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

Information gathered from Steering Committee meetings indicated that while dryer periods have come and gone, the most recent drought of significant occurred in 1988/1989 and lasted until 1991/1992. 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 is 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 Foster 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 16 were U.S.D.A. Secretarial Declarations pertaining to drought between 1976 and 2017, the probability of drought is 71 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, Foster County experienced $660,133.27 in annualized crop damage and approximately eight 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.**

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 Foster 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.

- Foster County has a low overall vulnerability from drought based on $10,839,411 in crop insurance paid between 2003 and 2017 due to impacts of drought resulting in annualized payments of $722,627 in the same time frame.

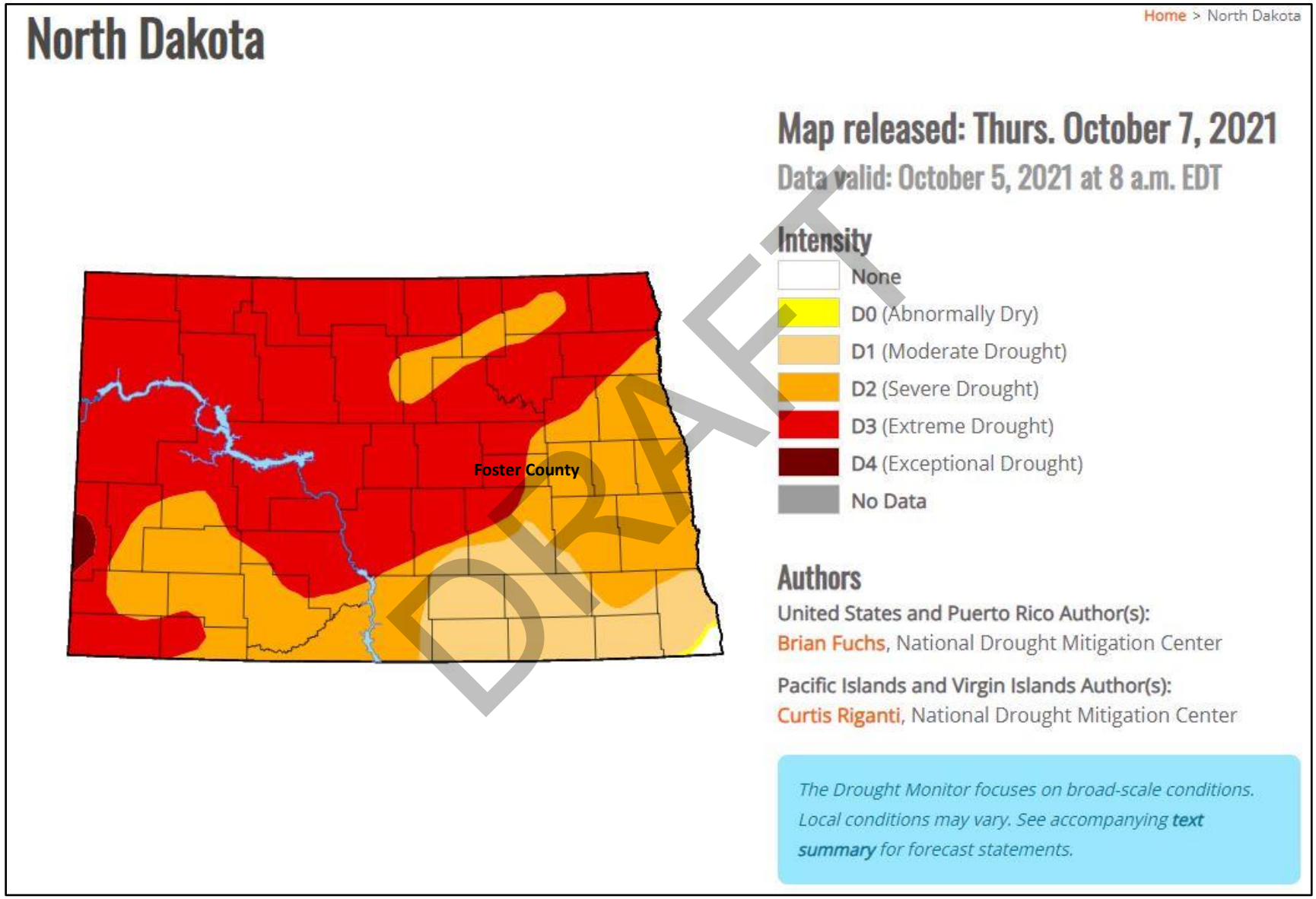
- Annualized crop damage of $811,941 between 2003 and 2017.

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 December 1, 2020. A substantial portion of Foster County was classified as D3 or Extreme Drought while the east-southeast areas were classified as D1 (Moderate Drought) and D2 (Severe Drought).

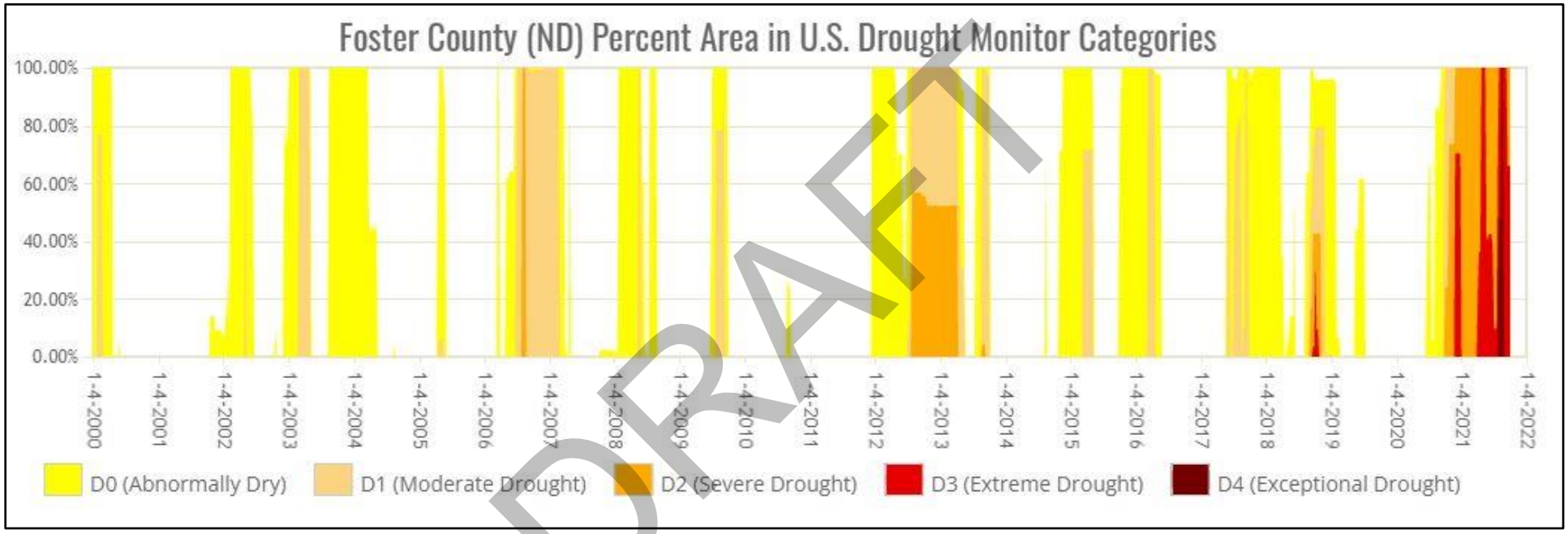
Figure 4.5.2 – December 1, 2020, U.S. Drought Monitor, North Dakota



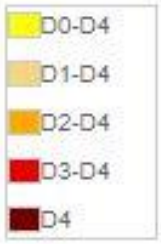
Source(s): U.S. Drought Monitor

Figure 4.5.3 shows the time series of drought for Foster County from January 4, 2000, to January 4, 2022, and the percent of the county and its respective drought classification. The figure is shown to assist Foster County in understanding the characteristics of local drought impacts. As seen in the figure, Foster 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, in the summer of 2017, and the summer/fall of 2021.

Figure 4.5.3 – January 4, 2000, to January 4, 2022, Foster County Drought Time Series



Source(s): U.S. Drought Monitor



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 – Foster County Drought Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	2	4	4	3	**11**
City of Carrington	4	2	4	3	3	**10**
City of Glenfield	4	2	4	3	2	**11**
City of Grace City	4	2	4	2	1	**11**
City of McHenry	4	2	4	2	1	**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 Foster County.

Table 4.5.2 – Foster County Area Drought Risk Assessment

Impact	• 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 fire responders – "community impact" • Soil erosion	• Local producers forced to reduce herd sizes and restructuring of harvest usage • Population decline due to loss of jobs/economy • **Annualized crop damage of $811,941 between 2003 and 2017 (2018 State Enhanced Mitigation MAOP)** • **Between January 1, 2001, and December 31, 2020, Foster County experienced 308 incidents of crop loss due to drought impacting approximately 186,726.94 acres of crops totaling $13,202,665.42 in losses.**
Frequency	• Severe Drought of 1961/1962, 1988/1989 through 1991/1992, 2012/2013 • Summer of 2017, local producers forced to sell off portions of their herds • End of July through winter of 2016 – county reached severe drought status • **Severe drought conditions winter 2020/2021 and summer/fall 2021** • **CRP was released from haying**	• **Foster County experienced $660,133.27 in annualized crop damage and eight annual claims of indemnity between 2001 and 2017** • **FSA activated the Livestock Forage Program in 2012** • **Based on 13 state declared emergency orders, one was presidential, and 16 were U.S.D.A. Secretarial Declarations pertaining to drought between 1976 and 2017, the probability of drought is 71 percent in any given year.**
Likelihood	<u>More likely</u> • Dry/wet cycle every five to six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation • Weather patterns becoming more irregular and extreme	<u>Less likely</u> • Heavy precipitation • Drain tile will drain excess soil moisture/water but not contribute to severe drought conditions because it only drains to field capacity • Producers work with state to develop irrigation measures

Table 4.5.2 – Foster County Area Drought Risk Assessment – Continued

Vulnerability	More vulnerable • 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 • **Presence of aquifers, which are used for livestock and municipal water sources, can be depleted during droughts of significance**	Less vulnerable • Financial assistance programs made available by the state and federal government • Burn bans • Fire Index monitoring and mapping from NDDES • 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**

Table 4.5.2 – Foster County Area Drought Risk Assessment - Continued

Capability	See Chapter 7 for a list of capabilities to address drought. <u>Administrative and Technical</u> • Active county commission • Full-time emergency manager and asst. emergency manager • NDSU Extension/Foster County • Farm Service Agency (FSA) • Natural Resource Conservation Service (NRCS) • Contracts for engineering, planning and grant writing • GIS services provided through state • County-wide mutual aid agreement • U.S.D.A. Emergency Board • Foster County Soil Conservation District (SCD) • N.D. Agriculture Weather Network <u>Education and outreach</u> • NDSU Extension/Foster County • Farm Service Agency (FSA) • Active emergency management department with education and outreach available on the department's website <u>Financial</u> • FSA has programs designed to financially assist farmers in times of need (FLP, LIP, LFAP – all cattle) • 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 <u>Planning and Regulatory</u> • **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 • Rural Water Districts – have drought management and water conservation plans in place

Vulnerabilities to Publicly-Owned Buildings and Property

Drought has not had a direct impact on buildings and property in Foster 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 2016 by reported use was irrigation utilizing ground water resources.

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. 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 the demand for water and the vulnerability of drought in Foster 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 Foster County with more frequency and increased severity.

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 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 Foster 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. 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
- Foster County Comprehensive Plan
- Foster County Commercial Animal Feed Operation Ordinance
- Foster County Evacuation and Shelter Plan
- Foster County Local Emergency Operations Plan
- Foster County Shelter and Mass Care Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- 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 Foster 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.
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

Chapter 4.5.1 profiles urban fire/structure collapse and Chapter 4.5.2 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), Carrington Fire Department, 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 Foster County and indicates 55 structure fires, 45 vehicle fires, and 87 other fires between January 1, 2000, and December 31, 2020, for a total of 187 fire calls. In addition, local fire agencies responded to 62 rescue calls (44 medical and 18 other). Approximately 68.2 percent (30 – which are sometimes combined with EMS) of all medical calls were received by Carrington 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 $265,000.00 between January 1, 2000, and December 31, 2019, while combined with other losses totaled $271,000.00 during the same time frame.

Table 4.6.1.1 – January 1, 2000, to December 31, 2019, Foster County Urban Fire/Structure Collapse Hazard History Summary

	Fires				Rescue Calls			Losses	
Fire Protection Agency	**Struc.**	**Vehicle**	**Other**	**Total**	**Med.**	**Other**	**Total**	**Fire Only**	**Total**
Carrington Fire Dept.	19	8	7	34	30	13	43	$57,000.00	$63,000.00
Carrington Rural Fire Dept.	32	31	72	135	13	5	18	$177,000.00	$177,000.00
Glenfield Fire Prot. Dist.	3	3	1	7	1	0	1	$10,000.00	$10,000.00
McHenry Rural Fire Dept.	1	3	7	11	0	0	0	$21,000.00	$21,000.00
TOTAL	**55**	**45**	**87**	**187**	**44**	**18**	**62**	**$265,000.00**	**$271,000.00**

Note: All fires, rescue calls and loss statistics are from January 1, 2000 to December 31, 2019.

Source: 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 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 Foster County. The data was provided by the N.D. State Fire Marshal's Office. A detailed hazard history for Foster County can be found on a disc located at the beginning of Chapter 4, Threat and Hazard Identification Risk Assessment.

Carrington Fire Department

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

- **September 22, 2012.** Residential fire east of the city of Carrington approximately six miles resulting in the death of the owner. The cause of the fire is suspected to be a space heater. The fire required over 18,000-gallons of water to be ferried to the site.

- **Tufte Fire - February 25, 2017.** The initial call was received around 5 o'clock. The fire started in the same room where the children were sleeping and was noted most likely due to an electric space heater. There were no working smoke alarms in the home and the fire was found because the father had woken up to a noise. The three children perished and the family also lost their dog in the fire. That weekend six crew members were attending fire school in Minot. All crew members came back to relieve the first responding crew.

Fire departments from neighboring counties have coverage over parts of Foster 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 Foster 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 Foster County is 100 percent based on the following information.

Profile meeting participants indicated the probability of urban fire/structure collapse in Foster 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 Foster County respond to an average of nine fire calls per year between January 1, 2000, and December 31, 2020, or approximately three structure fires, two vehicle fires, four other fires annually. Foster County experiences, on average, $13,250.00 in fire losses and $13,550.00 in other losses annually.

Extent/Magnitude

The 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 Foster County Courthouse, an emergency services building such as a fire or ambulance hall, public schools, 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 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.

National Fire Incident Reporting System (NFIRS)

- According to data provided by the NFIRS and the Carrington Fire Department, communities/fire agencies in Foster County experienced $265,000.00 in fire losses and $271,000.00 in other losses January 1, 2000, and December 31, 2020.

Carrington Fire Department

- The 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. The Carrington Fire Department reported three fatalities on February 25, 2017, referred to as the Tufte fire.

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 – Foster County Urban Fire/Structure Collapse Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	2	2	3	2	**9**
City of Carrington	4	2	2	2	3	**7**
City of Glenfield	4	2	2	2	2	**8**
City of Grace City	4	2	2	4	1	**11**
City of McHenry	4	1	2	2	2	**9**

(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 Foster 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

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. Foster 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, the city of Carrington is the only incorporated jurisdiction in Foster County that has building inspection services.

An inventory of household units by type by jurisdiction in Foster 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.

Table 4.6.1.5 – Foster County Urban Fire/Structure Collapse Risk Assessment

Impact	• Blocked Roads • Building Collapse • Business Interruptions/Loss of Economy • Delayed Emergency Response • Evacuation (Localized) • Explosion • Human Injury/Death • Increased Fire Potential • Mass Casualties/Fatalities	• Loss of Power/Downed Power Lines • Level of impact depends on the structure
Frequency	• Annual occurrences of structures/vehicle fires • Significant fire once every 5 to 10 years • **Tufte Fire in 2017**	• Local fire agencies responded to 55 structure fires, 45 vehicle fires, and 87 other fires between January 1, 2000, and December 31, 2019, for a total of 187 fire calls.
Likelihood	More likely • Close spacing and age of downtown 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**	Less likely • Better building standards and maintenance of buildings • Smoke detectors required by code • Well-equipped fire departments with trained volunteers • Annual inspections of commercial properties • Smoke alarm drive in April 2018 installed over 200 free smoke alarms with the help of the American Red Cross
Vulnerability	More vulnerable • Close spacing and age of downtown 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** • **Growing population** • **Shrinking volunteerism for fire protection**	Less vulnerable • Better building standards and maintenance of structures • Smoke detectors required by code • Well-equipped fire departments with trained volunteers • Annual inspections of commercial properties • Smoke alarm drive in April 2018 installed over 200 free smoke alarms with the help of the American Red Cross
Capability	• See Chapter 7 for a list of capabilities to address urban fire/structure collapse.	

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 Foster 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)
- Carrington Fire Department Annual Report
- Foster County Comprehensive Plan
- Foster County Commercial Animal Feed Operation Ordinance
- Foster County Evacuation and Shelter Plan
- Foster County Local Emergency Operations Plan
- Foster County Shelter and Mass Care Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- James River Firefighter's Association
- 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 the N.D. Dept of Emergency Services; USDA, Risk Management Agency; the 2018 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), and Foster County Emergency Management.

N.D. Dept. of Emergency Services

- As of June 30, 2021, a total of 10 fires burning 20 acres were reported in Foster County. The first fire was reported March 18, 2021.

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 identities 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, Foster County two incidents of crop loss due to wildland fire impacting approximately 1,587.00 acres of crops totaling $57,704.00 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 declared disasters or emergencies pertaining to wildland fire in Foster 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 Foster 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 in rural residential areas in Foster 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 low across Foster 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 Foster County could be affected. In terms of 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 magnitude of wildland fire in Foster 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

- Foster County has $154,200 (2013 dollars) in housing unit values in high and moderate wildfire risk areas.

- Foster County has two people and two housing units in the High and Moderate Wildland Urban Interface Threat Zones; two people and one housing unit in high-risk areas, and no people and one housing unit in moderate risk areas.

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 – Foster County Wildland Fire Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	3	4	2	2	**11**
City of Carrington	4	3	4	2	2	**11**
City of Glenfield	4	3	4	2	2	**11**
City of Grace City	4	2	3	4	1	**12**
City of McHenry	4	1	3	2	1	**9**

(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 Foster 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).

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.

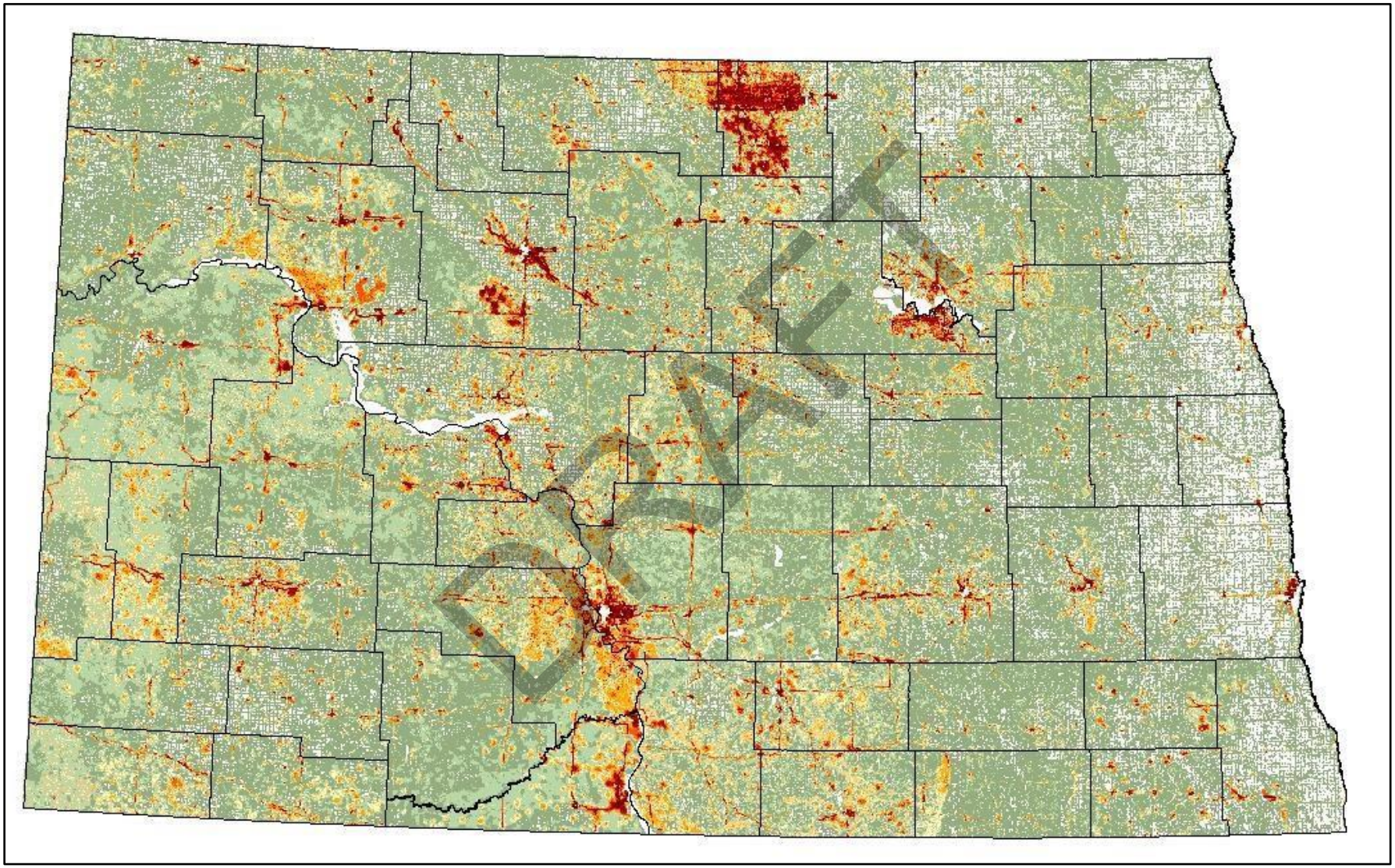
- **Intermix** refers to areas where housing and vegetation intermingle.
- **Interface** refers to areas with housing near contiguous wildland vegetation.

Figures 4.6.1.2 to 4.6.1.7 show the WUI for Foster County and the cities of Carrington, Glenfield, Grace City, McHenry, and unincorporated Bordulac and Juanita. The areas colored in orange indicate areas where housing and vegetation intermingle.

Table 4.6.2.3 – Foster County Wildland Fire Risk Assessment

Impact	• Building Collapse • Crop Loss • Delayed Emergency Response • Evacuation (Localized) • Explosion • Increase Fire Potential	• 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**
Frequency	• Controlled burns becoming out of control between 25 and 50 percent of the time	• 90 percent of wildland fires responded to by local departments are wildland from hay land or CRP
Likelihood	More likely • Agricultural burn-off, sometimes includes garbage and manure • 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**	Less likely • Removal of CRP • Summer and winter weather with heavy precipitation
Vulnerability	More vulnerable • Agricultural burn-off, sometimes includes garbage and manure • 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 all incorporated and unincorporated communities** • **Shrinking volunteerism for fire protection** • **Lack of permanent generators at fire halls across the county** • **Lack of fire index signs**	Less vulnerable • Burn bans • Removal of CRP • Heavier precipitation than other parts of the state • MOUs with neighboring fire departments • **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 100.0 percent of the total land area of Foster County.**
Capability	• See Chapter 7 for a list of capabilities to address wildland fire (including rural).	

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 Carrington Wildland-Urban Interface

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

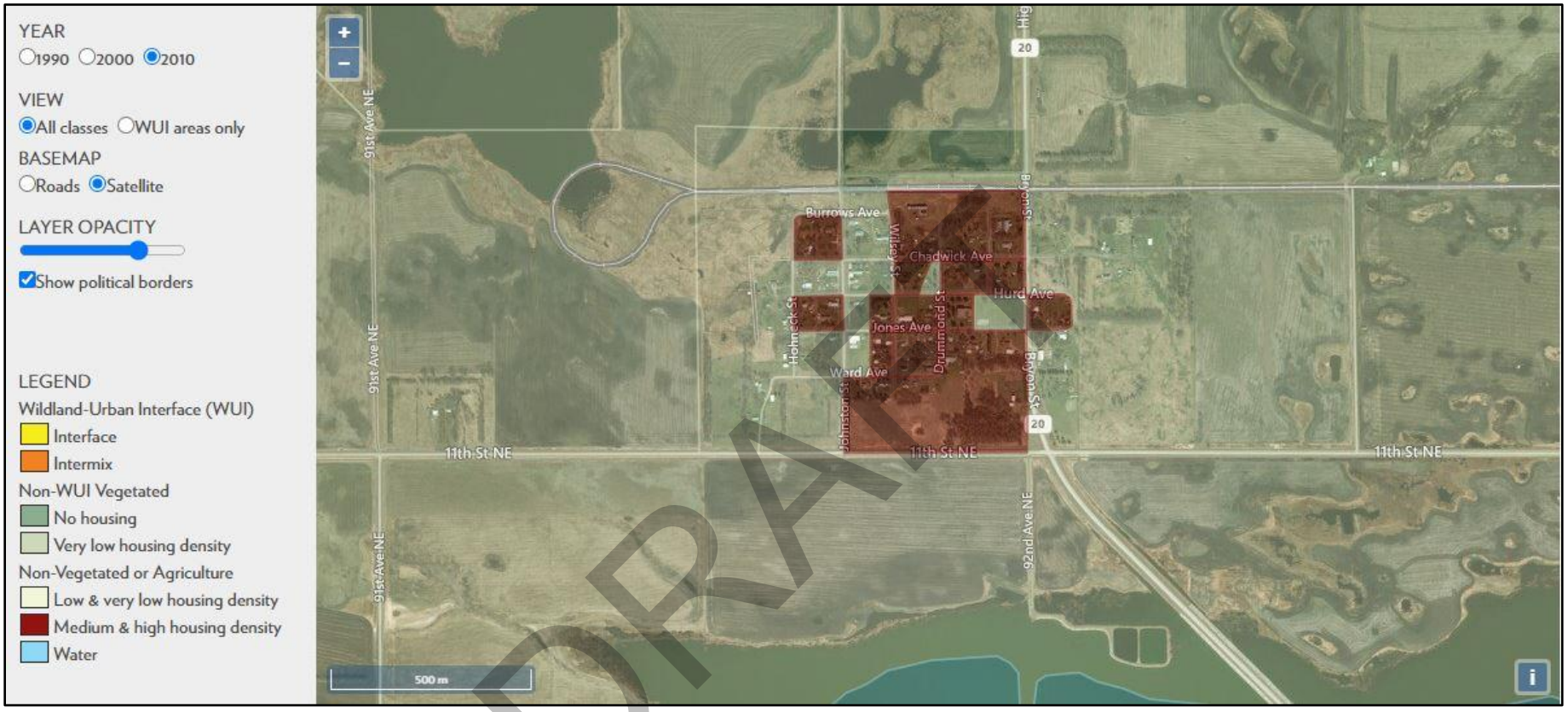
Figure 4.6.2.3 – 2010 City of Glenfield Wildland-Urban Interface

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

Figure 4.6.2.4 – 2010 City of Grace City Wildland-Urban Interface

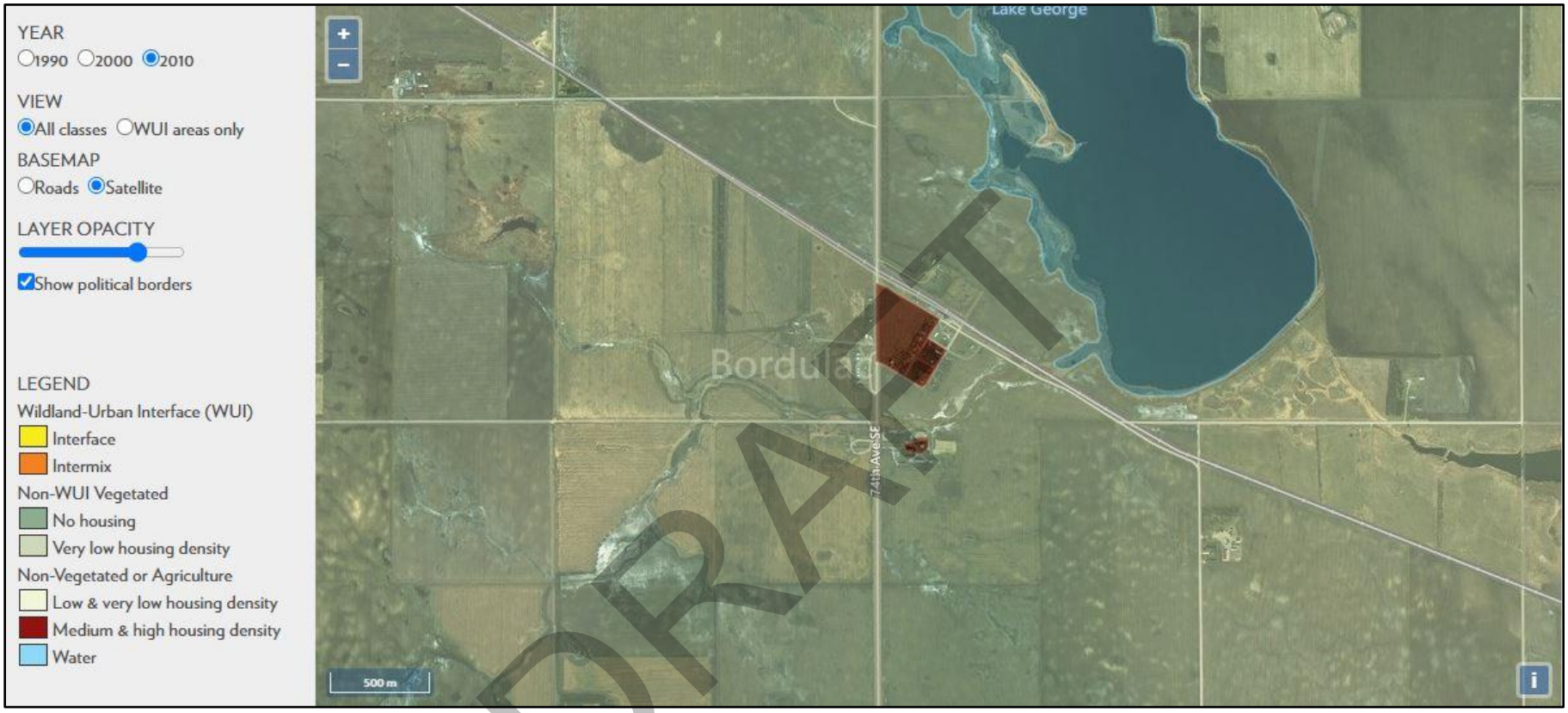
Source: University of Wisconsin, Silvis Lab – Spatial Analysis for Conservation and Sustainability

Figure 4.6.2.5 – 2010 City of McHenry Wildland-Urban Interface



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

Figure 4.6.2.6 – 2010 Unincorporated Bordulac Wildland-Urban Interface



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

Figure 4.6.2.7 – 2010 Unincorporated Juanita 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 Foster Country increase 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, remained the same between 1990 and 2010 consisting of 0.0 percent of the total area of Foster 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.

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. Foster 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. **The non-Wildland-Urban Interface (WUI), both intermix and interface, consists of 100.0 percent of the total land area of Foster County.**

Data Limitations and Other Key Documents

Foster 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
- Foster County Comprehensive Plan
- Foster County Evacuation and Shelter Plan
- Foster County Local Emergency Operations Plan
- Foster County Shelter and Mass Care Plan
- Foster 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, 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.

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 and/or riverine flooding.
Speed of Onset	Minutes for flash flooding. Between 12 and 24 hours warning for closed basin, overland, and riverine flooding. Prolonged warning for potential risk to riverine flooding due to a dam failure.
Location	Foster County. Baldhill Creek – tributary of Sheyenne River. Carrington Creek. Kelly Creek. Pipestem Creek. Rocky Run natural watercourse. James River. Low-lying areas near or adjacent to bodies of water, or with inadequate drainage. Closed basins. The Foster County Courthouse in Carrington has experienced ground seepage and interior flooding in the basement. See Figures 4.7.1 and 4.7.2 for locations of damages to bridges, dams, and roads from occurrences of flooding. Incorporated Jurisdictions. See Chapter 8, Jurisdictions. Alkali Lake near the city of McHenry.

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

History

Information on the history of flooding in Foster County was obtained from the Federal Emergency Management Agency (FEMA); National Climatic Data Center (NCDC); National Oceanic and Atmospheric Administration (NOAA); Foster County Auditor's Office; Foster 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, Foster County has had 21 Presidential Disaster Declarations, of which 16 were for flooding. Flooding accounts for or is a factor in approximately 76 percent of disasters declared in Foster County.

National Climatic Data Center/National Oceanic and Atmospheric Administration

Table 4.7.1 summarizes the history of flooding in Foster County between January 1, 1996, and December 31, 2020. 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 Foster 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.

- Foster County experienced six occurrences of flooding resulting in approximately one incident of significance every four years.
- Approximately $1,725,000.00 in property damage was reported.
- Three injuries and no fatalities were reported.

Table 4.7.1 – 1996 to 2020 Foster County Flood Hazard History Summary

Flood				
Occurrences	**Fatalities**	**Injuries**	**Property Damage**	**Crop Damage**
6	0	3	$1,725,000.00	$0.00

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

Foster County Auditor's Office and Foster County Emergency Management

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

- **DR-1829.** A total of 38 damaged sites were identified from the 2009 flood declaration totaling $592,106.99. The cost share was approximately 3.0 percent local, 7.0 percent state, and 90.0 percent federal. The average cost per damaged site was $15,581.76. According to the Foster County Emergency Manager, three bridges were impacted with damages.
- **DR-1907.** A total of 11 damaged sites were identified from the 2010 flood declaration totaling $83,663.59. 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 $7,605.78.
- **DR-1981.** A total of 44 damaged sites were identified from the 2011 flood declaration totaling $549,609.14. The cost share was approximately 3.0 percent local, 7.0 percent state, and 90.0

percent federal. The average cost per damaged site was $12,491.12. According to the Foster County Emergency Manager, three bridges were impacted with damages.

- **DR-4118.** A total of 73 damaged sites were identified from the 2013 flood declaration totaling $121,545.70. The cost share was approximately 15.0 percent local, 9.5 percent state, and 76.2 percent federal. The average cost per damaged site was $1,665.01.

- **DR-4475.** A total of 64 damaged sites were identified from the 2019 flood declaration totaling $124,236.05. The cost share was approximately 14.3 percent local, 9.52 percent state, and 76.19 percent federal. The average cost per damaged site was $1,941.19.

- **DR-4553.** A total of 255 damaged sites were identified from the 2020 flood declaration, of which only 18 were approved by FEMA totaling $40,950.01. 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 $2,275.00.

Table 4.7.2 2009 to 2020 Public Infrastructure Damages from Flooding

Disaster No.	Year	Damaged Sites*	Local Share	State Share	Federal Share	Grade Raises
DR-4553	2020	18*	$6,142.49	$4,095.01	$30,712.51	0
DR-4475	2019	64	$17,747.99	$11,832.01	$94,656.05	0
DR-4118	2013	73	$18,231.86	$12,154.57	$91,159.27	NA
DR-1981	2011	44	$16,488.18	$38,472.67	$494,648.29	NA
DR-1907	2010	11	$12,549.51	$8,366.35	$62,747.73	NA
DR-1829	2009	38	$17,763.19	$41,447.48	$532,896.32	NA

*The number of sites approved by FEMA. Does not include the total amount of damaged sites included in the application.
Source(s): Foster County Auditor's Office; Foster 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 identities 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, Foster County experienced 20 incidents of crop loss due to flooding impacting approximately 3,276.57 acres of crops totaling $755,026.75 in losses.**

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

The James River begins in neighboring Wells County and flows through Foster County into Stutsman County to the south. According to the 2018 N.D. Enhanced Mitigation MAOP, the following information on the James River Basin was obtained, in addition to historical flooding information and related damages in Foster County.

- The James River, the largest river in the basin, is a major tributary of the Missouri River. The principal tributary of the James River is Pipestem Creek. Other important tributaries to the James River include Maple, Beaver, Bone Hill, and Cottonwood Creeks. These creeks all drain the area to the west of the river, while Bear Creek is the only major east-side tributary.

Jamestown and Pipestem Dams, both just north of Jamestown, hold water throughout the year and provide flood protection to communities along the James River from Jamestown to the South Dakota state line. These dams provide over 90 percent flood damage reduction along the James River. The river becomes permanent below these dams, but periods of no flow are not uncommon. Countless wetlands store water in the noncontributing portions of the basin.

Flooding has occurred in the basin. Major floods occurred in 1881, 1920, 1922, 1942, 1950, 1969, 1993-1997, 1999, and 2009. In addition, at least 17 minor floods are known to have taken place since 1881. Flooding in the James River Basin is most often caused by rapid runoff from relatively steep tributaries to the nearly flat main channel of the James River which may be obstructed along its route by small jams, log jams, vegetation, sediment deposits, and inadequate bridge capacities. It is not uncommon for tributary discharges to exceed the channel capacity of the James.

The major water problems in the James River Basin relate to periodic flooding of agricultural cropland, hay land, pasture, and several communities. Communities most severely affected include Jamestown, **Carrington**, Spiritwood Lake, Oakes, LaMoure, and Edgeley. A major issue within the basin is the controversy involving agricultural drainage versus wetland preservation. River channel obstructions and stream bank erosion exist in many areas along the James River below the Jamestown Dam.

- **According to the National Centers for Environmental Information, as of 2018, Foster County has experienced four flash flood events resulting in $1,120,000 in property damage and no crop damage, and two flood events resulting in $605,000 in property damage and no crop damage. No injuries 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 Foster 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 Foster County can be determined through data provided by the National Climatic Data Center/National Oceanic and Atmospheric Administration; the U.S. Dept. of Agriculture, Risk Management Agency; Foster County Emergency Management; and the 2018 N.D. Enhanced Mitigation MAOP.

National Climatic Data Center/National Oceanic and Atmospheric Administration

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

- Probability of flooding in Foster County is approximately 25 percent based on six flood occurrences between January 1, 1996, and December 31, 2020, resulting in approximately one incident of significance every four years.

- Foster County experiences approximately $69,000.00 in property damage and no crop damage annually between January 1, 1996, and December 31, 2020.

- Three injuries or fatalities were reported between January 1, 1996, and December 31, 2020.

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 impacted approximately 163.83 acres totaling $37,761,34 in losses annually in Foster County.

Foster County Emergency Management

- Figures 4.7.1 and 4.7.2 illustrate infrastructure impacted from the 2009, 2010, 2011, 2013 and Fall 2019 flooding events in western and eastern Foster County, which were included in the respective presidential disaster declaration.

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

- Figure. 4.7.3 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 floodplain is present along the James River in central Foster 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 Foster 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 Foster County is determined.

- Per Table 4.7.1, approximately $1,000,000.00 in property damage occurred from a flash flood event on August 6, 2011, in unincorporated Bordulac. Lake George and Dry Lake were inundated with runoff resulting in damages to county and township roads, and railroad infrastructure.

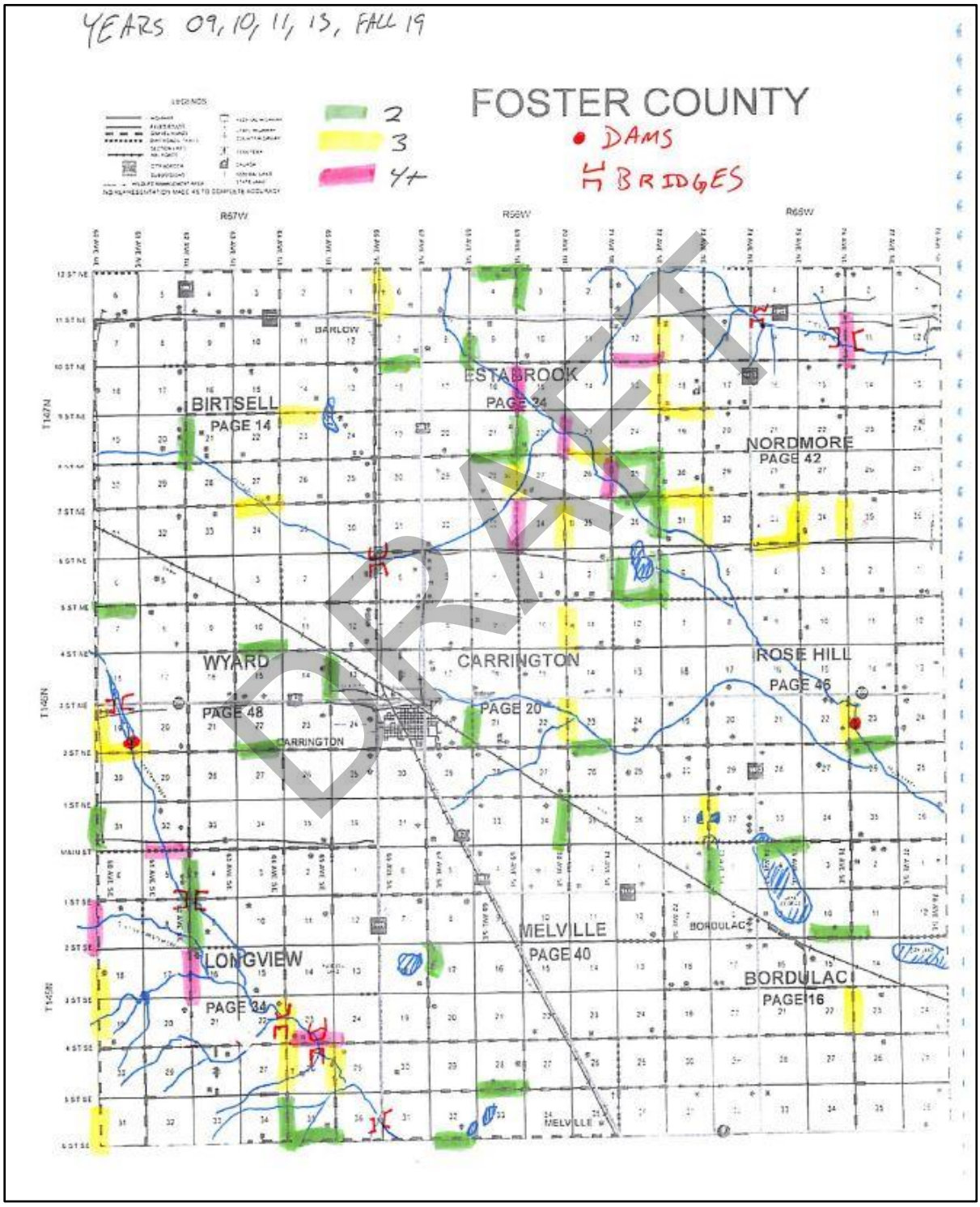
- Per Table 4.7.2, the largest flooding event in terms of monetary damage and average cost per damaged site was DR-1829 with $592,106.99 in total damages and $15,581.76 per site. The largest flooding event in terms of damaged sites was DR-4118 with 73 damaged sites.

- High water on Alkali Lake, which receives water from an adjacent unnamed lake also experiencing high water, causes flooding impacts to roadways to the City of McHenry, McHenry Township, and the ND Department of Transportation. The City's sanitary sewer lagoon system is located adjacent to the lake and would be completely inundated before Alkali Lake reaches its natural outlet elevation.

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

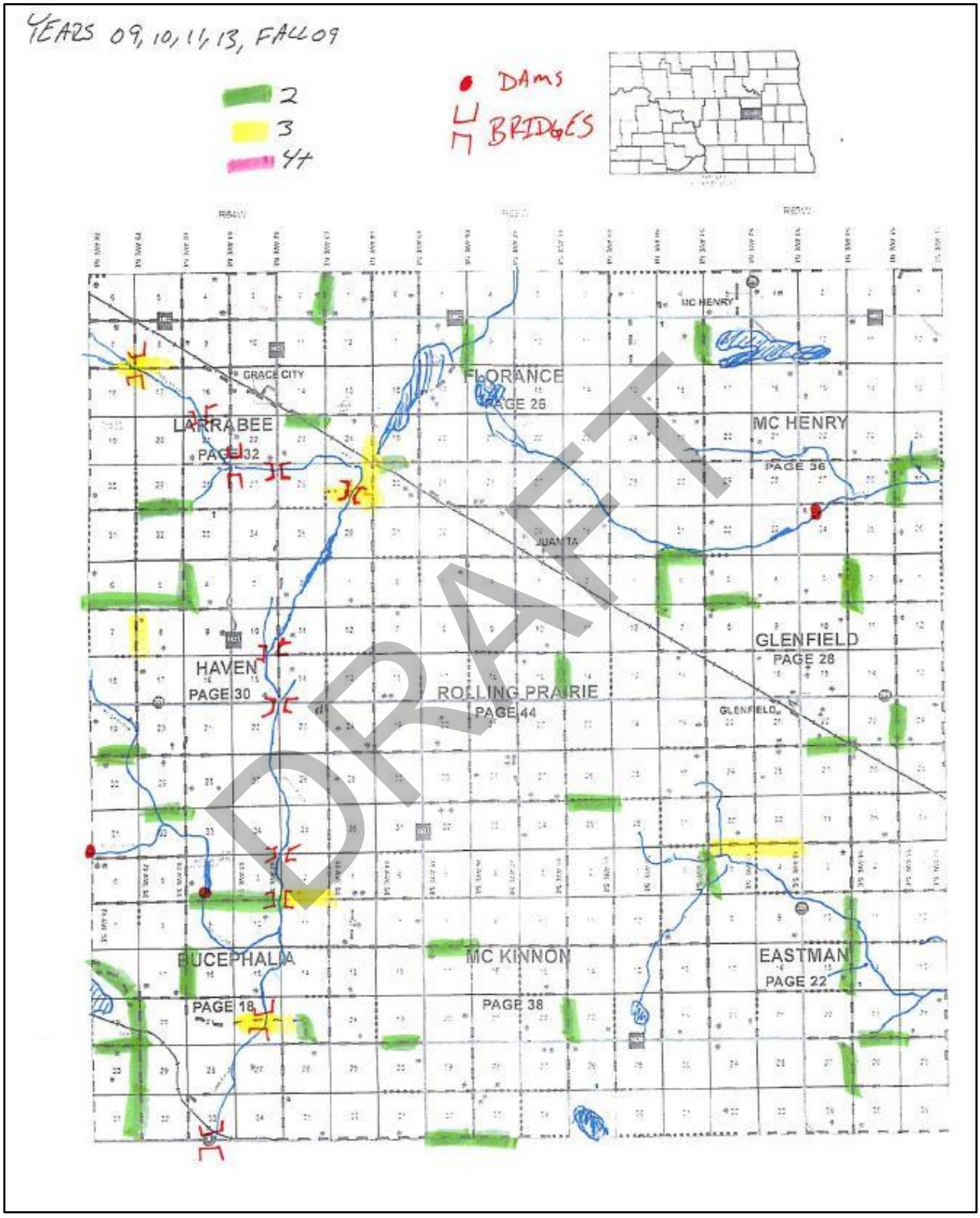
- Crop loss data from the USDA, RMA shows the largest indemnity paid for crop loss due to flooding was in 2020 for $491,775.00 for corn.

Figure 4.7.1 – Western Foster County Infrastructure Impacted by Flooding Events



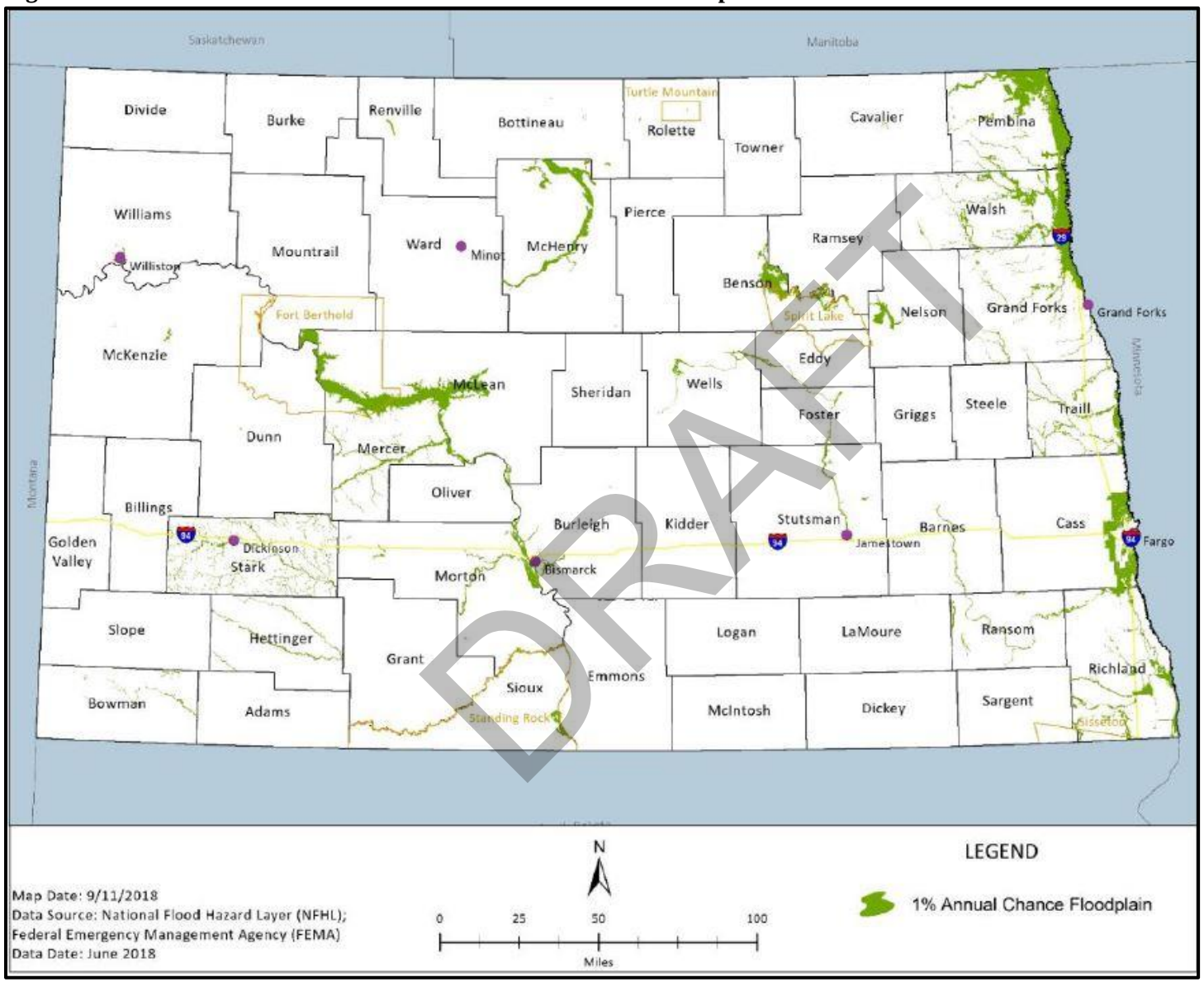
Source: Foster County Emergency Management

Figure 4.7.2 – Eastern Foster County Infrastructure Impacted by Flooding Events



Source: Foster County Emergency Management

Figure 4.7.3 – 2019 North Dakota One-Percent Annual Chance 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 Foster 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.

Table 4.7.3 – Participation in National Flood Insurance Program (NFIP) – Foster County

Jurisdiction Name	CID #	Initial FHBM Identified	Initial FIRM Identified	Mapped
Foster, County of	380696	--	06/21/17	06/21/17(M)
Carrington, City of	380218	05/28/76	--	(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 September 30, 2021, there are two NFIP policies in Foster County covering $630,000.00 in property and assets. The number of claims made since 1978 in Foster County is 10 with $110,338.00 paid on those claims.

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 June 30, 2021, there are no repetitive loss properties were in Foster 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 June 30, 2021, there are no severe repetitive loss properties were in Foster 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 – Foster County Flood Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	2	4	3	3	**10**
City of Carrington	4	2	4	3	3	**10**
City of Glenfield	4	2	4	3	2	**11**
City of Grace City	4	2	2	3	3	**8**
City of McHenry	4	3	4	4	1	**14**

(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 Foster 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 – Foster County Flood Risk Assessment

Impact	• 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 debris laying around • Large property loss, 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 population • 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 permanent closure of township roads** • Compromise/diminished water quality from agricultural runoff carried by flood waters • **$110,338.00 in losses paid on 10 claims through the NFIP since 1978 in Foster County** • **Between January 1, 2001, and December 31, 2020, Foster County experienced eight incidents of crop loss due to flooding impacting approximately 456.30 acres of crops totaling $47,779.20 in losses.** • **The largest flooding event in terms of monetary damage and average cost per damaged site was DR-1829 with $592,106.99 in total damages and $15,581.76 per site.**
Frequency	• Annual occurrences of localized flooding of streets in incorporated cities and county roads and bridges • Periodic flash flooding from heavy rains during 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 • Agricultural land management practices to maximize production can impact the severity flooding	• **Presidential Disaster Declarations in Foster County in 2009, 2010, 2011, 2013, 2019, and 2020.**

Table 4.7.4 – Foster County Flood Risk Assessment – Continued

Likelihood	More likely • **Presence of the Baldhill Creek – tributary of Sheyenne River, Carrington Creek, Kelly Creek, Pipestem Creek, Rocky Run natural watercourse, James River** • **Pipestem Creek creates the most flooding issues** • Rapid change of seasons = excessive snow melt/drainage • Low spots on county/township roads, and county and state highways • Closed basins increase likelihood of flooding due to being 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	Less likely • Likelihood dependent local weather climate patterns • Structure-specific drain tile and dewatering systems • Farm and field drain tile and dewatering systems
Vulnerability	More vulnerable • **Pipestem Creek creates the most flooding issues** • Lack of storm water system in smaller jurisdictions • Smaller jurisdictions and rural areas with agriculture based economic 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 • **Ground seepage at the Foster County Courthouse**	Less vulnerable • **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 a Everbridge, 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

Table 4.7.4 – Foster County Flood Risk Assessment – Continued

Capability	Administrative and Technical • **FEMA Flood Maps – being updated 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 Carrington with GIS capabilities through their engineering contract • Foster County Water Resource District • ND Dept. of Water Resources - ND Risk Assessment Mapping (NDRAM) Education and Outreach • Active emergency management department with education and outreach capabilities • Foster County Water Resource District provides regulation to land-owners for issues pertaining to water Financial • Relies on federal and state entities for assistance with major projects Planning and Regulatory • Foster County Water Resource District • Foster County Planning and Zoning Committee and Administrator/Floodplain Administrator • City of Carrington Flood Plain Ordinances • County adopted NFIP and related flood ordinances • Natural Resource Conservation Service • ND Dept. of Water Resources - ND Risk Assessment Mapping (NDRAM) • ND Dept. of Water Resoruces also has regulations in place for surface water • Carrington Planning & Zoning Committee and Administrator

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. Locations of publicly-owned buildings and property will determine vulnerabilities to river channel and overland flooding. In the city of Carrington, 10th and 11th Avenues experience overland flooding, impacting Carrington City Hall, Carrington Fire Hall, and the Carrington and Armory.

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 Carrington, 10th and 11th Avenues experience overland flooding, impacting Carrington City Hall, Carrington Fire Hall, and the Carrington and Armory.

N.D. Highway 20 and the sanitary sewer lagoons for the city of McHenry are impacted by Alkali Lake during high precipitation events.

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 Foster County is at high risk to flooding if allowed in a floodplain. With projected local populations stable in Foster County through 2030, more people will be vulnerable to flooding if development is not restricted from flood-prone areas.

Data Limitations

The lack of digitized records of public assistance provided to local governments from flood events makes flood mitigation planning difficult to comprehend during mitigation planning processes.

National Climatic Data Center/National Oceanic and Atmospheric Administration

The hazard history provided through the National Climatic Data Center/National Oceanic Atmospheric Administration's Storm Events Database contains data from **1950 to 2020**, 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)
- Foster County, North Dakota Alkali Lake High Water Outlet Feasibility Study (preliminary)
- Foster County Comprehensive Plan
- Foster County Evacuation and Shelter Plan
- Foster County Local Emergency Operations Plan
- Foster County Shelter and Mass Care Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- National Flood Insurance Program (and required flood ordinances)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Flood Annex
- North Dakota League of Cities: Planning and Zoning Handbook
- North Dakota Risk Assessment Mapping (RAM) Service (flood mapping software)
- 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 Foster 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 Foster 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 Foster County.
- **Earthquake.** There is not a history of earthquakes in Foster 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 Foster County.
- **Environmental Minerals (Radon).** According to the N.D. Dept. of Environmental Quality, between January 1, 2014, and March 1, 2021, there were approximately 43 positive tests for radon in residential homes in Foster County.
- **Expansive/Unstable Soils.** There is not a history of expansive/unstable soils events within Foster County.
- **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. Foster 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 Foster County.
- **Volcanic Hazards.** There is not a history of volcanic hazards in Foster 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 Foster County. The following probability for geologic hazard in Foster County is as follows:

- **Abandoned Mine Lands (AMLs).** According to the N.D. Public Service Commission (PSC), there are no Abandoned Mine Lands in Foster 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 Foster County. The probability of earthquake in Foster 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 Foster 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 Foster County Therefore, the probability of this geologic hazard would be low to unknown in Foster 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.

- **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.

- **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 Foster 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 Foster 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 Foster County at high concentrations based on available information. Therefore, the extent/magnitude of this geologic hazard would be low or unknown in Foster 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 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. There is not a history of his type of geologic event in Foster County. Therefore, the extent/magnitude of expansive/unstable soils is unknown in Foster 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 Foster County.

- **Volcanic Hazards.** There are no volcanoes in Foster 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 – Foster County Geologic Hazard Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	1	2	2	2	2	**5**
City of Carrington	1	2	2	2	2	**5**
City of Glenfield	1	2	2	2	2	**5**
City of Grace City	1	2	2	2	2	**5**
City of McHenry	1	2	2	2	2	**5**

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

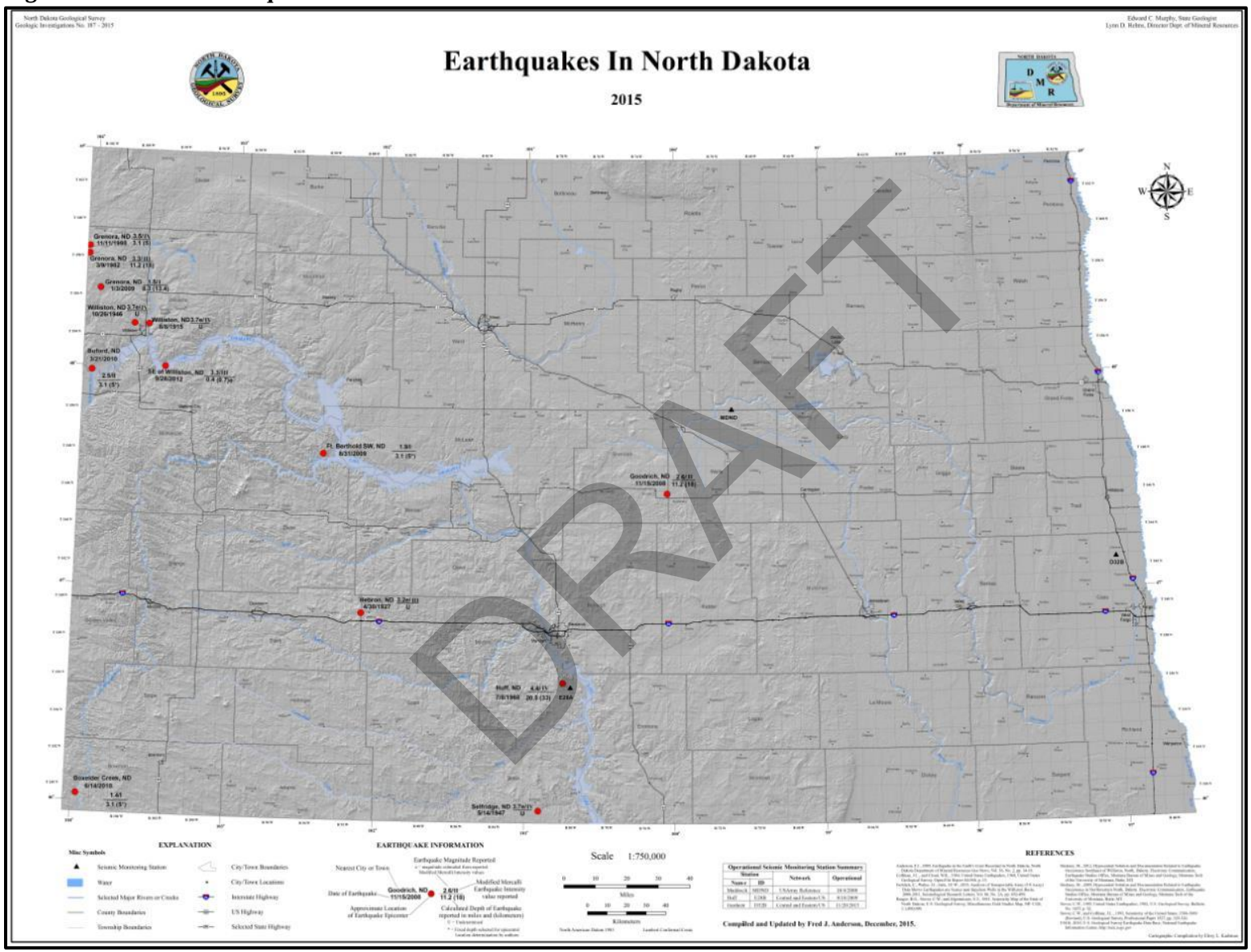
Tables 4.8.3 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of geologic hazard in Foster County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat and Hazard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

Vulnerabilities to Publicly-Owned Buildings and Property

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

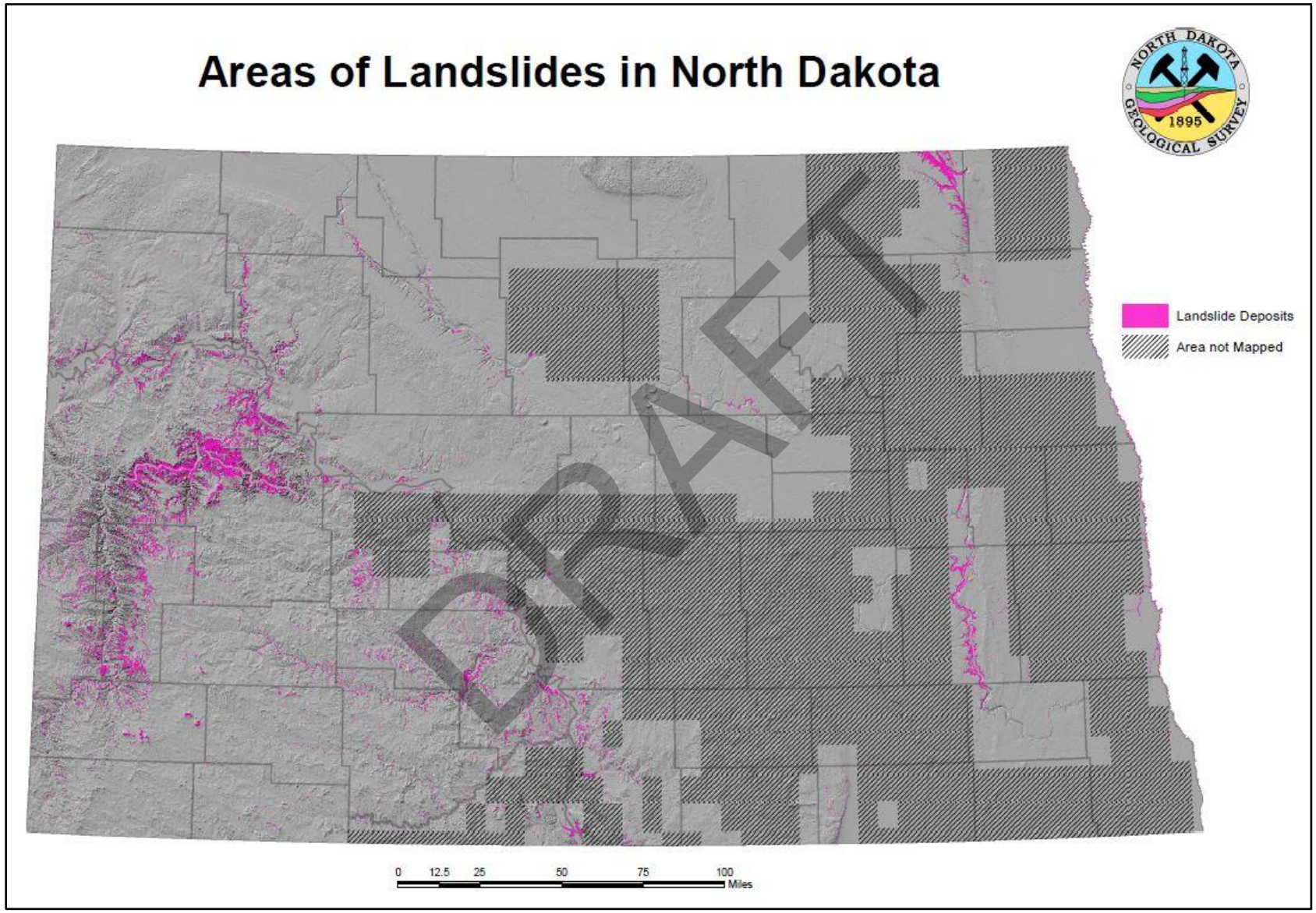
- **Abandoned Mine Lands (AMLs).** According to the PSC, no known publicly owned buildings or infrastructure are believed to be affected.
- **Environmental Minerals (erionite, uranium, arsenic).** This type of geologic hazard is localized to its area of geologic origination. They are not expansive or extensive and not found in Foster County at high concentrations based on available information. Therefore, publicly-owned buildings and property in Foster 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.

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 – 2021 Landslides in North Dakota



Source(s): N.D. Geological Survey

Table 4.8.3 – Foster County Geologic Hazard Risk Assessment

Impact	• Blocked Roads & Delayed Emergency Response • Business & Government Interruptions • Infrastructure Degradation • Loss of Power/Electricity Outage • Soil Degradation/Erosion	• **Short-term or prolonged loss of service of transportation, communication, or energy infrastructure.** • **Structures could become uninhabitable or unusable.**
Frequency	• 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. Foster County was included in this disaster declaration.	• January 1, 2014, and May 21, 2021, there were approximately 41 positive tests for radon in residential homes in Foster County.
Likelihood	<u>More likely</u> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils • Presence of James River Valley Hydrologic Corridor	<u>Less likely</u> • Abandoned mine reclamation projects by the N.D. Public Service Commission • No AMLs in Foster County
Vulnerability	<u>More vulnerable</u> • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils • Presence of James River Valley Hydrologic Corridor • **Foster County not entirely mapped for landslide susceptibility by the N.D. Geological Survey**	<u>Less vulnerable</u> • 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 Foster County
Capability	• 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 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.
- **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 Foster County.
- **Environmental Minerals (erionite, uranium, arsenic).** No vulnerability to new and future development in Foster 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)
- Foster County Commercial Animal Feed Operation Ordinance
- Foster County Comprehensive Plan
- Foster County Local Emergency Operations Plan
- Foster 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
Duration	Minutes/hours/days/weeks
Speed of Onset	No warning
Location	Along major transportation routes: Tier II and agricultural and/or industrial storage sites, pipelines, railroads and roads: U.S. Highway 52/281, and N.D. Highways 9, 20, 200, and local/township roads

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

Carrington Fire Department

The following hazardous material releases have occurred since 2017.

- **08/31/2017.** Fuel spill at Caseys General Store diked all run-off sewers and on standby until local contractor could provide sand to make the spill inert.
- **10/16/2017**. Called to investigate anhydrous smell at the Arrowood Fertilizer Plant, Fertilizer Plant had a maintenance blow down earlier in the day.
- **05/06/2018.** Called to Arrowood Coop Fertilizer plant. Once on scene found a valve leaking and assisted Plant Maintenance in close the valve.
- **07/07/2018.** Called to Anhydrous Leak at 74 Ave S.E and 1st S S.E. Anhydrous tank farm had four tanks with valves left open. We closed valves and cordoned area off until Anhydrous dissipated.
- **10/17/2018**. Called to 311 9 Ave N, contractor hit a buried Natural Gas line, MDU was on site right before Fire and plugged leak.
- **12/11/2018.** Called to Casey's General Store to investigate natural gas smell. Area that the employee state the smell coming from had only electric appliances. We check the meter assembly and furnace and could not detect any trace of gas. MDU was notified and the PD remained on site until they arrived.
- **01/26/2019.** Called to the neighborhood of 5th Street and 5th Ave South for a natural gas smell. Found the meter assembly leaking at 525 5th Ave South. Advised the residents that the gas would be shut off unit MDU could make repairs. MDU was notified and responded.
- **03/02/2019.** Called to Train Derailment around 90 70th Ave N.E. CPR train had a 27-car complete derailment/damaged with 3 leaking cars (2 anhydrous, 1 propane) (8) more cars were derailed but not damaged. Incident lasted from 3-2-2019 to 4-1-2019 (See Attached report).
- **03/06/2019.** Called to natural Gas Leak at 115 15th Ave N gas regulator was found leaking, feed valve was shut off and MDU notified. Stayed on scene until MDU arrived.
- **06/13/2019.** Called to a natural Gas Line strike at 1239 2nd St N. pinched off gas line and held scene until MDU was on scene.
- **07/02/2019.** Called to a natural gas release at 1146 3rd St N. Gas line could not be shut off. Evacuated house and held scene until MDU arrived.
- **10/16/2019.** Called to Westside Trailer Court 19th Ave S. PD reported a strange smell. We scanned the area with our 4 gas meter and could not locate any leaks. On meeting with MDU and the Police Chief we caught a whiff of the odor and found a gear oil spill. Owner of the property stated he would clean it up.

- **12/19/2019.** Called the Cobblestone Inn for a Gas Leak. Investigation found the water heater was malfunctioning Cobblestone Maintenance and MDU were notified and gas was turned off. All gas meter levels were unremarkable so scene was turned back to the site manager.

- **02/27/2020.** Called to Casey's General Store for fuel spill. Diked off all runoff sewers and provide coverage and traffic control until a local contractor could provide sand to make the spill inert.

- **04/12/2020.** Called to 247 6th St N for gas smell. Building was not service by gas and no odor or gas leak could be located. Building is about 6 blocks from the city lagoon. Allowed residence back in the building and returned to base.

- **04/25/2020.** Called to Train derailment on the CP Rail Tracks from 11th Ave to 5th Ave. CR Rail track crew informed that there was 30 cars derailed but none were pressurized or carrying hazardous material. CP Rail Carrington Fire and Carrington Public Works set up a safe zone from 5th Ave to 11th Ave 5th St N to 8th St N. Only responding equipment and crew we allowed inside the zone. We helped with traffic control and resource management. (See Attached report).

- **11/13/2020.** Called to 20 11th Ave alley behind Armory. Natural Gas Line strike. Provided coverage for repair crew.

- **12/08/2020.** Called to 74th Ave Bordulac for a Propane Tank leak. 1000-gallon propane tank had to be dropped and broke control assembly. It was damaged in a way that it could not be closed so we cordoned off the area and provided coverage until the tank was empty.

- **03/08/2021.** Called to 828 3rd St S for natural gas leak. Detected gas smell around the home shut off gas to home and notified MDU.

N.D. Dept. of Health

- Per table 4.9.1, a total of 13 releases/spills were reported in Foster County between 1975 and 2020 discharging a total of 823 gallons/35,535 pounds of hazardous materials.

Foster County Emergency Management

- **March 3, 2019.** A Canadian Pacific train derailed east of the city of Carrington around 8 a.m. Approximately 35 cars derailed with some containing anhydrous ammonia and propane. A small amount of anhydrous was released. Local firefighters, law enforcement, and emergency medical technicians responded and were on the scene throughout cleanup. CP Railway said the line was reopened to rail traffic on Monday at 8 a.m. One family was evacuated and was cleared to return to their home on Monday.

National Pipeline Mapping System

- The National Pipeline Mapping System website provides mapping services to illustrate where pipeline infrastructure geographically traverses political subdivisions. As shown in Figure 4.9.1, there have been no incidents involving pipelines in Foster County.

Table 4.9.1 – 1975 and 2020 Foster County Hazardous Material Release History Summary

Incident ID	Date Reported	Date of Incident	County	TwnRngSec	Latitude	Longitude	Contaminant	Volume	Units	Contained
EIR110	12/21/1989	12/21/1989	Foster	14606619	47.45021	-99.12788	Diesel Fuel	40	gallons	
EIR91	2/2/1990	2/18/1990	Foster	14606619	47.45021	-99.12788	Diesel Fuel	30	gallons	
EIR216	10/11/1994	10/10/1994	Foster	14606618	47.46469	-99.12784	Diesel Fuel	100	gallons	
EIR219	11/16/1994	11/15/1994	Foster	14606617	47.46456	-99.10657	Transformer Oil	10	gallons	
EIR247	8/31/1995	8/30/1995	Foster	14506433	47.33394	-98.82953	Ethylene glycol	500	gallons	
EIR518	5/2/2002	5/2/2002	Foster	14706712	47.56612	-99.14894	Diesel Fuel	40	gallons	
EIR545	7/1/2002	7/1/2002	Foster	14506509	47.39191	-98.95792	Hydraulic Oil	10	gallons	
EIR761	5/2/2005	4/30/2005	Foster	14606619	47.45021	-99.12788	Triflurex HFP (Trifluralin)	8	gallons	
EIR1514	9/2/2011	9/1/2011	Foster	14606815	47.46508	-99.31931	Diesel	25	gallons	
EIR1704	6/12/2012	6/5/2012	Foster	14706607	47.56612	-99.12771	Pre-emergent weed killer	20	gallons	
EIR1900	4/4/2013	4/3/2013	Foster	14606619	47.45021	-99.12788	Hydraulic Oil	30	gallons	
EIR3663	2/19/2015	2/17/2015	Foster	14506621	47.36317	-99.0767	Urea Ammonium Nitrate Solution, 28-0-0,	35,535	pounds	Yes
EIR5502	8/31/2017	8/31/2017	Foster	14606618	47.45853	-99.11831	Diesel Fuel - 1993	10	gallons	Yes
TOTAL - Gallons								**823.00**		

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

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 years based on 13 occurrences between 1975 and 2020. Meeting participants also indicated the probability of a hazardous material release highly likely, meaning that there is a 100 percent probability in the next year of an occurrence.

The following are key points regarding hazardous material release probability in Foster County:

- **Airports.** Hazardous materials are not transported via plane to and from Foster County using the Carrington Municipal Airport and private landing strips. There are no reported incidents of a plane crash carrying hazardous materials in Foster County.

- **Fixed Facilities (Tier II and Extremely Hazardous Substance).**

  Tier II. Tier 11 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. **Per the 2018 N.D. Enhanced Mitigation MAOP, Foster County has 24 Tier II Sites.**

  A lot of anhydrous operations have closed in Foster County in the last five years due to new federal requirements and the business no longer being cost-effective.

- **Pipelines.** According to the 2018 N.D. Enhanced Mitigation MAOP, there are 49.49 miles of gas transmission pipelines and 53.03 miles of hazardous liquid pipelines traversing Foster County comprising 1.42 percent of the total in the state. The pipelines are Alliance, Kinder-Morgan and MDU.

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

- **Rail.** Burlington Northern Santa Fe (BNSF) Railway, Canadian Pacific (CP) Railway, and Red River Valley & Western (RRV&W) operate railroad infrastructure through Foster County.

- **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 Foster County Emergency Management and meeting participants, releases/spills do occur from road transportation incidents. Interstate 94, U.S. Highway 52/281 and N.D. Highways 9, 20, and 200 are highways where large quantities of hazardous materials are transported.

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 35,535 pounds of urea ammonium nitrate solution of diesel fuel on February 17, 2015, followed by 500 gallons of ethylene gylcol August 30, 1995. 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.

- **Per the 2018 N.D. Enhanced Mitigation MAOP, the number of trains carrying 1,000,000 gallons of crude oil (BNSF Railway) reached 172 per year in 2015 and declined to 18 annually by 2018 in Foster County. Similarly, the state plan also indicated that the number of CP Railway trains carrying 1,000,000 gallons of crude oil reached 16 in 2014 and declined to eight by 2018 in Foster County. The state plan also ranked hazardous material release as high for Foster County.**

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.

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.

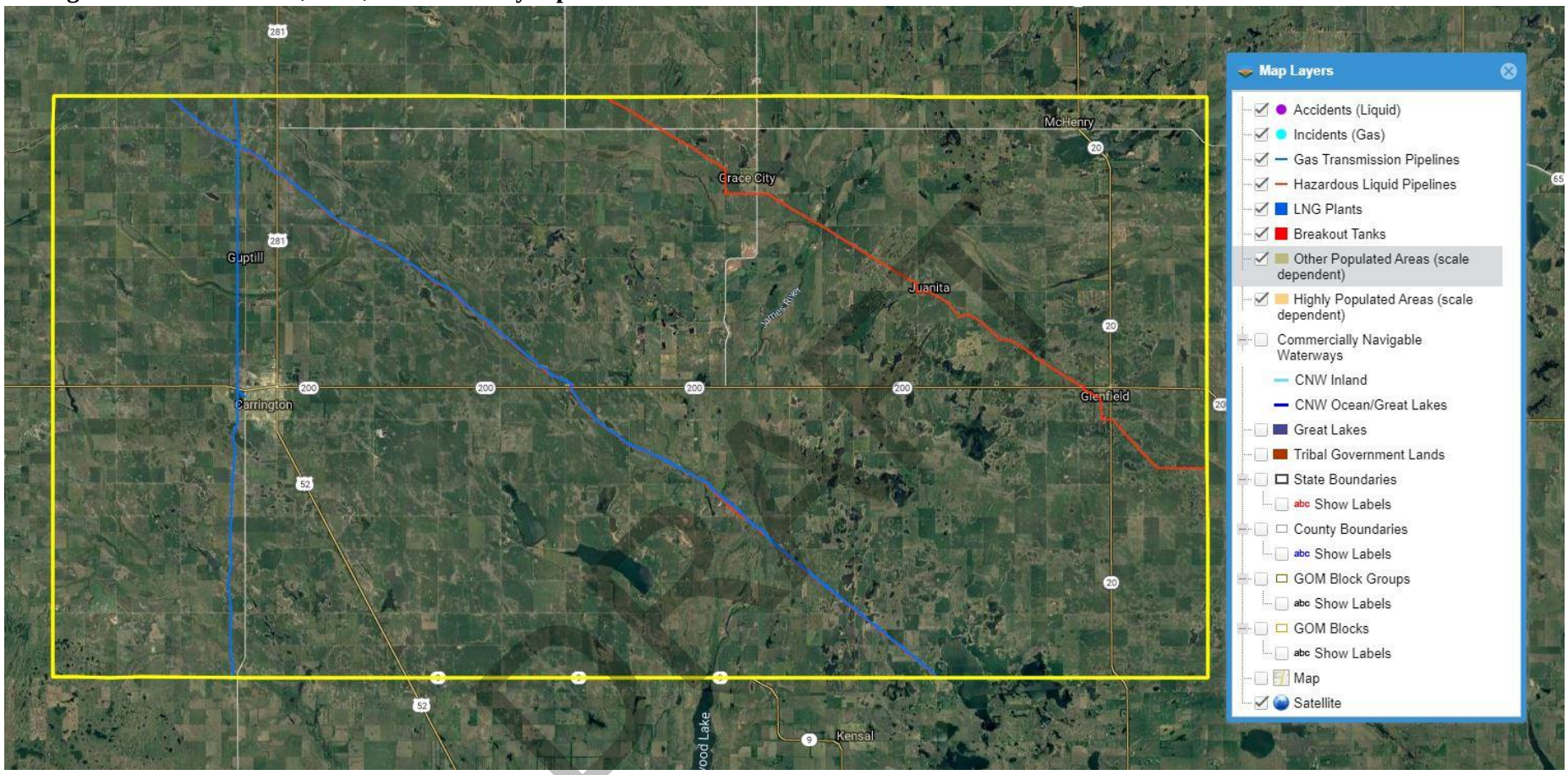
Table 4.9.2 – Foster County Hazardous Material Release Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	2	4	4	2	**12**
City of Carrington	4	2	4	4	2	**12**
City of Glenfield	4	2	2	4	1	**13**
City of Grace City	4	2	2	3	1	**11**
City of McHenry	4	1	2	2	1	**8**

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

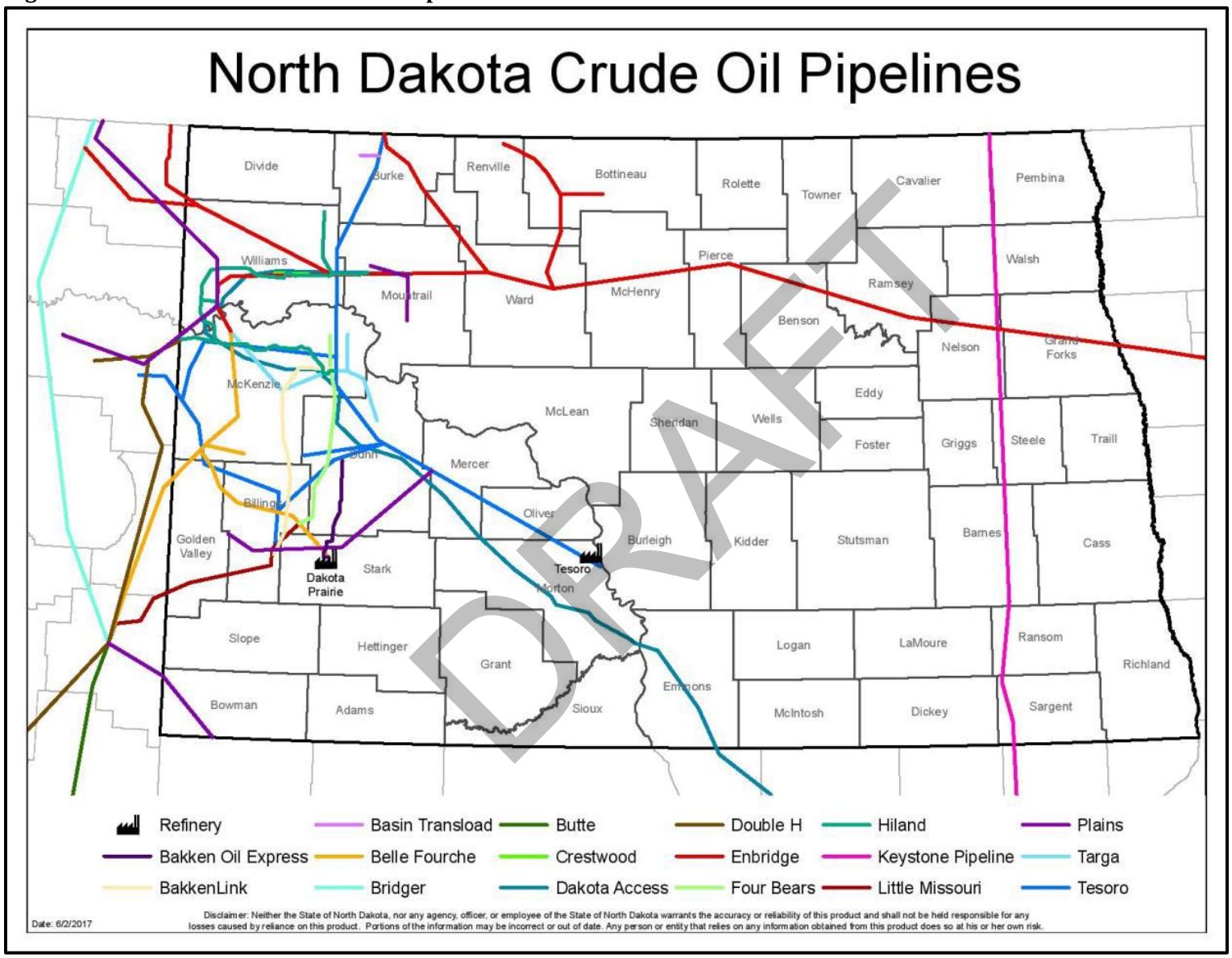
Table 4.9.3 provides information on the specific impact, frequency, likelihood, vulnerability and capability of hazardous material release in Foster County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown in Chapter 4, Threat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

Figure 4.9.1 – October 1, 2021, Foster County Pipelines



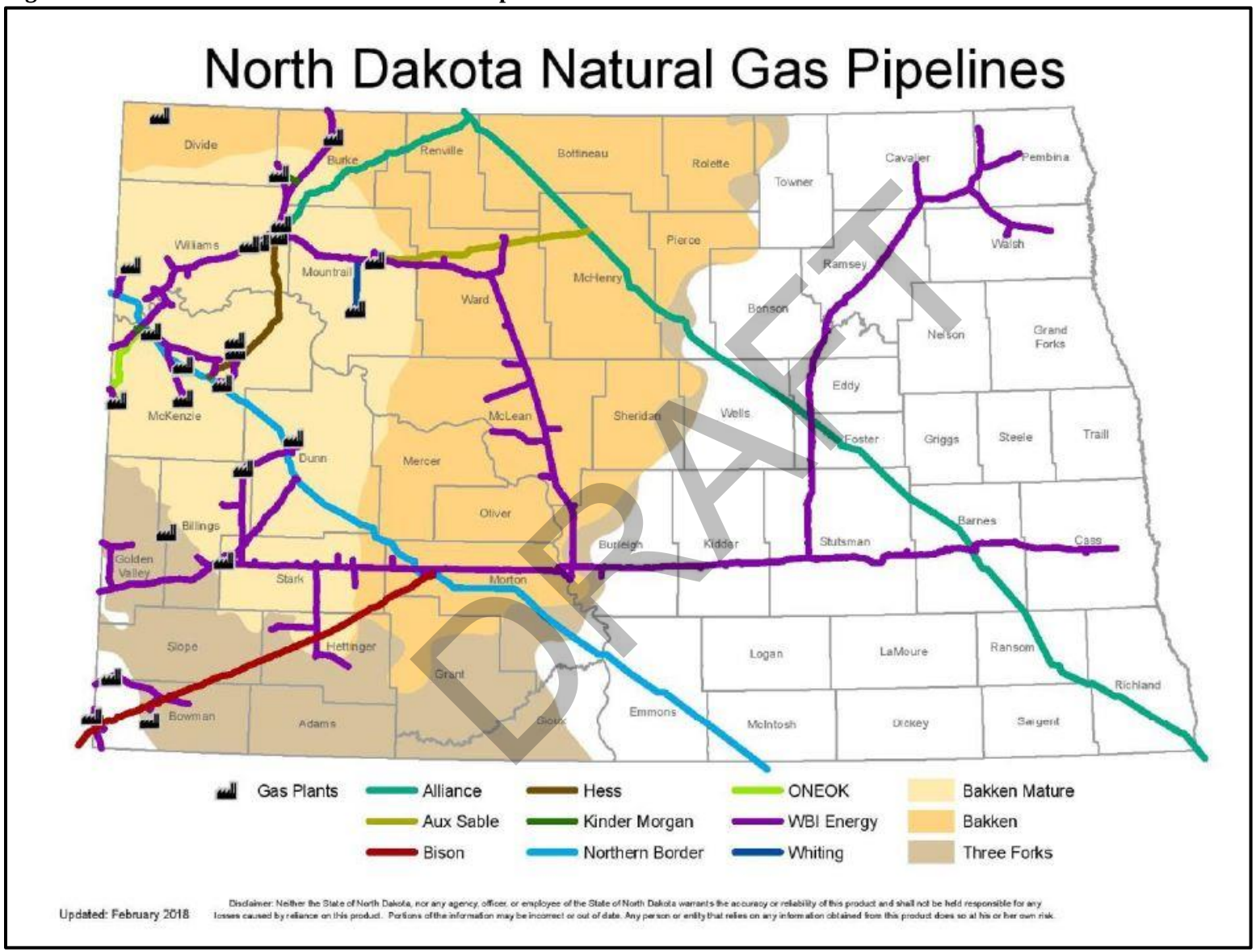
Source(s): National Pipeline Mapping System

Figure 4.9.2 -- North Dakota Crude Oil Pipelines



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

Figure 4.9.3 – 2018 North Dakota Natural Gas Pipelines



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

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 Carrington, the Foster County Courthouse, Carrington City Hall, emergency services buildings and public schools are vulnerable to a hazardous material release due to nearby highways, and railroad infrastructure.

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 hospitals 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.

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.**

Table 4.9.3 – Foster County Hazardous Material Release Risk Assessment

Impact	• Business Interruptions/Loss of Economy • Explosion • Environmental Degradation • Fuel Outage/Shortage • Human/Injury Death • Increased Public Safety Runs	• Loss of Critical Facilities and Infrastructure • Loss/Overcrowded Medical Facilities **Loss of Transportation Systems/Accessibility - Blocking of roads when emergency services response to incidents** • **Leaking fuel tanks contaminate local waterways and potable water supplies (individual wells)** • **School Closure**
Frequency	• 13 releases/spills were reported in Foster County between 1975 and 2020 resulting in one incident every three and-a-half years. • **March 3, 2019, train derailment released anhydrous ammonia**	• 35,535 pounds of urea ammonium nitrate solution of diesel fuel on February 17, 2015. • 500 gallons of ethylene gylcol August 30, 1995.
Likelihood	<u>More likely</u> • Natural gas lines traversing the county – See Figure 4.9.3 • Presence of U.S. Highways 52/281, and highways • Presence of railroad infrastructure and airports • Agriculture economy with heavy use of chemicals • **Foster County has 24 Tier II Sites.** • **Shuttering of DAPL would result in increase of oil traffic on railroad infrastructure. Tier II reporting does not apply.**	<u>Less likely</u> • Tier II reporting and regulations (fixed facilities only) • **Decrease in the frequency of oil trains**
Vulnerability	<u>More vulnerable</u> • Natural gas lines traversing the county – See Figure 4.9.3 • Presence of U.S. Highways 52/281, and highways • Presence of railroad infrastructure and airports • Agriculture economy with heavy use of chemicals • **Foster County has 24 Tier II Sites.** • **Shuttering of DAPL would result in increase of oil traffic on railroad infrastructure. Tier II reporting does not apply.** • One ag-based chemical business at the airport in Carrington	<u>Less vulnerable</u> • Pipelines have SCADA systems • Railroads have emergency response personnel/equipment • **Decrease in frequency of oil trains** • Tier II reporting and regulations • Ordinances regulating development/placement of HAZMAT • **Fire departments have frequent HAZMAT training** • **Used to be two ag-based chemical businesses at the airport in Carrington – now only one.** • **NDDES has HAZConnect**
Capability	• See Chapter 7 for a list of capabilities to address hazardous material release.	

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 accident, 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.

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)
- Foster County Comprehensive Plan
- Foster County Commercial Animal Feed Operation Ordinance
- Foster County Evacuation and Shelter Plan
- Foster County Local Emergency Operations Plan
- Foster County Shelter and Mass Care Plan
- Foster 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	Animal. Depends on the organism and current season. Human. Depends on the organism and current season. Plant. More susceptible in the summer as they are dormant in the winter, and year-round for plants grown indoors such as greenhouses.
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); Foster County Public Health; and NDSU Extension/Foster County. The history of infectious disease for animals, humans and plants is summarized for Foster County in the following section. A detailed hazard history for Foster 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 Foster 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, Foster County has experienced six cases of rabies in animals between 2006 and 2020. Table 4.10.1 illustrates the history of rabies in Foster County.

- Rabies was most prevalent in 2012 with four cases – one in a horse and three in skunks. One case was also reported in a skunk in 2008 and 2011.

Table 4.10.1 – 2006 to 2020 Foster County Rabies History

Animal	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Bat																0
Cat																0
Cow																0
Dog																0
Goat																0
Horse							1									1
Pig																0
Raccoon																0
Skunk			1			1	3									5
Sheep																0
TOTAL	**0**	**0**	**1**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**

Source: 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 Foster 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 2020. Table 4.10.3 shows the history of infectious diseases in Foster County between 2016 and 2020.

- Between 2010 and 2020, Foster County recorded an average of 23 cases of influenza on annually. The 2019/2020 flu season had the highest number of reported cases at 83 followed by the 2018/2019 flu season where 54 cases were reported. The prevalence of influenza was so high that the public school considered canceled the annual Christmas program in 2019.

Table 4.10.2 – 2010 to 2020 Foster County Influenza History

Infectious Disease	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Influenza	5	5	12	5	12	1	33	24	54	83

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

Source: N.D. Dept. of Health

- Aside from influenza, Foster County recorded 41 infectious disease cases between 2016 and 2020, or roughly eight cases per year.

- Between 2016 and 2020, Foster County recorded 17 cases of Chlamydia, eight cases of Hepatitis C-Chronic, six cases of Camplyobacteriosis representing 41.5 percent, 19.5 percent, 14.6 percent of reported infectious diseases, respectively.

- In 2014, a case of hantavirus was reported in Foster County and resulted in a fatality.

Table 4.10.3 – 2016 to 2020 Foster County Infectious Disease History in Humans

Infectious Disease	2016	2017	2017	2019	2020	Total By Disease
Campylobacteriosis	0	2	2	1	1	6
Chlamydia	3	4	4	4	2	17
E.coli, shiga-toxin producing	1	0	0	0	0	1
Gonorrhea	0	0	0	2	1	3
Hepatitis C, Chronic	1	2	2	2	1	8
Streptococcus pneumoniae, invasive	0	1	1	0	1	3
TB-Active	0	0	0	0	1	1
Salmonellosis	0	0	0	1	0	1
West Nile Infection	1	0	0	0	0	1
TOTAL	**6**	**9**	**9**	**10**	**7**	**41**

Source: Foster County Public 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. There was one active case in Foster County in January of 2020.

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, Foster County experienced 53 incidents of crop loss due to infectious disease impacting approximately 69,727.38 acres of crops totaling $3,694,020.30 in losses.**

The NDSU Extension/Foster 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 Foster 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 Foster 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. Foster County has 28,000 head as of 2018.
- A total of six cases of rabies were reported in Foster County between 2006 and 2020.
- 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 Foster County is designated as a Health Professionals Shortage Area (HPSA).

- According to Foster County Public Health, if a pandemic from a new strain of Influenza or Avian Flu occurred in Foster County, the impact could be catastrophic, like the COVID-19 Pandemic. The COVID-19 pandemic resulted in 19 fatalities in Foster 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 Foster County. Approximately 19.9 percent of Foster 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 Foster 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 Foster 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 Foster County.

- There were 53 incidents of crop loss due to infectious disease between January 1, 2001, and December 31, 2020, resulting approximately two and-a-half occurrences of crop loss annually.
- On average, crop losses from infectious disease impacts 3,486.37 acres per year resulting in an average of $184,701.02 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.

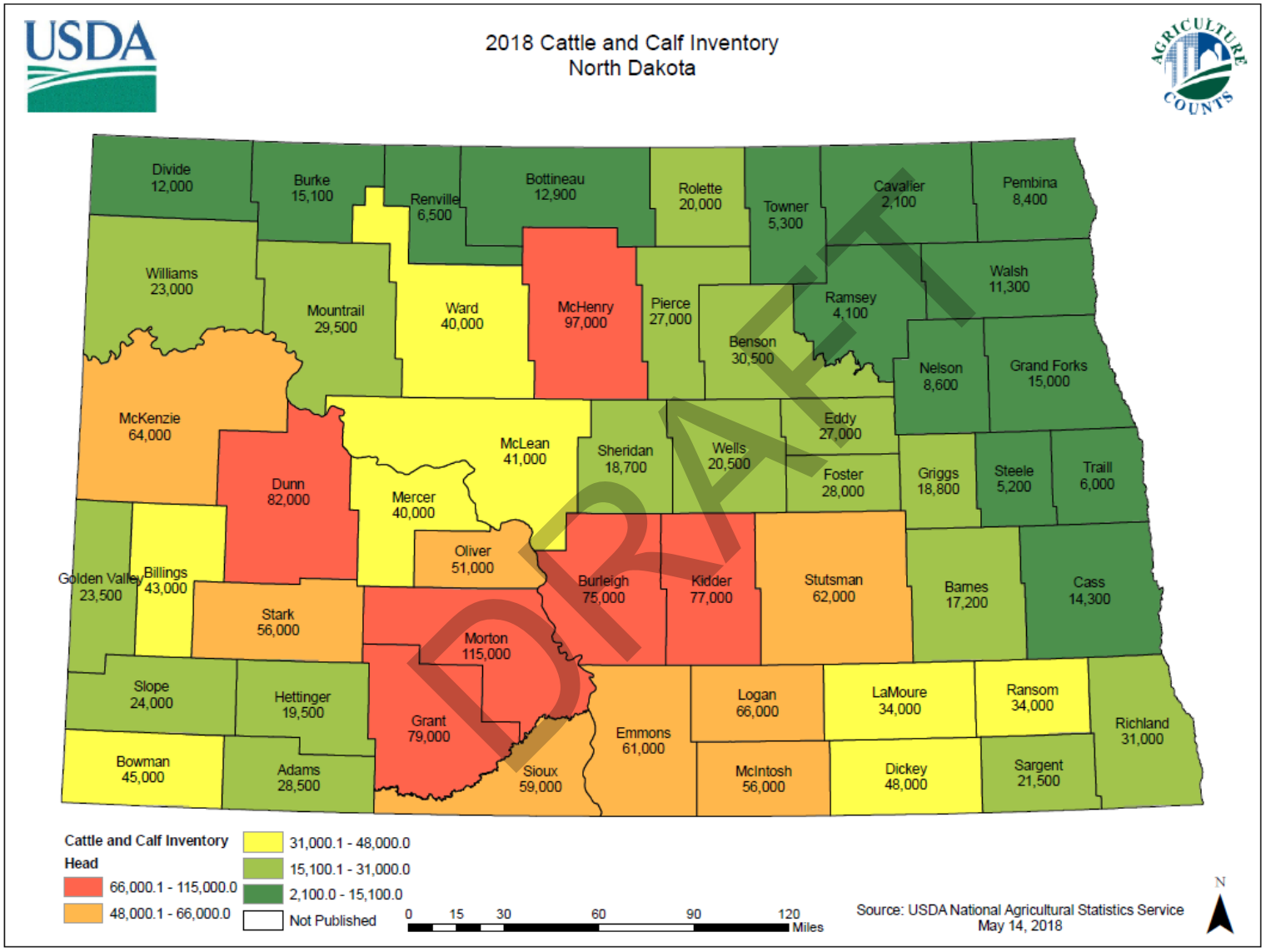
Table 4.10.4 – Foster County Infectious Disease Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County – Human	4	4	4	3	4	**11**
Foster County – Animal & Plant	4	4	4	4	4	**12**
City of Carrington	4	4	4	4	3	**13**
City of Glenfield	4	4	4	4	2	**14**
City of Grace City	4	4	4	3	1	**14**
City of McHenry	4	4	4	3	1	**14**

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

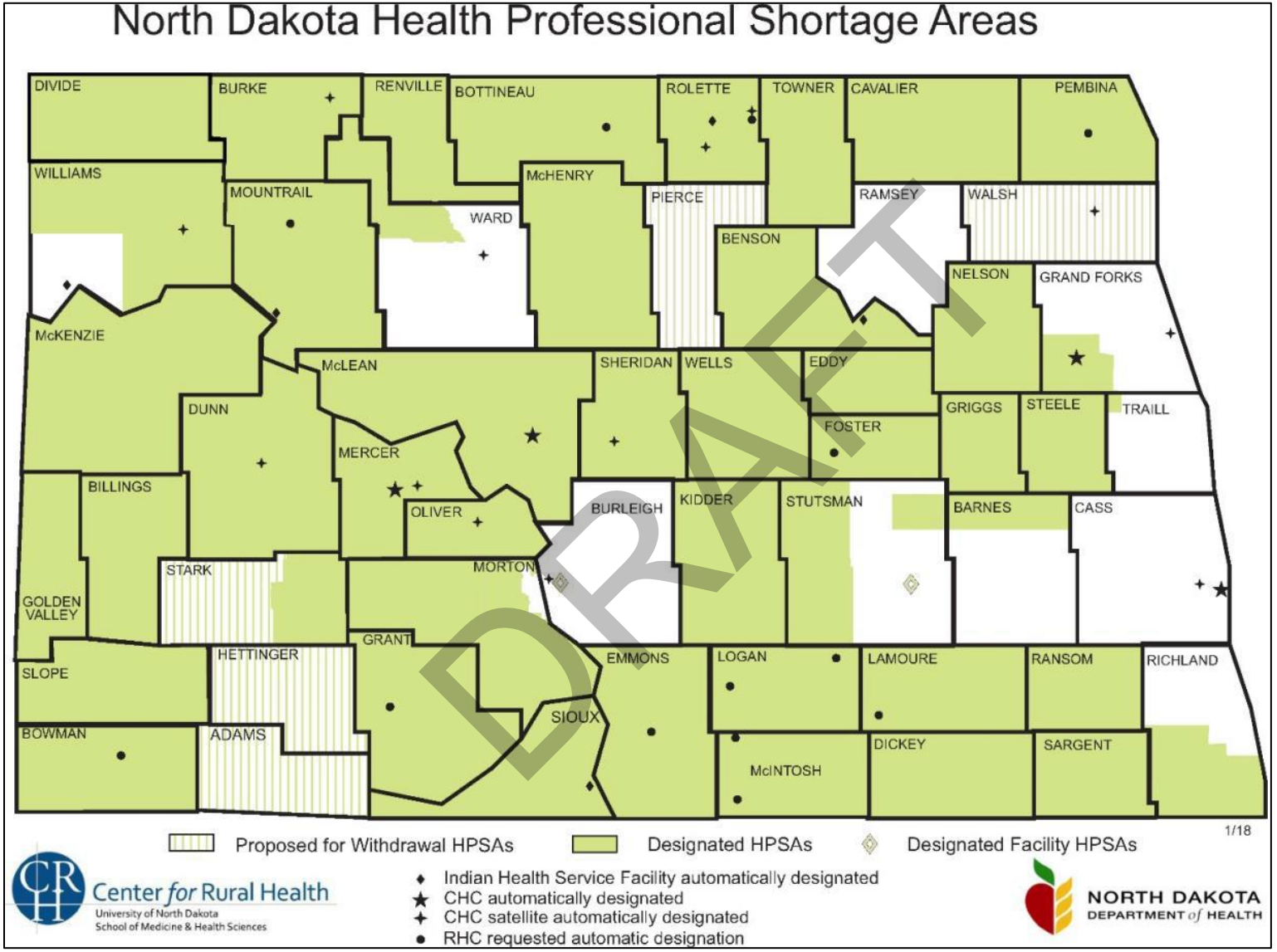
Tables 4.10.5, 4.10.6, and 4.10.7 provide information on the specific impact, frequency, likelihood, vulnerability, and capability of infectious disease in Foster County in animals, humans and plants, respectively. A list of impacts identified as commonplace for natural hazards and man-made threats regardless 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 – Foster County Infectious Disease Risk Assessment - Animal

Impact	• Disease Outbreak/Mass Infections – (animals only) • Government Interruptions • Labor Shortages • Livestock Loss • Loss of Economy • Loss/Overcrowded Veterinarian Facilities • Loss of Drinking/Potable Water	• **Strain on local veterinarian resources** • **Financial cost to local producers and the public** • Lack of awareness of general 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
Frequency	• Animal losses due to infectious disease occur annually • A total of six cases of rabies were reported in Foster County between 2006 and 2017.	
Likelihood	<u>More likely</u> • 28,000 head of cattle & calf in 2018 in the county • Agriculture economy • Dependent on weather for animals and crops • Transporting of animals across state lines • **U.S. Highways 52/281 and N.D. Highway 200 = heavy livestock traffic** • **Overuse of antibiotics leading to disease tolerance**	<u>Less likely</u> • 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**
Vulnerability	<u>More vulnerable</u> • 28,000 head of cattle & calf in 2018 in the county • Agriculture economy • Dependent on weather for animals and crops • Transporting of animals across state lines • **U.S. Highways 52/281 and N.D. Highway 200 = heavy livestock traffic** • **Overuse of antibiotics leading to disease tolerance** • **Shortage of veterinary service** • **Cross contamination between producers**	<u>Less vulnerable</u> • 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**
Capability	• See Chapter 7 for a list of capabilities to address infectious disease.	

Table 4.10.6 – Foster County Infectious Disease Risk Assessment - Human

Impact	• 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	• **Financial cost to public health resources** • **Infrastructure degradation resulting from labor shortages** • **Mass casualties can overwhelm funeral homes and hospital's morgue has limited space** • **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**
Frequency	• 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 • 41 infectious disease cases between 2016 and 2020 in Foster County, or roughly eight cases per year • In 2014, a case of hantavirus was reported in Foster County and resulted in a fatality.	• **According to public health, the average age of COVID-19 cases are 48 years of age** • Between 2016 and 2020, Foster County recorded 17 cases of Chlamydia, eight cases of Hepatitis C-Chronic, six cases of Camplyobacteriosis representing 41.5 percent, 19.5 percent, 14.6 percent of reported infectious diseases, respectively.
Likelihood	<u>More likely</u> • 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 • **41 percent of people in Foster County are classified as obese in 2021 – lack of physical activity** • **Emergence of the COVID-19 variants**	<u>Less likely</u> • Advanced communications such as internet and tv promoting wellness and preventative measures – conducted through public health and Foster County • Public health and employment regulations for public and private facilities, producers, etc. • Immunizations & medications • Lower population • Mask-wearing

	• **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**

Table 4.10.6 – Foster County Infectious Disease Risk Assessment – Human – CONTINUED

Vulnerability	More vulnerable • Growing elderly population • Increase in mobility and air travel • Shortage of health professionals in Foster County • Shortage of advanced medical equipment – i.e. ventilators, bipap, bypass, dialysis, air and surface-sterilization • Lack of isolation and negative-pressure rooms at the hospital • 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 Foster 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** • **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 Foster County**	Less vulnerable • 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 Foster County is sparse and the rural setting allows for immediate social distancing • Colder climate limits social interactions • **Foster County Public Health** • **Carrington Ambulance** • **CHI St. Alexius Health Carrington Medical Center – has a permanent backup generator but needs upgrading** • **Adequate storage space and refrigeration units for stockpile of medical supplies at public health** • **Foster 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 Foster 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** • **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** • **Foster County PIO and back up PIO**

	• **Lack of indoor drive-through mass vaccinating/testing facility** • **Hospital needs an upgraded generator for backup power** • **Lack of backup generator for Foster County Ambulance** • **Lack of consistent information from state leaders** • **Lack of sensaphones in backup refrigeration units** • **Lack of refrigeration storage comprehensively across the county between public health, pharmacies and the hospital** • **Infectious disease statistics is not always indicative of community spread as not all cases of disease are reported**	• **Foster County has a low Social Vulnerability Index per the CDC as of 2021** • **Public health has an MOU with the hospital to transport vaccines if refrigeration units fail at public health** • **Foster County Public Health staff is 100 percent vaccinated for COVID-19** • **CHI-St. Alexius Health Carrington Medical Center staff is 92 percent vaccinated for COVID-19**
Capability	• See Chapter 7 for a list of capabilities to address infectious disease.	

Table 4.10.7 – Foster County Infectious Disease Risk Assessment - Plant

Impact	• Crop Loss • Disease Outbreak/Mass Infections (plants only) • Livestock Loss • Loss of Economy • Soil Erosion	• **Strain on local, state, and federal governments resources, and private enterprise** • **Between January 1, 2001, and December 31, 2020, Foster County experienced 53 incidents of crop loss due to infectious disease impacting approximately 69,727.38 acres of crops totaling $3,694,020.30 in losses.**
Frequency	• Crop loss due to infectious disease occurs annually	• **Between January 1, 2001, and December 31, 2020, Foster County averaged 3,486.37 acres of crops impacted by infectious disease totaling $184,701.02 in losses.**
Likelihood	More likely • Agriculture economy • Dependent on weather for animals and crops	Less likely • 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	More vulnerable • Agriculture economy • Dependent on weather for animals and crops	Less vulnerable • Advanced communications such as internet and tv • Public health and employment regulations for public facilities • Pesticide Training facilitated by NDSU Extension
Capability	• 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.

The ventilation system at CHI-St. Alexius Health Carrington Medical Center can contribute to contamination of the entire building if an infectious patient presents themselves for care at a location in the facility other than the emergency garage door.

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 city of Carrington 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 Foster 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 foster 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, Foster County, North Dakota
- CHI-St. Alexius Health Carrington Medical Center Disaster Response Plan
- CHI-St. Alexius Health Carrington Medical Center Hazardous Waste Plan
- CHI-St. Alexius Health Carrington Medical Center Incident Command Response Plan
- CHI-St. Alexius Health Carrington Medical Center Loss of Utilities Response Plan
- CHI-St. Alexius Health Carrington Medical Center Mass Vaccination Plan
- Foster County Local Emergency Operations Plan
- Foster County Public Health Continuity of Operations Plan
- Foster County Public Health Mass Vaccination Plan
- Foster County Public Health Pandemic Influenza Response Plan
- Foster County Public Health Point of Dispensing Plan (POD)
- Foster County Public Health Shelter and Mass Evacuation Plan
- Foster 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 Foster 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 Foster County was obtained from the National Climatic Data Center (NCDC); the National Oceanic and Atmospheric Administration (NOAA); the USDA, Risk Management Agency; and Foster County Emergency Management. A detailed hazard history for Foster 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 Foster County between January 1, 1950, to December 31, 2020. The following are key points.

- Foster County experienced 193 occurrences of severe summer weather resulting in approximately three storms of significance annually.
- Approximately $13,846,560.00 in property damage and $1,580,000.00 in crop damage was reported.
- Two injuries and no fatalities were reported.

Table 4.11.1 – 1950 to 2020 Foster County Severe Summer Weather Hazard History Summary

Severe Summer Weather				
Occurrences	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**
193	2	0	$13,846,530.00	$1,580,000.00

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, Foster County experienced 1,265 incidents of crop loss due to severe summer weather impacting approximately 980,068.80 acres of crops totaling $110,721,224.45 in losses.

There have been disaster declarations and emergencies pertaining to a severe summer weather in Foster 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 Foster 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 Foster County is as follows.

- The probability of severe summer weather is 100 percent based on 193 occurrences between January 1, 1950, and December 31, 2020, or three severe summer weather events of significance annually.
- Foster County experiences approximately $195,021.55 in property damage and $22,253.52 in crop damage annually between January 1, 1950, and December 31, 2020.
- Approximately two injuries and no fatalities have been reported between January 1, 1950, and December 31, 2020.

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 $5,536,061.22 annually in Foster 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 4.11.3 illustrate the history of significant hail, tornado, and wind speed occurrences recorded between 1950 and 2018 in Foster County. Profile meeting participants and the Steering Committee indicated the magnitude or impact of severe summer weather as catastrophic meaning as an estimated 50 percent or more of Foster 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. Foster County is split in half longitudinally between Zones II and III.

National Climatic Data Center (NCDC)

- **July 29, 1972.** An F2 Tornado occurred in the county causing $25,000 in property damage.
- **August 18, 1994.** A hailstorm impacted the city of Carrington produced hail 2.75 inches in diameter resulting in $25,000 in property damage and $30,000 in crop damage. **According to meeting participants, the size of the hail was around a softball. Every single-family home in the city had to be reshingled, in addition to replacement of siding, windows, damage to vehicles, etc. Estimated damages is in the millions of dollars.**
- **June 25, 1999.** A Thunderstorm Wind event produced winds of 87 m.p.h. resulting in $10,000,00.00 in property damage near unincorporated Melville. **According to meeting participants, the storm resulted in toppling over of steel bins and farm structures, and damage to farm equipment. A large amount of cottonwood trees were destroyed.**
- **July 21, 2014.** A Thunderstorm Wind event produced winds of 91 m.p.h. impacting unincorporated Bordulac resulting in $2,000,000.00 in property damage and $1,000,000.00 in crop damage. **According to meeting participants, the storm resulted in toppling over of steel bins and the elevator in Bordulac had extensive damage.**

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.

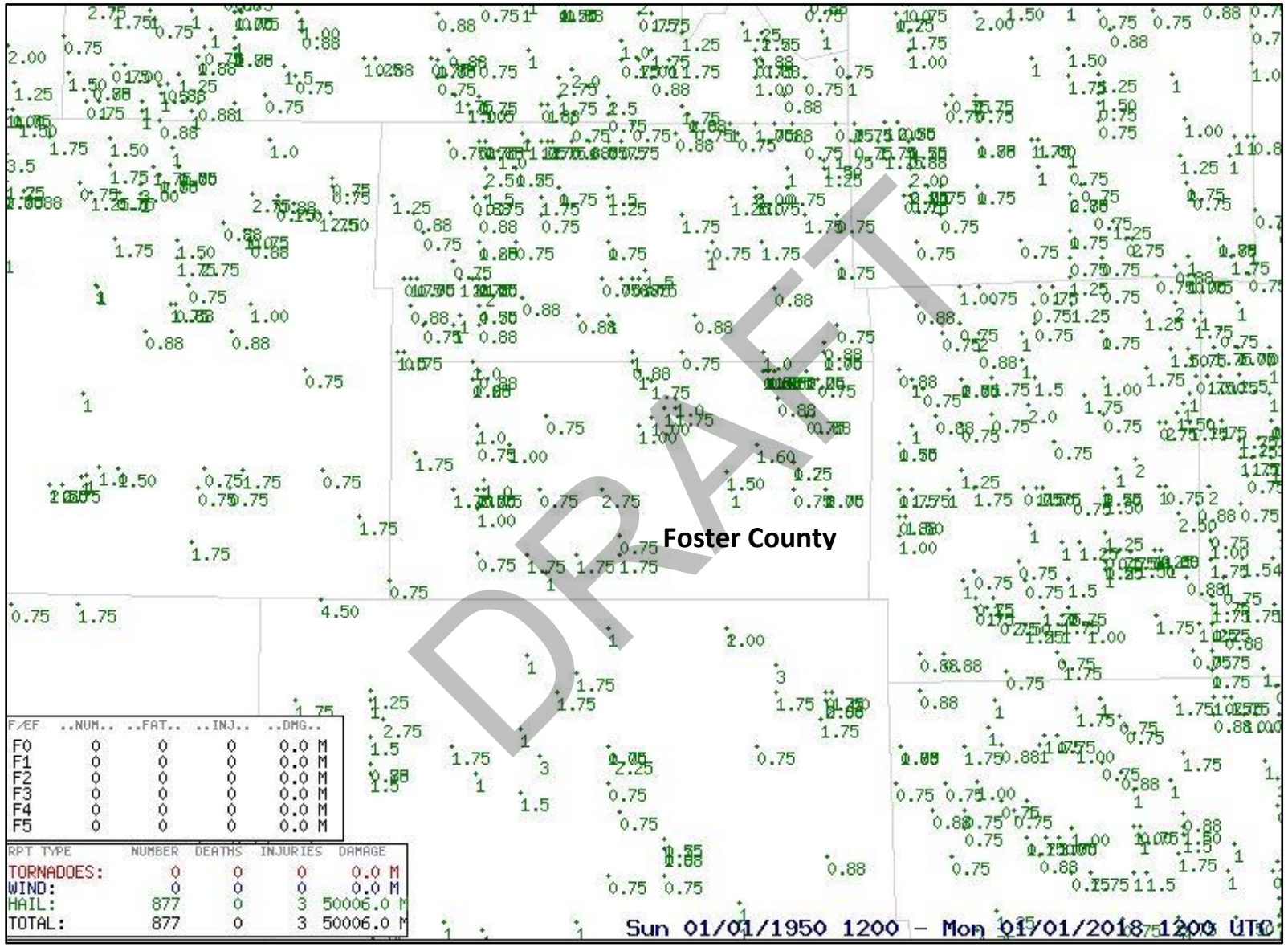
Table 4.11.2 – Foster County Severe Summer Weather Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	4	4	2	3	**11**
City of Carrington	4	4	4	2	3	**11**
City of Glenfield	4	4	4	3	1	**13**
City of Grace City	4	4	4	3	1	**13**
City of McHenry	4	4	4	3	1	**13**

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

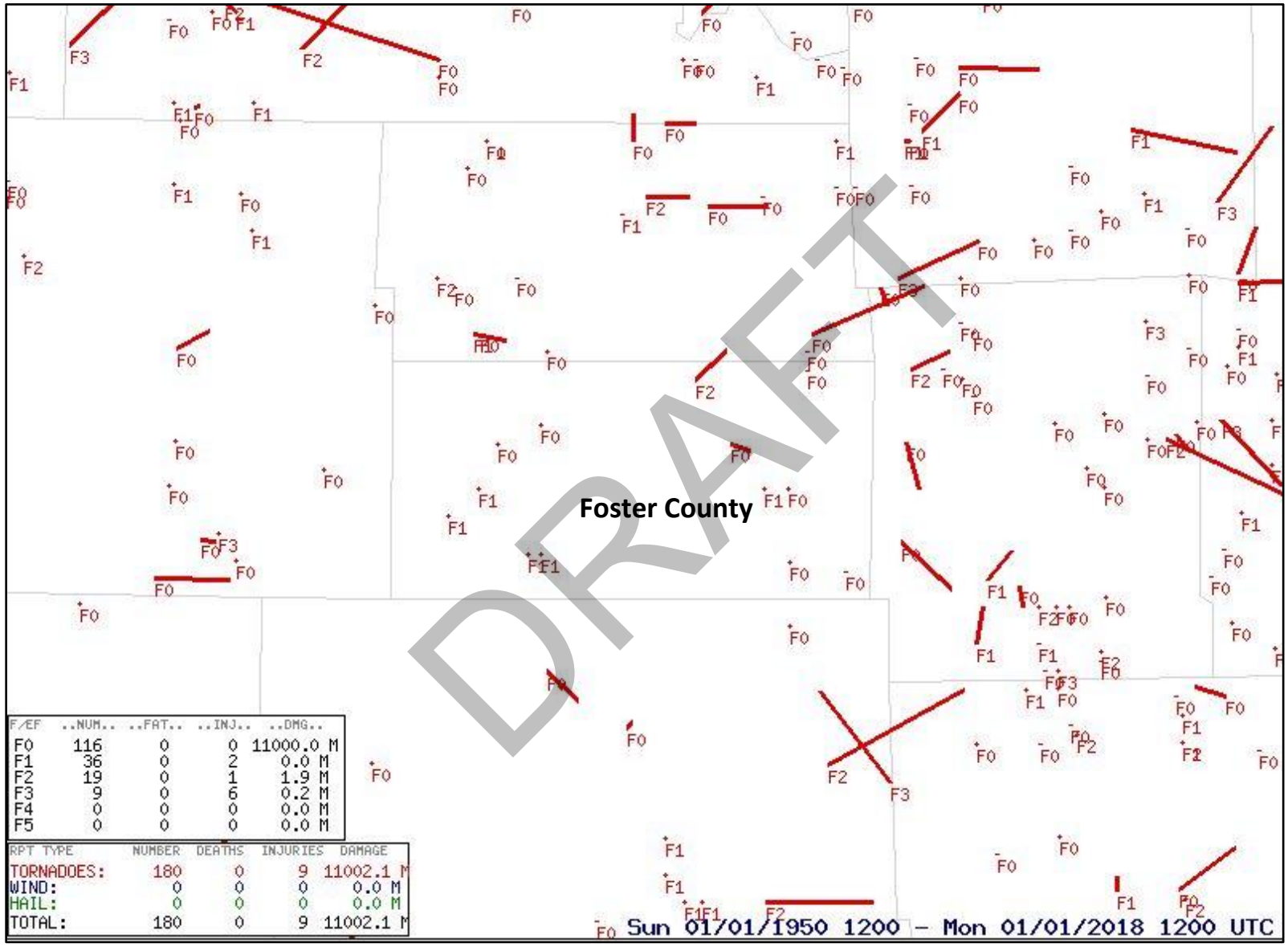
Table 4.11.3 provides information on the specific impact, frequency, likelihood, vulnerability, and capability of severe summer weather in Foster County. A list of impacts identified as commonplace for natural hazards and man-made threats regardless of the jurisdiction is shown at the beginning of Chapter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

Figure 4.11.1 – 1950 to 2018 Foster County Recorded Hail Occurrences



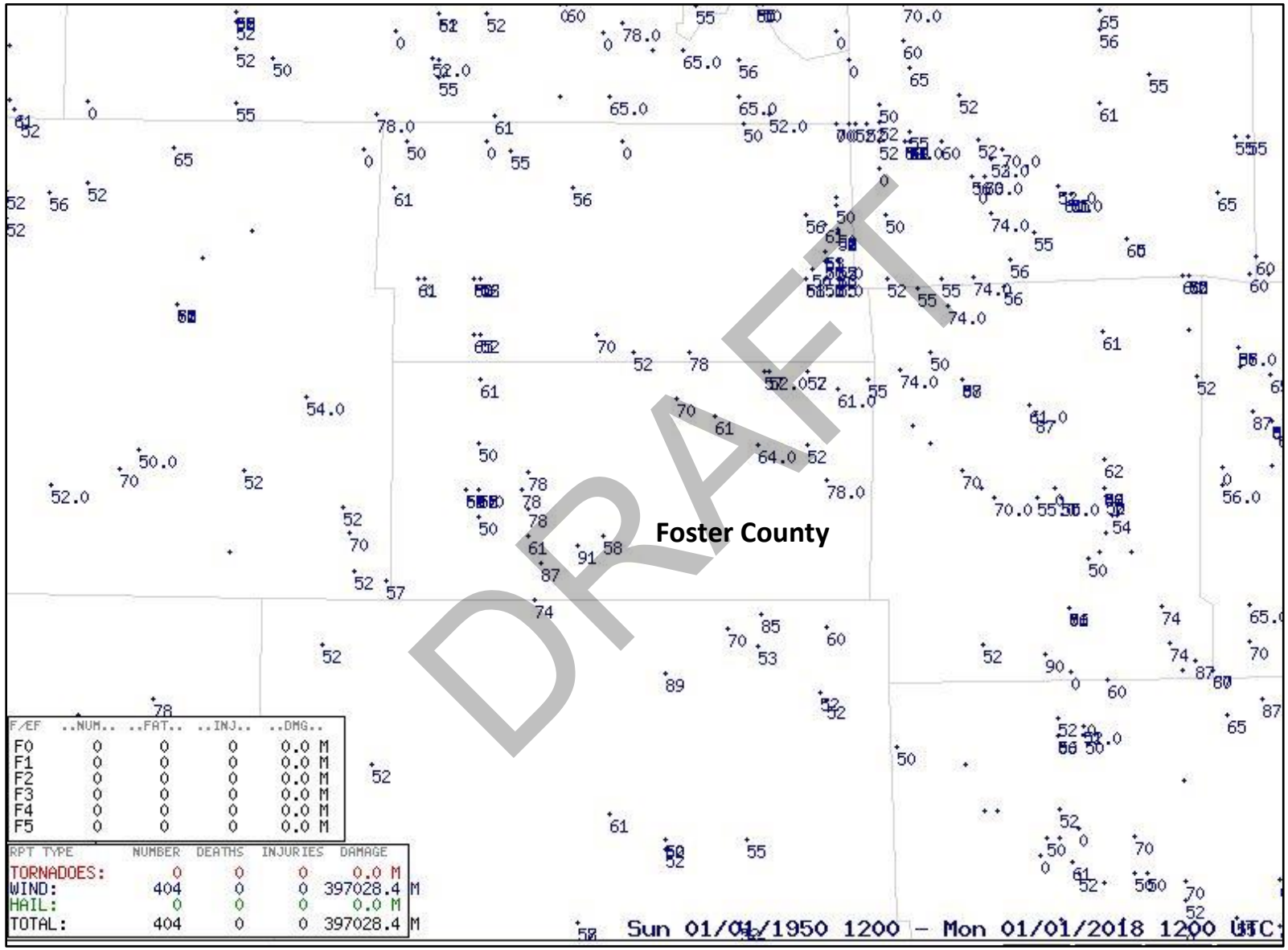
Source(s): National Oceanic and Atmospheric Administration (NOAA), Storm Prediction Center

Figure 4.11.2 – 1950 to 2018 Foster County Recorded Tornado Occurrences



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

Figure 4.11.3 – 1950 to 2018 Foster County Recorded Wind Speed Occurrences



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

Table 4.11.3 – Foster County Severe Summer Weather Risk Assessment

Impact	**Blocked Roads:** Dover Dam Road, 4th St. South in Longview Township along the Pipestem Creek, Clarkhart Road in the James River Valley near Arrowwood WPA. • 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 • 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**	• **$13,846,530.00 in property damage and $1,580,000.00 in crop damage between January 1, 1950, and December 31, 2020, according to NCDC.** • **Two injuries reported between January 1, 1950, and December 31, 2020.** • **Temporary economic boost due to rebuilding/repairs of homes, businesses and other structures.** • **June 25, 1999.** A Thunderstorm Wind event produced winds of 87 m.p.h. resulting in $10,000,00.00 in property damage. • **July 21, 2014.** A Thunderstorm Wind event produced winds of 91 m.p.h. impacting unincorporated Bordulac resulting in $2,000,000.00 in property damage and $1,000,000.00 in crop damage
Frequency	• Annual occurrences of power loss from storms • Property damage from tornados/straight-line winds in summer 2017 • Windstorms occurring annually • Two or three significant storms producing damage to trees and property annually • **July 29, 1972.** An F2 Tornado occurred in the county causing $25,000 in property damage.	• **193 occurrences between January 1, 1950, and December 31, 2020, or three severe summer weather events of significance annually** • **Foster County experiences $195,021.55 in property damage and $22,253.52 in crop damage annually between January 1, 1950, and December 31, 2020.** • **4th St. South (the Gross Road) was blocked for 5 months in 2011 due to heavy precipitation.** • **4th St. South (the Gross Road) was blocked in 2019 due to heavy precipitation**
Likelihood	• Climatic patterns will result in numerous annual occurrences of the hazard	

Table 4.11.3 – Foster County Severe Summer Weather Risk Assessment - Continued

Vulnerability	More Vulnerable • 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 • Lack of funding to improve previously low-traffic roads as traffic volumes increase due to economic activity • Increase in permanent and temporary populations, and economic activity, will increase amount of people and community assets exposed to severe summer weather events • Presence of pipelines, rail, and 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 causing fires and damage to structures • Removal of shelterbelts leaves little to no protection to structures from severe summer weather • Critical facilities: Foster County Courthouse, Carrington City Hall, CHI St. Alexius Health Carrington Medical Center, all fire halls and ambulance buildings county-wide • Undersized culverts for drainage • Older bridges are not large enough to allow for adequate drainage of runoff/do not meet current standards	Less Vulnerable • Building codes and enforcement • Advanced warning/notification such as internet and TV • Switching of overhead power 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 Foster County Nixle-Everbridge** • **Presence of social media alerting to the public** • **Advancements in public works equipment to use for responding to significant events**
Capability	• See Chapter 7 for a list of capabilities to address severe summer weather.	

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 Foster 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.

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

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities such as Foster County Courthouse, CHI St. Alexius Health Carrington Medical Center, schools, water towers, roadways, publicly-owned buildings 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 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.

Vulnerabilities to New and Future Development

Building codes ensure buildings and structures are built adequately to better withstand severe summer weather. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have adopted buildings codes, but only the city of Carrington 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 Foster County in 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 reduce the amount of reported weather information available to county emergency management.

National Climatic Data Center/National Oceanic and Atmospheric Administration

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
- Foster County Local Emergency Operations Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- 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)

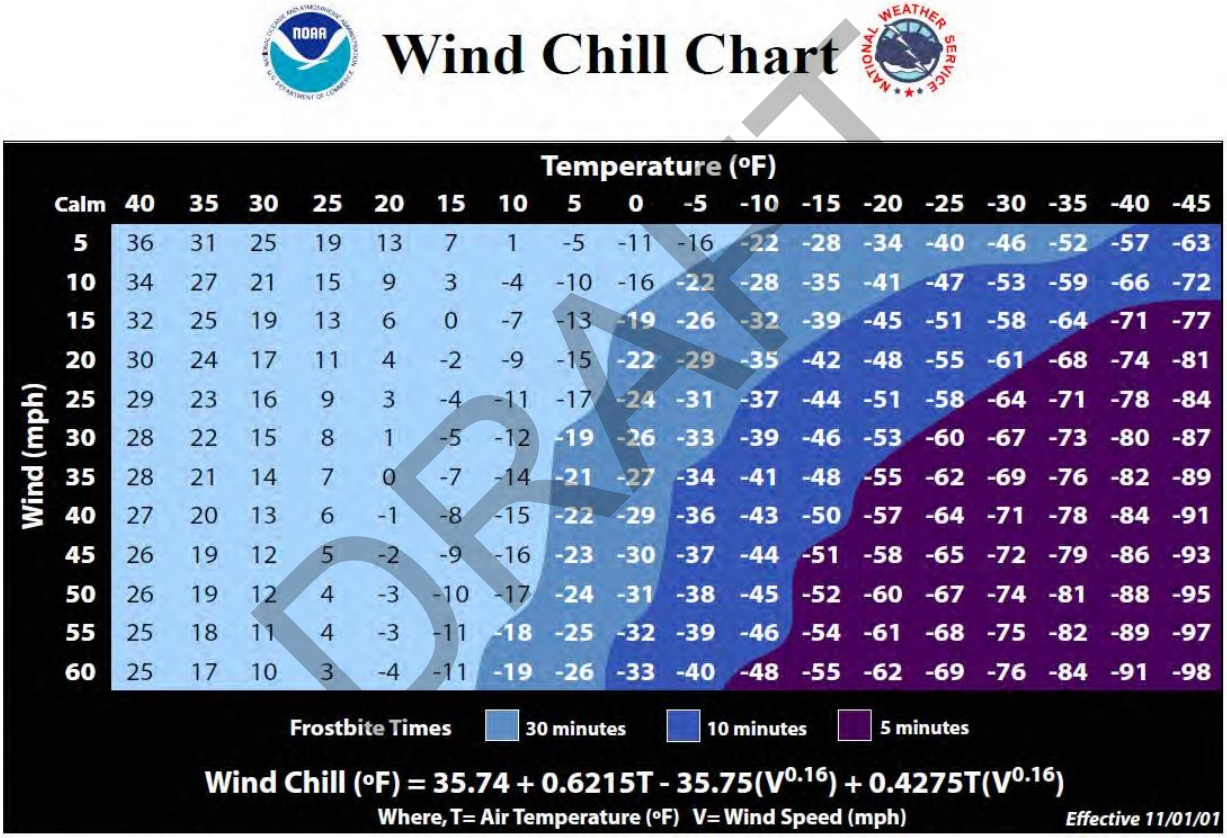
4.12 Severe Winter Weather

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 Foster 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 Foster County was obtained from the National Climatic Data Center (NCDC); the National Oceanic and Atmospheric Administration (NOAA); the USDA, Risk Management Agency; and Foster County Emergency Management. A detailed hazard history for Foster 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 Foster County between January 1, 1996, and December 31, 2020. 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.

- Foster County experienced 101 occurrences of severe winter weather resulting in approximately four storms of significance annually.
- Approximately $4,470,000.00 in property damage was reported.
- One injury and one fatality was reported.

Table 4.12.1 – 1996 to 2020 Foster County Severe Winter Weather Hazard History Summary

Severe Winter Weather				
Occurrences	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**
101	1	1	$4,470,000.00	$0.00

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 identities 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, Foster County experienced 114 incidents of crop loss due to severe winter weather impacting approximately 73,273.54 acres of crops totaling $6,268,347.25.**

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

- Foster County experienced no property damage from 89 severe winter weather events between 2000 and 2018.
- Claims paid for collapse on state facilities and other critical facilities insured by the North Dakota Tornado and Fire Fund, 2013, between 1989 and 2013 included $735 to local governments. No claims were paid to state agencies, adjutant general, state universities, or school districts.

There have been disaster declarations and emergencies pertaining to a severe winter weather in Foster 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 Foster 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 Foster County is as follows:

- The probability of severe winter weather in Foster County is 100 percent based on 101 occurrences between January 1, 1996, to December 31, 2020, resulting in approximately four incidents of significance annually. Foster County experiences approximately $178,800.00 in property damage and no crop damage annually.

- One injury and one fatality was reported between January 1, 1996, and December 31, 2020.

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 $313,417.36 annually in Foster 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 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 Foster County resulting in an estimated 120 inches of snow. The events occurred on January 4, 9, 15, and 21 of 1997, and resulted in 3,470,000.00 in property damage.

- The 1997 Ice Storm occurred on April 4, 1997, resulting in $1,000,000.00 in property damage.

Profile meeting participants and the Steering Committee indicated the magnitude or impact of severe winter weather as catastrophic meaning 50 percent or more of Foster 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 – Foster County Severe Winter Weather Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	4	4	2	3	**11**
City of Carrington	4	4	4	2	3	**11**
City of Glenfield	4	4	4	3	1	**13**
City of Grace City	4	4	4	3	1	**13**
City of McHenry	4	4	4	3	1	**13**

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

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 Foster County Courthouse, CHI St. Alexius Health Carrington Medical Center, schools, lift stations and numerous critical facilities and infrastructure in Foster 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, leading to power outages. Restoration of power can take several days or a week. 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 state highways and county roads resulting in stranded motorists. 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 medical supplies.

Sanitary Sewer. Sanitary sewer systems can fail causing sewer backup resulting in property damage if prolonged power loss occurs and lift stations fail.

Water. Disruptions in drinking/potable water service can be caused by physical damage to water towers or lift stations, 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.

Table 4.12.3 – Foster County Severe Winter Weather Risk Assessment

Impact	**Blocked Roads:** Four miles south of Carrington on 66th Ave, N.D. Highway 200 on all sections, Murphy Highway (county highway that is six miles long and blocked on three miles), Peavey Road (70th Ave from 3rd St. to 5th St.), N.D. Highway 200 to Murphy Highway • 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	• 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 • **Foster County experiences approximately $178,800.00 in property damage and no crop damage 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 $313,417.36 annually in Foster County.** • **Temporary economic boost due to rebuilding/repairs of homes, businesses and other structures.**
Frequency	• 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	• Strong winds are commonplace • Occurrences of blocked roads from heavy snow occurs frequently • **101 occurrences between January 1, 1996, and December 31, 2020, resulting in a probability of 100 percent.**

Table 4.12.3 – Foster County Severe Winter Weather Risk Assessment – Continued

Likelihood	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	More Vulnerable • 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 • **Some township roads lack signage for navigation** • **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: CHI St. Alexius Health Carrington Medical Center, Foster County Courthouse, Carrington City Hall, all fire halls and ambulance buildings county-wide	Less Vulnerable • Building Codes • Advanced warning and notification such as internet and TV • Switching of overhead power 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 Foster County Nixle-Everbridge** • **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** • **Foster County Highway Department is on-call during blizzard warnings** • **Appropriately positioned living snow fences**

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 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 MAOP
- Building Codes
- Foster County Local Emergency Operations Plan
- Foster 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, and technology in many ways, including blackouts, high-frequency radio disruptions, and interference with 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 Foster 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

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 provide insight.

- 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.
- 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 Foster 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 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 Foster 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 5, 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 – Foster County Space Weather Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	1	2	4	2	**9**
City of Carrington	4	1	2	4	2	**9**
City of Glenfield	4	1	2	4	2	**9**
City of Grace City	4	1	2	4	2	**9**
City of McHenry	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 Foster County. A list of impacts identified as commonplace for natural hazards and man-made threats is shown in Chapter 4.

Table 4.13.2 – Foster County Space Weather Risk Assessment

Impact	• 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	• 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 Carrington City Hall, Foster County Courthouse, correctional centers, hospitals, public schools, and other specialty facilities such as nursing homes and senior housing facilities**
Frequency	• Never a recorded occurrence in Foster County or North Dakota	• 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.
Likelihood	• 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	<u>More Vulnerable</u> • 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	<u>Less Vulnerable</u> • Advanced warning and notification such as internet & TV • Local food production/households with gardens • Gas-powered backup generators for critical facilities and infrastructure • **The fallout shelter at the Carrington Armory was constructed to act as a Faraday Cage**
Capability	• 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 Foster County is provided in Chapter 3, Profile and Inventory.

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities such as the Foster County Courthouse, CHI-St. Alexius Health Carrington Medical Center, public schools, and other specialty facilities such as nursing homes/assisted living facilities are vulnerable to space weather in a similar fashion to publicly-owned buildings and property. The Foster County Courthouse has a specific vulnerability to space weather as prolonged outages of power and data/technological systems could compromise security and lead to a potential breakdown of order within the facility and endanger the overall functionality city of Carrington and greater Foster 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.

The fallout shelter below the basement of the Carrington Armory was constructed to act as a faraday cage.

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 Foster 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 Foster 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
- Foster County Local Emergency Operations Plan
- Foster 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 and energy sectors. 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 Foster County with a focus on U.S. Highway 52/281, N.D. Highways 9, 20, and 200; railroads, county and township roads, the Carrington Airport, and boating/recreational traffic.

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 almost weekly in Foster County (primarily in and around the city of Carrington). Incidents involving cars and farm equipment occur annually. History on transportation incidents in Foster County was provided by Foster County Emergency Management and the N.D. Dept. of Transportation.

Foster County Emergency Management

Foster County Emergency Management provided the following information regarding aircraft incidents in Foster County.

Aircraft

- **July 8, 2014.** The Carrington Fire Department responded to a plan crash at the Carrington Airport just before 9 p.m. A crop duster had damaged landing gear and crashed while attempting to land on the runway. No serious injuries were reported. The pilot was taken to Carrington Health Center. Authorities say the fixed landing gear on the crop duster may have been damaged while in the air, but it's uncertain. The cause of the crash was investigated by the National Transportation Safety Board and the Federal Aviation Administration.

- **July 3, 2017.** **S**tate Radio notified NDDES Duty Officer (Hanson) of a downed Aircraft SE of Carrington. The nearest intersection is 74th Ave NE & Main Street East on the east side of Lake George. A Foster County Deputy Sheriff is on scene and NDHP supervisor has been notified by State Radio. Reporting party stated there were no injuries and no hazmat concerns. The plane is a crop duster (tail number 2249B). NDDES Duty Officer notified Foster County EM (Earle) who spoke with the Sheriff and confirmed that there were no injuries or hazmat concerns. The pilot had just finished spraying and had to make an emergency landing.

Rail

- **March 3, 2019.** A Canadian Pacific train derailed east of the city of Carrington around 8 a.m. Approximately 35 cars derailed with some containing anhydrous ammonia and propane. A small amount of anhydrous was released. Local firefighters, law enforcement, and emergency medical technicians responded and were on the scene throughout cleanup. CP Railway said the line was reopened to rail traffic on Monday at 8 a.m. One family was evacuated and was cleared to return to their home on Monday.

- **April 26, 2020.** A Canadian Pacific (CP) train hauling grain derailed Sunday morning at the city of Carrington. The last 15 to 20 cars of an eastbound 100-car train derailed under the N.D. Highway 200/52 overpass. A spokesperson for CP said the grain train derailed at 7 a.m. and no hazardous materials were involved and no public safety issues were present. CP dispatched teams to the site. U.S. Highway 52 was closed and traffic was detoured for about 90 minutes while CP and the N.D. Dept. of Transportation inspected the bridge. No damage was found. The derailment was believed to be weather related. No injuries were reported.

- A railroad incident occurred in 2010.

- A railroad incident occurred in 2012.

Figure 4.14.1 – April 26, 2020, Train Derailment at the City of Carrington

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

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 Foster County between 2005 and 2020.

The following are key points from Table 4.14.1.

- Between 2005 and 2020, Foster County experienced 1,029 total crashes of which 887 were property damage only crashes, 136 were injury crashes resulting in 169 injuries, and six were fatal crashes resulting in seven fatalities. Approximately 86.2 percent of crashes were property-damage only.
- Foster County experiences 55 property-damage only crashes, nine injury crashes resulting in 11 injuries, and no fatalities on average between 2005 and 2020, or 64 crashes annually.
- The last fatal crash in Foster County occurred in 2011.

Table 4.14.1 – 2005 to 2020 Foster County, N.D. Crash Summary

Year	Property Damage Only (PDO)	Injury Crashes	Total Injuries	Fatal Crashes	Total Fatalities	Total Crashes
2005	84	4	--	0	--	88
2006	97	4	5	1	1	102
2007	108	8	12	2	2	118
2008	99	12	20	1	1	112
2009	89	6	6	0	0	95
2010	72	18	21	1	2	91
2011	109	10	11	1	1	120
2012	52	10	15	0	0	62
2013	43	10	12	0	0	53
2014	24	7	10	0	0	31
2015	24	9	11	0	0	33
2016	22	4	6	0	0	26
2017	27	14	18	0	0	41
2018	13	4	4	0	0	17
2019	14	5	7	0	0	19
2020	10	11	11	0	0	21
TOTAL	**887**	**136**	**169**	**6**	**7**	**1,029**

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, Foster County experiences 55 property-damage only crashes, nine injury crashes resulting in 11 injuries, and no fatalities on average between 2005 and 2020, or 64 crashes annually.

The profile meeting participants indicated the probability of a vehicular transportation incident for Foster 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.

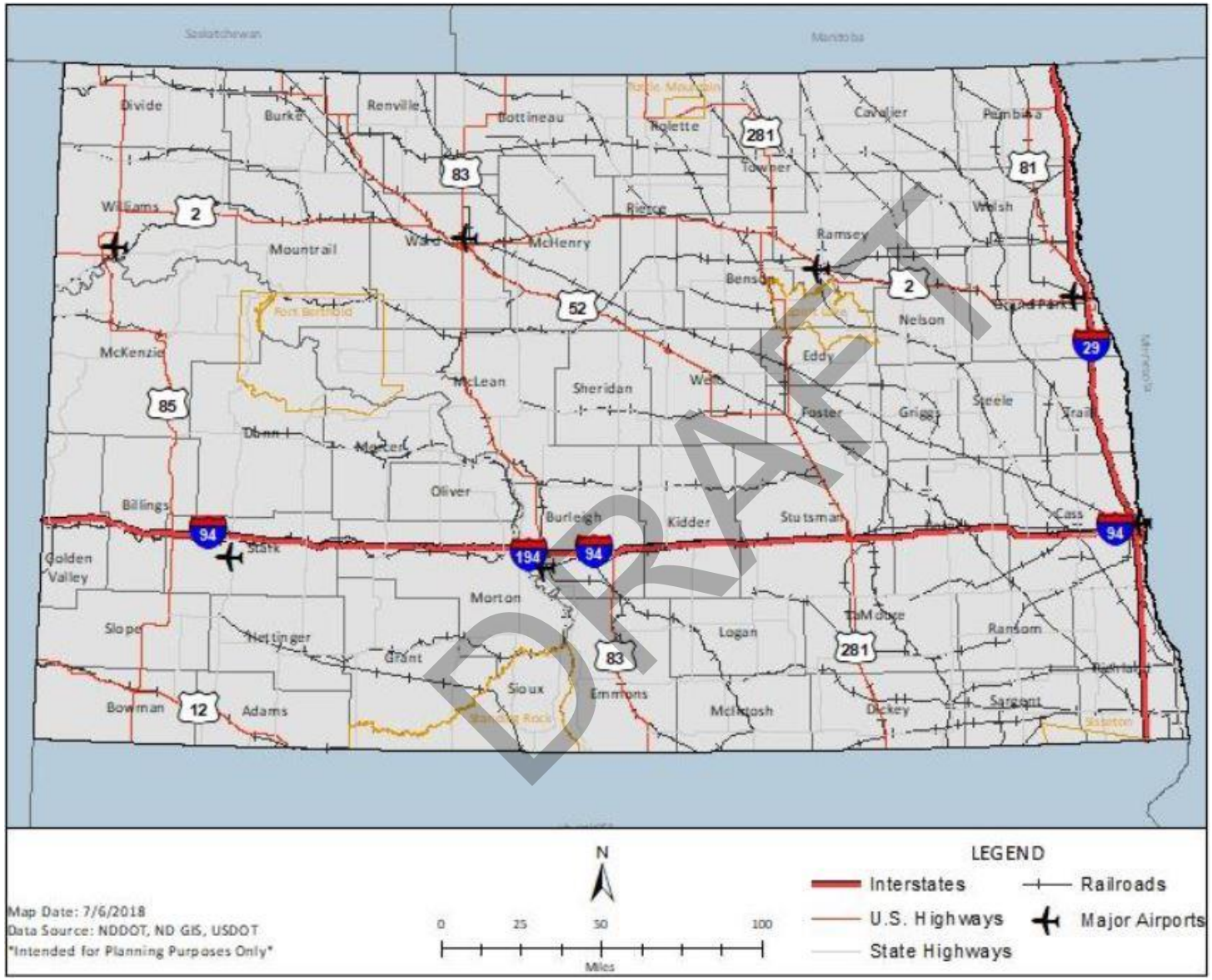
Extent/Magnitude

The 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 magnitude of a transportation incident for Foster 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), Foster County has a moderate vulnerability to transportation incidents due to the county having an airport, state highways, U.S. Highways, and 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. Foster County was not among the top 10 counties with estimated injury and fatality costs for motor vehicle crashes in 2016.

Figure 4.14.2 illustrates transportation system in North Dakota.

Figure 4.14.2 – North Dakota Transportation System



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

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 – Foster County Transportation Incident Risk Assessment Scored Chart Summary

Jurisdiction	Impact	Frequency	Likelihood	Vulnerability	Capabilities	Total
Foster County	4	2	3	2	2	**9**
City of Carrington	4	3	3	4	2	**12**
City of Glenfield	4	2	3	3	1	**11**
City of Grace City	4	2	3	3	1	**11**
City of McHenry	4	2	3	2	1	**10**

(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 Foster 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 crashes into 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 Foster 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 Foster County is provided in Chapter 3, Profile and Inventory.

Table 4.14.3 – Foster County Transportation Incident Risk Assessment

Impact	• **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	• **2,211 injuries and 56 fatalities from vehicular crashes between 2005 and 2019** • **Decrease in economic regional activity if impacting a major transportation artery for an extended period**
Frequency	• Annual occurrences of car crashes, truck-related incidents, etc. • Incidents involving the railroad occurs every two to five years • Aircraft accidents in 2014 and 2017 • Trail derailments in 2010 and 2020	• Foster County experiences 55 property-damage only crashes, nine injury crashes resulting in 11 injuries, and no fatalities on average between 2005 and 2020, or 64 crashes annually.
Likelihood	More likely • U.S. Highways 52/281, N.D. Highways 9, 20, and 200, railroads, county and township roads, and the Carrington Airport • High truck traffic with chemicals and fuel from Dakota Growers • High truck traffic from farm and agriculture related industry • **DAPL pipeline court ruling could cause rail traffic to increase** • **Heliport near the city of Kensal (neighboring Stutsman County)** • **Heliport at CHI-St. Alexius Health Carrington Medical Center** • **CP Railway establishing more un-mechanized railroad crossings**	Less likely • Construction of the roundabout at the intersection of U.S. Highways 52/281 and N.D. Highway 200
Vulnerability	More vulnerable • U.S. Highways 52/281, N.D. Highways 9, 20, and 200, railroads, county and township roads, and the Carrington Airport • High truck traffic with chemicals and fuel from Dakota Growers • High truck traffic from farm and agriculture related industry • **DAPL pipeline court ruling could cause rail traffic to increase** • **Carrington Municipal Airport** • **Heliport near the city of Kensal (neighboring Stutsman County)** • **Heliport at CHI-St. Alexius Health Carrington Medical Center** • **CP Railway establishing more un-mechanized railroad crossings**	Less vulnerable • Construction of the roundabout at the intersection of U.S. Highways 52/281 and N.D. Highway 200
Capability	• See Chapter 7 for a list of capabilities to address transportation incident.	

Vulnerabilities of Critical Facilities and Infrastructure

Critical facilities such as the CHI-St. Alexius Health Carrington Medical Center, the Carrington Ambulance Services Ambulance Hall, and infrastructure such as water/wastewater treatment facilities and power grid infrastructure should not be affected by transportation incidents, except in rare occurrences.

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 U.S. Highways or 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.

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.

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 North Dakota Highway Safety Plan
- 2020 N.D. Dept. of Transportation Urban High Crash Locations Report
- Foster County Comprehensive Plan
- Foster County Local Emergency Operations Plan
- Foster County Threat and Hazard Identification and Risk Assessment (THIRA)
- North Dakota Continuity of Operations Plan
- North Dakota Emergency Operations Plan, Transportation Incident Annex
- 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 Foster 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 temperate 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 expected 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. Foster County, North Dakota Mitigation Strategy

Mitigation Purpose, Goals, and Projects

The Foster 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 Foster County consists of 33 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 Foster 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 Foster 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 – Prioritization of Mitigation Projects by Jurisdiction

	Project Number by Prioritization			
Jurisdiction	**Low**	**Medium**	**High**	**Very High**
Foster County	--	AT: 2, 3 EO: 5 PR: 5, 6 I: 3	AT: 1, 4, 7, 8, 10 EO: 2, 3, 4, 6, 7, 8 PR: 1, 2, 4, 8	AT: 5, 6, 9 EO: 1, 9, 10 F: 1 PR: 3, 7 I: 1, 2, 4
City of Carrington	--	5	2	1, 3, 4
City of Glenfield	--	3, 4		1, 2, 5
City of Grace City	--	3		1, 2
City of McHenry	--	4		1, 2, 3

Projects with affected jurisdictions identified as 'Foster County and incorporated jurisdictions' are shown in the table under Foster 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 Carrington, Glenfield, Grace City, McHenry
County Commission	Foster County Commission
Emergency Management	Foster 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/Foster County Extension Service
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FRA	U.S. Dept. of Transportation, Federal Railroad Administration
FSA	U.S.D.A. - Farm Service Agency
Historical Society	State Historical Society of North Dakota
HUD	U.S. Dept. of Housing and Urban Development
Media	Newsletter: Midkota Messenger, Chamber Chatter Newspaper: Foster County Independent Social Media: Facebook pages for Foster County Emergency Management, Foster County Sheriff's Office, Foster County Public Health, Carrington Medical Center, Carrington Fire Department, Carrington Economic Development, Midkota Public School, Carrington Public Schools, City of Carrington, City of McHenry, Carrington Chamber of Commerce, Carrington Police Department Websites: Foster County, City of Carrington, Carrington Public Schools, Midkota Public School
Medical Service Providers	Hospitals: CHI-St. Alexius Health Carrington Medical Center Medical Clinics: CHI-St. Alexius Health Carrington Medical Center Urgent Care 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
NDLC	N.D. League of Cities
NDTOA	N.D. Townships Officers Association

Table 6.2 – Acronyms and Definitions of Responsible Agencies and Partners for Mitigation Projects – Continued

Acronym/Definition	Entity
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	Foster County Public Health
PSC	Public Service Commission
Public Utilities	Cable: Daktel, Dish Network/DirecTV/Satellite, Moore Liberty Griggs Telephone Company Electricity: Northern Plains Electric Cooperative, Otter Tail Power Company Internet: Daktel, Dish Network/DirecTV/Satellite, Moore Liberty Griggs Telephone Company Natural Gas: Montana-Dakota Utilities Phone (cellular): AT&T, Smart Talk/Trac Phones, Verizon Phone (landlines): Daktel, Dish Network/DirecTV/Satellite, Moore Liberty Griggs Telephone Company Waste (solid and water): Brager Disposal, municipal services Water: Greater Ramsey Water District, individual wells, municipal wells, private irrigation systems, Stutsman Rural Water District
Public Schools	Carrington Public School, Midkota Public School
Public Works	Foster County Road Department, Carrington 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
SWC	N.D. State Water Commission
U.S.A.C.E.	U.S. Army Corps. of Engineers
USFS	United States Forest Service
VOAD (Voluntary Organizations Active in Disaster)	Adventist Community Services, American Red Cross, Catholic Charities, Church of Jesus Christ of Ladder 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	Foster County Water Resource District
Weed Board	Foster 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.

Foster County

Foster 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. Small 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 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; 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.

Foster County Project AT-1: Expand administrative and technical mitigation capabilities.

Description/Benefit	Expand administrative and technical mitigation capabilities to improve county readiness and preparedness. Administration: Update mutual aid agreements on a continuous basis. Convert verbal to written. Staff: Conduct Floodplain Administrator education in Foster County. Research options for relinquishing incorporated jurisdiction administration to Foster County. Educate staff to enforce building codes. Technical • Install solar-powered electronic fire index sign in the city of Carrington at the roundabout at U.S. 281/52 and N.D. Highway 200. Complete installation of the fire index sign the city of Carrington already has. • Install permanent generators – See Foster 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 • Install faraday cages/shields at technological/digital 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.**		
Hazards Addressed	All (Space Weather)		
Affected Jurisdictions	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	City Council(s), County Commission, Emergency Services, NDIT, Public Schools, Public Works, Public Utilities		
Partners	Emergency Management, Extension, Planning & Zoning		
Completion Timeframe	1 to 3 years	Cost	Project-specific
Funding Source	Local, state, federal grants. FEMA, Public Utilities, Regional Council, 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
4	4	4	4	5	4	5	30

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Solicit project scope of work. Pursue grant funding or use local funds.

Foster County Project AT-2: Upgrade and expand early warning system(s).

Description/Benefit	Foster 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 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. **Upgrade sirens:** City of Carrington (armory) **New sirens:** City Glenfield, City of Grace City, City of McHenry **NOAA Weather Radios:** To any city or county residents, upon request		
Hazards Addressed	Flood, Hazardous Material Release, Severe Summer Weather, Fire (Wildland)		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Medium/High		
Responsible Agency	Emergency Management, Emergency Services		
Partners	County Commission, City Council(s), FEMA, NDDES, NWS, Public Works		
Completion Timeframe	2 to 3 years	Cost	Siren: Up to $20,000 per siren Reverse 9-1-1/CodeRED: $4,500 annually
Funding Source	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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Develop specifications. Received EHP approval. Pursue grant funding. Approval by county commission/city councils.

Foster County Project AT-3: Maintain Foster County Emergency Alerting System and conduct user training.

Description/Benefit	Foster County currently has a subscription to Nixel – a software alerting system. Foster 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 Nixel.		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster 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	2 to 3 years	Cost	Siren: Up to $20,000 per siren Reverse 9-1-1/CodeRED: $4,500 annually
Funding Source	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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Develop schedule and incorporated into existing plans.

Foster County Project AT-4: Upgrade existing or purchase new equipment and infrastructure for emergency services and 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. **Carrington, City of:** New snow-go snowblower **Carrington Ambulance:** 800 Mhz trunking radios (SIRN 2020) **Carrington City and Rural Fire Dept:** 800 Mhz trunking radios (SIRN 2020), rescue vehicle, 1,500 gpm foam capability fire truck, level B hazardous material suits, 3,000-gallon self-fill tanker. **Foster County Sheriff's Office:** 800 Mhz trunking radios (SIRN 2020), portable surveillance cameras **Glenfield Fire Department:** 800 Mhz trunking radios (SIRN 2020), turnout gear, air packs with spare bottles, level B hazardous material suits, high pressure extrication tools **McHenry Fire Department:** 800 Mhz trunking radios (SIRN 2020), turnout gear, air packs with spare bottles, level B hazardous material suits, high pressure extrication tools, jaws of life		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	Emergency Management, Emergency Services		
Partners	City Council(s), County Commission		
Completion Timeframe	1 to 3 years	Cost	Project-specific
Funding Source	Local, state, 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster 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 councils.

Foster County Project AT-5: Install permanent generators and/or upgrade existing permanent or portable generators at critical facilities and infrastructure.

Description/Benefit	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: Upgrade (permanent): CHI-St. Alexius Health Carrington Medical Center, Foster County Courthouse, Foster County Public Health New (permanent): Carrington Ambulance Bay, Carrington Armory (Emergency Operations Shelter), Carrington City Hall, Carrington Fire Hall, Carrington Police Department, Carrington Public School, Golden Acres Manor/Estates, master lift station, City of Glenfield Community Center, lift stations (all cities), and Midkota Public School. New portable: Carrington Fire Hall, Carrington Police Department, lift stations, Cities of Grace City and McHenry - miscellaneous wherever possible for city water systems, equipment, etc.		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	Foster 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 Utilities, Public Works		
Completion Timeframe	3 to 5	Cost	Project-specific
Funding Source	Public Utilities, Regional Council, RD. FEMA Pre-Disaster Mitigation Grant Program (PDM). 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	5	5	34

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Procure scope of work for project. Received EHP Approval. Apply for grant funding.

Foster County Project AT-6/City of McHenry Project 3: Conduct engineering study for Lake Alkaline to eliminate impacts of flooding to the City of McHenry.

Description/Benefit	High water on Alkali Lake, which receives water from an adjacent unnamed lake also experiencing high water, causes flooding impacts to roadways to the City of McHenry, McHenry Township, and the ND Dept. of Transportation. The city's sanitary sewer lagoon system is located adjacent to the lake and would be completely inundated before Alkali Lake reaches its natural outlet elevation. A preliminary engineering study has been completed by Foster County Water Board in conjunction with Moore Engineering, Inc. The preliminary study identified installation of a two-mile pipeline to eliminate impacts of overland flooding. **See Figure 6.1 for an aerial image of the McHenry Sanitary Sewer Lagoons and Alkali Lake.**		
Hazards Addressed	Flood (Overland), Infectious Disease, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and City of McHenry		
Project Status	New		
Priority	Very High		
Responsible Agency	City Council(s), County Commission, Emergency Management		
Partners	Emergency Services, FEMA, Public Works, SWC, engineering firms		
Completion Timeframe	End of 2022	Cost	TBD
Funding Source	Local budgets. FEMA's Building Resilient Infrastructure and Communities (BRIC). DWR Cost Share. Clean Water State Revolving Fund. 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	4	4	5	3	1	3	25

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Alkali Lake High Water Outlet Feasibility Study (preliminary) Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Procure bids and evaluate options. Select firm to complete the study. Consider options. Approval and adoption by city councils and/or county commission.

Figure 6.1 – City of McHenry Sanitary Sewer Lagoons

Source(s): City of McHenry

Foster 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.		
Hazards Addressed	Drought, Flood (Overland), Infectious Disease, Severe Summer Weather, Severe Winter Weather, Wildland Fire		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	City Council(s), County Commission, Public Works		
Partners	Emergency Management, Emergency Services, NRCS, SWC, Water Resource District		
Completion Timeframe	End of 2020	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

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster 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.

Foster County Project AT-8: Establish a "Safe Send" site/Drop-Off Point for Disposal of Hazardous Materials.

Description/Benefit	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 Foster County should work with Jamestown Landfill to include procedures for disposal in the county's hazardous materials response plan. A "Safe Send" site is available for fungicides, herbicides, and pesticides through the N.D. Dept. of Agriculture.		
Hazards Addressed	Drought, Fire, Hazardous Material Release, Infectious Disease (All)		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New/Ongoing and Continue		
Priority	High		
Responsible Agency	City Council(s), County Commission, Public Works		
Partners	Emergency Management, Emergency Services, NRCS, SWC, Water Resource District		
Completion Timeframe	End of 2022	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	4	5	5	5	5	34

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Work with local emergency services to identify development of site.

Foster County Project AT-9: Install homeland security measures at critical facilities and infrastructure.

Description/Benefit	The Foster County Courthouse, emergency services buildings, CHI-St. Alexius Health Carrington Medical Center, public schools are critical facilities, and utility infrastructure, are vulnerable to adversarial threats. Installation of (but not limited to) access control measures, cybersecurity enhancements, door alarms, door locks, enhanced lighting, security fencing, motion-detecting systems, and security camera surveillance systems are needed to mitigate adversarial threats. • Install a door access control system and a security camera surveillance system at the Foster County Public Health building. • Install an outdoor security camera surveillance system at the Foster County Courthouse. • Installation of exterior building to store portable generator and other medical equipment at CHI-St. Alexius Health Carrington Medical Center		
Hazard/Threat Addressed	Civil Disturbance; Criminal, Terrorist, or Nation/State Attack, Fire (Urban), Transportation Incident		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Very High		
Responsible Agency	City Council(s), County Commission, Emergency Services, Public Works		
Partners	Emergency Management, Dept. Homeland Security, NDDES, private contractors		
Completion Timeframe	3 to 5 years	Cost	Project-specific
Funding Source	Local budgets and department staff and resources. 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	4	4	5	3	5	31

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Develop scope of work and procure bids/quotes. Select contractor. Apply for grant funding to execute.

Foster County Project AT-10: Conduct joint hydrology study for Birtsell, Wyard, and Longview Townships, and the City of Glenfield, to evaluate local drainage systems.

Description/Benefit	Conduct a hydrology study to evaluate drainage ditch/storm water systems and culvert sizes 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 permanent drainage maintenance system based on the study will assist in reimbursement from state and federal sources for expenses incurred during emergency events. **Birtsell, Wyard, and Longview Townships:** Evaluate current drainage systems and culver sizing. **City of Glenfield:** Evaluate street issues and take appropriate action to improve city drainage.		
Hazards Addressed	Drought, Flood (Overland), Infectious Disease, Severe Summer Weather, Severe Winter Weather, Wildland Fire		
Affected Jurisdiction(s)	Foster County and the City of Glenfield		
Project Status	New		
Priority	High		
Responsible Agency	City Council(s), County Commission, Public Works		
Partners	Emergency Management, Emergency Services, NRCS, SWC, Water Resource District		
Completion Timeframe	End of 2022	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

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Procure bids and evaluate options. Select firm to complete the study. Consider options. Approval and adoption by city councils, county commission, township boards, etc.

Foster County Project EO-1: Conduct education and outreach to improve household disaster 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, among others. Specific attention should be given to flooding, hazardous materials, severe weather, fire, and on truck routes and safe routes to school. Outreach and attention should be given to mass notification systems. **Existing:** Foster County, City of Carrington, Carrington Public Schools, Midkota Public School, City of Glenfield (needs activation and maintenance) **Develop new:** Pursue additional social media platforms.		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New/Ongoing and Continue		
Priority	Very High		
Responsible Agency	City Council(s), County Commission, Emergency Management, Public Schools		
Partners	Emergency Services, Extension, Media, Public Health, Public Utilities		
Completion Timeframe	Ongoing	Cost	$1,000 to 2,000 annually
Funding Source	Local resources. 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Develop and review by appropriate jurisdictions or agencies. Review by state's attorney. Distribute.

Foster County Project EO-2: Increase awareness of methods for prevention of infectious disease.

Description/Benefit	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, handwashing, influenza preparedness, and strategies used in agriculture-based economies such as pesticides, fungicides, herbicides and insecticides. New and future awareness should include social distancing and other measures to prevent the spread of coronaviruses.		
Hazards Addressed	Infectious Disease (All)		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
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	5	5	5	5	35

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Public Health (all plans) Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Development by respective agency. Approval by county commission, city councils and emergency management. Distribute.

Foster County Project EO-3: Update Foster County Public Health Strategic Plan annually.

Description/Benefit	The strategic plan for Foster County Public Health is required to be updated on an annual basis.		
Hazards Addressed	Infectious Disease (All)		
Affected Jurisdiction(s)	Foster 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Public Health (all plans) Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Development by Public Health. Approval by board. Distribute.

Foster 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, rivers and watersheds. Crop should be checked for nitrates.		
Hazards Addressed	Dam Failure, Drought, Flood, Infectious Disease, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	Ongoing and Continue/New		
Priority	High		
Responsible Agency	Extension		
Partners	County Commission, City Council(s), Producers, N.D. Stockmen's Association (NDSA), Weed Board		
Completion Timeframe	1 year.	Cost	$3,000.00
Funding Source	NDSU/Foster County Extension. 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Bovine Emergency Response Plan (BERP) Drought Management Plan (State of North Dakota) Foster County LEOP	Capability Assessment, Hazard History, Risk Assessment	Development by NDSU/Foster County Extension. Review and approval by county commission. Updating of local plans.

Foster County Project EO-5: Increase awareness of drought tolerant practices and soil conservation methods in farming and ranching, and municipalities.

Description/Benefit	Make public aware of crop programs, and drought tolerant practices and soil conversation 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.**		
Hazards Addressed	Drought, Severe Summer Weather, Severe Winter Weather, Wildland Fire		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	Ongoing and Continue/New		
Priority	Medium		
Responsible Agency	Extension		
Partners	Emergency Management, FSA, Media, NRCS, USDA, Weed Board		
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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Bovine Emergency Response Plan (BERP) Drought Management Plan (State of North Dakota) Foster County LEOP Foster County Mitigation Plan	Capability Assessment, Hazard History, Risk Assessment	Development by Extension. Approval by county commission, city councils and emergency management. Distribute.

Foster County Project EO-6: Conduct continuous preventative education to increase awareness of cyberattack threats.

Description/Benefit	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 attention information should be developed for incorporated cities to protect utility infrastructure (i.e., Carrington Water treatment Plant).** **Specific education opportunities should be made available to IT staff at Carrington Public School and Midkota Public School.**		
Hazard/Threat Addressed	Cyberattack		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	Emergency Management and Foster County PIO in partnership with Computer Express and NDIT		
Partners	City Council(s), County Commission, Emergency Services, Public Schools		
Completion Timeframe	Ongoing	Cost	Project-specific
Funding Source	Local, state and federal grants. 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	3	5	5	5	33

Integration of Mitigation Plan Requirements into Local Planning Mechanisms		
Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Development by Foster County Office of Emergency Management, NDIT and Computer Express. Approval by county commission, city councils and emergency management. Distribute.

Foster 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	Make public aware of risk of shortage of critical materials and/or infrastructure and encourage citizens to be self-sufficient. Use 'Are You Prepared?" brochure from Logan and Stutsman Counties as an example. **Educate residents on the importance of shelter-in-place, stocking of food, water, and medical supplies, fuel for heating, backup power generation, etc.**		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	Emergency Management, Emergency Services, Public Schools, Social Services		
Partners	County Commission, City Councils, 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County Public Health (all plans) Foster 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 councils, school boards. Distribute.

Foster County Project EO-8: Update Foster County Vaccination Outreach Plan annually and perform outreach.

Description/Benefit	The influenza vaccination rate for school-aged children in Foster County needs to be increased. Develop outreach to increase 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.		
Hazard/Threat Addressed	Infectious Disease (only those that are vaccine preventable)		
Affected Jurisdiction(s)	Foster 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County Public Health (all plans) Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Develop by Foster County Public Health. Approval by board, public schools and emergency management. Distribute.

Foster County Project EO-9: Update CHI-St. Alexius Carrington Medical Center plans and policies annually.

Description/Benefit	The hospital is mandated to have the following plans and policies and are required to be updated on an annual basis: mass vaccination, mass casualty, airflight, hazardous materials disposable, communications/incident command, hazardous material response, diversion, utilities, severe weather, fire safety, weapons, missing person, assaultive person/manpower/womanpower, adversarial threats, water management, bomb threat, shelter-in-place, hostage, evacuation, vaccine storage, lock-down,		
Hazard/Threat Addressed	Infectious Disease (all)		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Very High		
Responsible Agency	CHI-St. Alexius Carrington Medical Center		
Partners	Emergency Management, Emergency Services, Public Health		
Completion Timeframe	Ongoing	Cost	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	5	5	5	5	5	5	35

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
CHI/St. Alexius Health Carrington Medical Center – all plans Foster County Public Health – all plans Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Develop new and/or update by hospital staff. Distribute to public health and emergency management for continuity purposes.

Foster County Project EO-10: 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.**		
Hazard/Threat Addressed	Drought, Fire (Wildland), Hazard Material Release, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster 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	Foster County Commission, Extension, fire departments/districts, NDDES, 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Development by Emergency Management and Emergency Services. Approval by county commission. Distribute.

Foster 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. To reflect changes in development and mitigate areas impacted by hazards through impact fees. • **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.**		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Very High		
Responsible Agency	County Commission and 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
City Councils and County Commission Planning Commission	Capability Assessment, Hazard History, Risk Assessment	Research effectiveness. Approval and adoption by county commission and city councils.

Foster County Project PR-1: Assure Foster 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.**		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	County Commission, Emergency Management		
Partners	Emergency Services, Extension, Planning & Zoning, Public Health, Public Works, SWC, 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 PDM 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Hazard Mitigation Plan (all other existing mechanisms)	All elements	Adoption by county commission and city councils. Approval NDDES and FEMA.

Foster 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 Foster 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, 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 Foster County and incorporated jurisdictions are bolded in text narratives and are found in Chapter 7, Capability Assessment.		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	High		
Responsible Agency	City Council(s), County Commission, 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
All	Capability Assessment, Hazard History, Risk Assessment	Development of specifications. Approval and adoption by county commission and city councils.

Foster 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.		
Hazards Addressed	Flood (overland and riverine), Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and the City of Carrington. The Cities of Glenfield, Grace City, and McHenry 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 Board		
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

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Flood Ordinances Foster County LEOP, Flood Annex Foster County Mitigation Plan Foster County THIRA National Flood Insurance Program	Capability Assessment, Hazard History, Risk Assessment	Approval and adoption by county commission and city councils

Foster 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 Foster County and incorporated jurisdictions meet or exceed the NFIP and/or to prepare for enrollment in the NFIP.		
Hazards Addressed	Flood (overland and riverine), Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and the City of Carrington. The Cities of Glenfield, Grace City, and McHenry are not enrolled.		
Project Status	Ongoing and continue		
Priority	High		
Responsible Agency	County Commission, City Councils, Emergency Management, Planning & Zoning		
Partners	Emergency Services, NDACo, NDDES, NDLC, SWC		
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	3	5	5	5	33

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Flood Ordinances Foster County LEOP, Flood Annex Foster County Mitigation Plan Foster County THIRA National Flood Insurance Program	Capability Assessment, Hazard History, Risk Assessment	Approval and adoption by county commission and city councils.

Foster 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.**		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	Ongoing and Continue		
Priority	Medium		
Responsible Agency	Emergency Management, Planning & Zoning, Public Works		
Partners	City Councils, County Commission, NDACo, NDDES, NDLC, Public Health, Public Utilities, Water Resource Board		
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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP (Appendix) Foster County Mitigation Plan Foster County THIRA Planning Commission	Capability Assessment, Hazard History, Risk Assessment	Organize planning committee and create plan. Approval and adoption by county commission and city councils. Update annually.

Foster 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.		
Hazards 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)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Medium/Low		
Responsible Agency	Emergency Management, Emergency Services		
Partners	Extension, N.D. State Vet Office, local producers and/or veterinarians, Weed Board, wrecker services		
Completion Timeframe	1 year	Cost	$75 to $100 per person
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

Planning Mechanisms Utilized	**Plan Element**	**Process for Integration**
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Schedule training and education event with Central Grasslands Research Extension Center. Develop draft plan and formally adopt by county commission. Integrate into local emergency services response protocols.

Foster County PR-7: Update Flood Operations/Management Annex in the Foster County Local Emergency Operations Plan on an annual basis.

Description/Benefit	Flooding impacts Foster County on an annual basis to varying degrees of severity. The Flood Operations/Management Annex in the Foster County Local Emergency Operations Plan should be updated annually based on the flooding event of the preceding year.		
Hazards Addressed	Dam Failure, Flood, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Very 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 Board		
Completion Timeframe	Annually	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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP, Flood Annex Foster County Mitigation Plan Planning Commission	Capability Assessment, Hazard History, Risk Assessment	Utilize the Foster County LEPC or Mitigation Plan Steering Committee to update annually. Approval and adoption by county commission and city councils.

Foster County PR-8: Create Community Wildfire Protection Plan (CWPP).

Description/Benefit	**Foster 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.** 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. **The plan should place emphasis on achieving Firewise Certification for appropriate communities - https://rb.gy/uav9w5**		
Hazards Addressed	Drought, Wildland Fire, Severe Summer Weather, Transportation Incident		
Affected Jurisdiction(s)	Foster 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 Board		
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)/Pre-Disaster Mitigation (PDM) 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	3	5	5	5	32

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster 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 councils, county commission and fire departments.

Foster County Project I-1: Assure continued monitoring and maintenance of Dover Dam and Tollefson Dam and conduct necessary maintenance/repair work.

Description/Benefit	To protect human life and property from dam failures. **EAPs and contact information should be updated on an annual basis for each respective dam.** **See Chapter 4.4 Dam Failure for additional information on high and medium hazard dams in Foster County. A full list of dams in Foster County can be found in the hazard history for the county on a disc at the beginning of this plan.**		
Hazards Addressed	Dam Failure, Flood, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdictions	Foster County and incorporated jurisdictions		
Project Status	Ongoing and continue		
Priority	Very High		
Responsible Agency	Emergency Management		
Partners	City Councils, County Commission, 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
5	4	4	5	5	1	5	29

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP Foster County Hazard Mitigation Plan Foster 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.

Foster 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.

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.**		
Hazards Addressed	Drought, Fire (Wildland), Flood (overland and riverine), Hazardous Material Release, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	Ongoing and Continue/New		
Priority	Very High		
Responsible Agency	County Commission, FHWA, FRA, NDDOT, Public Works, Water Resource Board		
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
5	5	4	5	5	2	5	31

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan 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 councils.

Foster 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: Wing walls on Hofmann Bridge: one-mile west and two miles south of Grace City. Close old Hofmann bridge (one-mile south and one-mile west of Grace City) and build a new access road to the west side of the James River.

Culverts: Add new/resized culverts on Kelly Creek.

Pipes (stormwater):

Railroads:

Road Retrofits and/or Grade Raises: Grade raise and re-place McHenry Road 3.5 miles east of McHenry due to rising water from Alkali Lake.

Underpasses:

Foster 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 **Cots were purchased and stored in the basement of the Carrington Armory. Cots are still needed for all remaining shelters.** **Upgrade:** Carrington Armory, Carrington High School, Midkota Public School, Schoolhouse Café in Grace City, McHenry Fire Hall **New:** City of Carrington, City of Glenfield, City of Grace City, City of McHenry		
Hazards Addressed	All		
Affected Jurisdiction(s)	Foster 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), NDDES, 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 Pre-Disaster Mitigation Grant Program (PDM).		

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	4	28

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Approval by county commission, city councils, and private house/community owners

Foster County Project I-4: Retrofit and/or upgrade the Foster County Courthouse substructure to mitigation impacts from flooding (ground seepage) and geologic hazards.

Description/Benefit	Ground seepage causes interior flooding in the basement of the Foster County Courthouse during high precipitation years. When the fill underneath the concrete that comprises the basement floor is saturated it expands causing the flooring to heave. When the fill dries out it causes the concrete to contract which in turn causes voids in the floor. The basement is the location of social services, housing authority, veterans' affairs office, and the maintenance supervisor office. The floor currently poses a tripping hazard to county employees and the public. Also, the electrical infrastructure/panels, fiberoptic infrastructure, and drinking/potable water and sanitary sewer infrastructure connect to the building in the basement. The basement also is the location of vaults containing historical archives for the county. Drain tile was installed spring 2021 to draw excess moisture away from the building. The effectiveness of the drain tile is not known until the existing substructure is removed. **See Figures 6.2, 6.3, and 6.4 on the following pages.**		
Hazards Addressed	Cyberattack, Drought, Flood, Geologic Hazard, Infectious Disease, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and incorporated jurisdictions		
Project Status	New		
Priority	Very High		
Responsible Agency	County Commission, Foster County Auditor, EAPC Architects		
Partners	Emergency Management, Emergency Services, Public Health, Social Services		
Completion Timeframe	2 to 3 years	Cost	TBD
Funding Source	Local, state, and federal grants. FEMA's Building Resilient Infrastructure and Communities (BRIC) Grant.		

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	1	1	23

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County Courthouse General/Improvement Fund Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Approval of scope of work by county commission. Apply for grant funding. Execute.

Figure 6.2 – Foster County Courthouse Substructure Heaving #1

Source(s): Foster County

Figure 6.3 – Foster County Courthouse Substructure Heaving #1

Source(s): Foster County

Figure 6.4 – Foster County Courthouse Substructure Heaving #1

Source(s): Foster County

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 Foster 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 Foster 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 Foster 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

Capability for mitigation is divided into four categories: administrative and technical, education and outreach, financial, and planning and regulatory.

- 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 Foster County by hazard 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 Foster County. Narratives for incorporated jurisdictions are found in Chapter 8, Jurisdictions. Information on the capabilities of each jurisdiction was gathered at committee meetings 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.

Table 7.1.1 shows the administrative and technical capabilities of the Foster 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. Foster County has an active county commission. The cities of Carrington, Glenfield, Grace City, and McHenry have active city councils.
2. **Foster County has an active local emergency planning committee (LEPC). The cities of Carrington, Glenfield, Grace City, and McHenry are represented by the local emergency planning committee (LEPC).**
3. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have an active mitigation planning committee through the county LEPC.**
4. Foster County and the cities of Carrington, Glenfield, Grace City and McHenry 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) need to be updated.**
5. **Foster County has staff capable of mitigation activities. County staff includes the extension office, auditor's office, tax equalization, emergency management, sheriff's office, and public health. The auditors and emergency services personnel for the cities of Carrington, Glenfield, Grace City, and McHenry are capable of mitigation activities. Additional staff capable of mitigation activities in the city of Carrington include the public works director, chief of police, city librarian, medical center administrator, and economic development director.**
6. Foster County has a park board through the Foster County Commission. The cities of Carrington and Grace City have park boards separate from their city council. The city councils of Glenfield and McHenry serve as the park board.
7. Foster County has a planning commission separate from the Foster County Commission. The city of Carrington has planning commission separate from the city council. The cities of Glenfield, Grace City, and McHenry have planning commissions through their city councils.
8. Foster County and the city of Carrington have a zoning administrator. The cities of Glenfield, Grace City, McHenry zoning administrators through their city councils.
9. Foster County and the city of Carrington have a planning and zoning board. The cities of Glenfield, Grace City, and McHenry have a planning and zoning board through their city councils.
10. The Foster County Public Health Board serves Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry.
11. Foster County has a water resource board. The cities of Carrington, Glenfield, Grace City, and McHenry have a water resource board through Foster County.
12. Foster County has a weed board. The cities of Carrington, Glenfield, Grace City, and McHenry have a weed board through Foster County.

Staff

1. Foster County has a part-time 9-1-1 coordinator. The cities of Carrington, Glenfield, Grace City, and McHenry receive 9-1-1 coordination through Foster County.

2. **Foster County and the cities of Glenfield, Grace City, and McHenry do not have a building official/inspector/board. The city of Carrington has a building inspector.**
3. Community planner/planning services are available to Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry through the regional council or other contracted services.
4. Foster County has a part-time emergency manager. The cities of Carrington, Glenfield, Grace City, and McHenry receive emergency management services through Foster County.
5. Foster County has law enforcement services through the Foster County Sheriff's Office. Ambulance protection is provided to Foster County and the cities of Carrington and Grace City through Carrington Ambulance Services. The cities of Glenfield and McHenry receive ambulance services through McHenry Ambulance. The city of Carrington has its own police department. The cities of Carrington, Glenfield and McHenry have their own fire department. The city of Grace City does not have its own fire department and receive fire services from Carrington Fire Dept. and McHenry Fire Dept.
6. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have a full-time engineer on-staff. Engineering services are provided by contract and/or on as-needed basis.
7. Foster County has a floodplain administrator. The auditor serves as the floodplain administrator for the cities of Carrington, Glenfield, Grace City, and McHenry.
8. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry can obtain GIS services through their respective engineering contract or another private entity.
9. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have staff with grant writing and administration capability through their respective auditor and/or other city/county staff.
10. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry receive public health services through Foster County Public Health.
11. The Foster County Road Department serves as the public works department for Foster County. The cities of Carrington, Glenfield, Grace City, and McHenry each have its own public works employee(s).
12. Foster County has a full-time Sheriff and two deputies. The Foster County Sheriff's Office provides law enforcement services through mutual aid to the cities of Carrington, Glenfield, Grace City, and McHenry.

Technical

1. **Emergency services in Foster County and the city of Carrington have GIS/GPS capabilities through the Computer Aided Dispatch (CAD) system administered through state radio. Emergency services in the cities of Glenfield, Grace City, and McHenry are not GIS/GPS capable. Emergency services personnel use app-based services on their mobile devices.**
2. Foster County does not have any manually-activated emergency sirens outside of incorporated city jurisdictions. The siren at the armory in the city of Carrington is manually-activated and radio-activated. The cities of Glenfield, Grace City, and McHenry do not have manually-activated sirens.
3. Foster County has a radio-activated emergency siren at Juanita Lake. The city of Carrington has three radio-activated sirens. These sirens can also be activated by the Z-Tron at the Carrington Fire Hall. The cities of Glenfield, Grace City, and McHenry do not have radio-activated sirens.
4. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not maintain municipal fire breaks.

Table 7.1.1 – Administrative and Technical Capabilities – Foster County, ND

	Administrative and Technical Mitigation Capability	Foster County	City of Carrington	City of Glenfield	City of Grace City	City of McHenry
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		X			
3	Community Planner/Planning Services	*	*	*	*	*
4	Emergency Management/Local Coordinators	X	*	*	*	*
5	Emergency Services (ambulance, fire, law enforcement)	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	X	*	*	*	*
11	Public Works and/or Road Department	X	X	X	X	X
12	Sheriff	X	*	*	*	*
Technical						
1	Emergency Services GIS/GPS capable					
2	Emergency Siren (manually-activated)		1			
3	Emergency Siren (radio-activated)	1	3			
4	Fire Break					
5	Fire Index Sign	X	X^			
6	Fire ISO Rating		5/5B			
7	Firewise Certification					
8	Generator (permanent)	1	1			
9	Generator (portable)	3	2	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	X	X	*	*	*
15	Warning Systems/Services	X*	X*	*	*	*

5. Foster County does not have a fire index sign. **Carrington Fire Dept. owns a fire index sign, but it still needs to be installed.** The cities of Glenfield, Grace City, and McHenry do not have fire index signs.
6. Foster County does not have a county-wide fire department and therefore does not have a fire ISO rating. The fire ISO rating for Carrington Fire Dept. is five and for Carrington Rural Fire Dept. is 5B. The fire ISO rating for fire departments based in Foster County in shown in Table 7.1.1.
7. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have Firewise Certification.
8. Foster County has a permanent generator at the Foster County Courthouse. The county needs an upgraded permanent generator for Foster County Public Health. The city of Carrington has a permanent generator at the city's water treatment plant. The city of Carrington needs permanent generators for its city hall, fire hall, and police station. The cities of Carrington, Glenfield, Grace City, McHenry do not have portable generators. The public school in Glenfield needs a permanent generator. Meeting participants during the planning process of this plan update indicated all permanent generators in Foster County and incorporated jurisdictions need to be upgraded.

   See Chapter 6, Mitigation Strategy project AT-4 or Chapter 8, Jurisdictions for a list of generators needed for each incorporated jurisdiction.

9. Foster County has one portable generator stored at the Carrington City Shop. **The generator is nearing its end of useful life and an upgraded portable generator is needed.** The city of Carrington has two portable generators used specifically for its six lift stations. **Therefore, the city of Carrington could use four additional portable generators.** The city of Glenfield also has a portable generator. **The cities of Grace City and McHenry need portable generators.**
10. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have a HAZUS Analysis.
11. The Foster County Road Department and the respective public works department in the cities of Carrington, Glenfield, Grace City, and McHenry conduct infrastructure maintenance on an as-needed basis and/or as-requested.
12. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have navigation signs for emergency services. However, any sign that faces the south needs to be monitored routinely for replacement due to impacts from severe weather, sun bleaching, etc.**
13. N.D. State Radio, city councils, and emergency services (ambulance, fire, law enforcement) report hazard data to county emergency management.
14. Foster County has StormReady Certification that covers the cities of Glenfield, Grace City, and McHenry. The city of Carrington has StormReady Certification.
15. **Foster County has an early warning system called Nixel. The system allows county personnel to create emergency alerts and disseminate them to county residents who are signed up for the service. Foster County residents in the cities of Carrington, Glenfield, Grace City, and McHenry are covered by Nixel.**

Table 7.1.2 shows the education and outreach capabilities of the Foster 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 Foster County where education and outreach can be conducted include Foster County Fair, Junk Fest, the NDSU Extension/Foster County Field Day. Events in the city of Carrington include the Community Picnic hosted by the Carrington Chamber of Commerce, National Night Out, events through the convention and visitor's bureau, the Carrington Farmer's Market, 4th of July parade, Carrington Public School all-school reunion every 5 years. There are no city-hosted events where education and outreach can be conducted in the cities of Glenfield, Grace City, and McHenry.
2. Foster County conducts continuous education and outreach through its social media presence, local newspaper and radio stations to county residents and the cities of Carrington, Glenfield, Grace City, and McHenry.
3. Non-profit organizations/citizen's groups providing public education and outreach in Foster County include, but are not limited, to emergency services (ambulance, fire, law enforcement), church groups, Carrington Senior Citizen's Center, Carrington Healthy Communities Coalition, and the Carrington Youth Center. The cities of Glenfield, Grace City, and McHenry have senior citizen enters that serve as community centers.
4. Foster 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 Foster County include Alliance Pipeline, CP Railway, and N.D. Pipeline Alliance, and Dakota Growers Pasta Plant through Tier II. The Eagle's Club, Lion's Club, and Kiwanis provide funding to various entities in Foster County for education and outreach and host events for local youth. Alliance Pipeline and N.D. Pipeline Alliance host an annual pipeline safety awareness training for local emergency services. CP Railway will host safety awareness trainings upon request.
6. Public Entities providing public education include, but are not limited to, incorporated city councils and emergency services, Foster County Emergency Management, Foster County Sheriff's Office, Central Prairie Social Services, Foster County Public Health, and NDSU Extension/Foster County. Foster County receives public information and outreach from the state of North Dakota and the federal government.
7. The Foster County Local Emergency Planning Committee (LEPC) is a public-private partnership providing education and outreach to Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry. Farm Safety Week is hosted by Farm Bureau in conjunction with Carrington Ambulance Services and McHenry Ambulance.
8. Public schools conduct an annual storm and fire awareness program in conjunction with local emergency services. The Foster County Sheriff's Office also provides education and outreach to public schools. The Foster Soil Conservation District conducts education and outreach to adults and youth through Eco-Day. NDSU Extension/Foster County hosts Ag-In-The-Gym event, Foster county 4-H Program, and other healthy eating programs. Fire departments in Foster County conduct Fire Safety Prevention Week. Farm Safety Week is hosted by Farm Bureau in conjunction with Carrington Ambulance Services and McHenry Ambulance. The Carrington Public School Booster Club and Midkota Public School Booster Club conduct education and outreach. TEEN Cert was conducted at Carrington Public School and Midkota Public School in 2019.

9. Facebook pages maintained by Foster County to provide education and outreach to county residents include Foster County Emergency Management, Foster County Public Health, and Foster County Sheriff's Office. Bordulac Bar & Grill located in the unincorporated city of Bordulac also has a Facebook Page. Facebook pages maintained by entities in the city of Carrington to provide education and outreach include the city of Carrington, Carrington Chamber of Commerce, Carrington Economic Development, Carrington Fire Dept., Carrington City Library, Carrington Healthy Communities Coalition, Carrington News.com, Carrington Police Department, Carrington Public School, and CHI-St. Alexius Health Carrington Medical Center. Facebook pages maintained by entities in the city of Glenfield includes Midkota Public School and Re-Bar & Grill. Facebook pages maintained by entities in the city of McHenry includes the city of McHenry and Bucks n' Does Bar & Grill. Facebook pages maintained by entities in the city of Grace city includes the Schoolhouse Café.
10. **Foster County and the city of Carrington maintain websites with hazard education and outreach media. The cities of Glenfield, Grace City, and McHenry do not maintain websites with hazard education and outreach media. Carrington Public School and Midkota Public school maintain websites with hazard education and outreach. CarringtonNews.com also maintains a website.**

Table 7.1.2 – Education and Outreach Capabilities – Foster County, ND

	Education and Outreach Mitigation Capability	Foster County	City of Carrington	City of Glenfield	City of Grace City	City of McHenry
1	County/City Events	X	X			
2	County Emergency Management	X	*	*	*	*
3	Non-Profit Organizations/Citizen Groups	X	X	X	X	X
4	Other					
5	Private Entities	X	X	*	*	*
6	Public Entities	X	X	X	X	X
7	Public-Private Partnerships	X	*	*	*	*
8	School Programs	*	X	X	*	*
9	Social Media	X	X	X	X	X
10	Website with Hazard Education	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 Foster 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. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry 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 Carrington has

a one-percent sales tax, of which 75 percent of revenue raised is dedicated Carrington Economic Development.

2. **Foster County issues building permits for non-agriculture related buildings on a flat-fee basis. The city of Carrington issue building permits at a cost based on the overall valuation of each project. The cities of Glenfield, Grace City, and McHenry do not issue building permits.**
3. **Foster County has a capital projects fund used specifically for repairs and/or improvements the Foster County Courthouse. The city of Carrington has a capital projects fund but is currently inactive. The cities of Grace City, and McHenry do not have a capital improvements fund/line items in local budgets. The city of Glenfield has a wish fund that acts as a capital improvements fund.**
4. The Foster County does not qualify for funding through the Community Development Block Grant (CDBG) as it does not meet the low-to-moderate income requirement. Eligibility status of the cities of Carrington, Glenfield, Grace City, and McHenry can be obtained by contacting the South Central Dakota Regional Council in Jamestown. Put in projects for the cities – call the regional council.
5. Otter Tail Power Company and Northern Plains Electric Cooperative implements a facility charge on the electric usage bill for customers in Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry.
6. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry qualify for grant funding through FEMA because Foster County has an approved multi-hazard mitigation plan.
7. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry issue general obligation bonds and/or special tax bonds to raise revenue, if warranted.
8. **The Foster County Fair Association has utilized the N.D. Endowment Fund and received a grant to purchase a portable stage. Foster County received grants from BlueCross BlueShield of North Dakota, Carrington Community Endowment Fund, Carrington Kiwanis, Garrison Diversion for funding of projects in the county. The Carrington Fire Dept. has utilized funding through the N.D. Endowment Fund for investments in equipment. Alliance Pipeline and CP Railway have Community Give Back Grants that provides funding to the county and incorporated cities**
9. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have impact fees for new development.**
10. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry did not identify any "Other" financial mitigation capabilities such as a road district, street maintenance, or wheel tax.
11. Otto Bremer Trust is a private entity providing financial assistance for mitigation activities in Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry. Dakota Growers provides funding to the Carrington Fire Dept. for training and equipment needs. Northern Plains Electric Cooperative has Operation Roundup, which is where the utility rounds up individual monthly bills to then investment into community capital improvements.
12. Property taxes are the primary source of revenue for Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry.
13. **Foster 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. An on-site sewer treatment system permit. The cities of Carrington, Glenfield, Grace City, and McHenry administer sanitary sewer utility fees to maintain existing systems and current operations.**

14. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have access to state funding programs. The Garrison Diversion Conservancy has grant money available for building or enhancing recreational facilities.
15. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have a storm water utility fee.**
16. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry and do not assess water utility fees for their respective municipal drinking/potable water systems.**

Table 7.1.3 – Financial Capabilities – Foster County, ND

	Financial Mitigation Capability	Foster County	City of Carrington	City of Glenfield	City of Grace City	City of McHenry
1	Authority to Levy Taxes for Specific Purposes (sales tax or special assessments)	X	X	X	X	X
2	Building Permits	X	X			
3	Capital Improvement Fund					
4	Comm. Dev. Block Grant (CDBG)		X	X	X	X
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*	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.

Table 7.1.4 shows the planning and regulatory capabilities of the Foster 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. Foster County and the cities of Glenfield, Grace City, and McHenry do not have an abandoned building/nuisance ordinance. The city of Carrington has an abandoned building/nuisance ordinance.
2. **Foster County and the cities of Glenfield, Grace City, and McHenry have adopted state building codes but lack enforcement. The city of Carrington has adopted state building codes and has enforcement.**

3. **Foster County and the city of Carrington issue building permits. The cost of each permit is project-specific. The cities of Glenfield, Grace City, and McHenry do not issue building permits.**
4. Foster County Emergency Management issues burn bans when necessary. The Foster County Commission manages burn bans and is the decision-maker for lifting bans.
5. **Foster County and the cities of Glenfield, Grace City, and McHenry do not have a capital improvement plan/fund. The city of Carrington has a capital improvement plan/fund.**
6. **Foster County and the cities of Glenfield, Grace City, and McHenry do not have a building official/inspector/board. The city of Carrington has a building inspector.**
7. Foster County has a commercial animal feed operation ordinance. The cities of Carrington, Glenfield, Grace City, and McHenry do not have commercial animal feed operation ordinances.
8. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have a community wildfire protection plan.
9. **Foster County and the city of Carrington have comprehensive plans. The cities of Glenfield, Grace City, and McHenry do not have comprehensive plans.**
10. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have continuity of operations plans, but are not in written documents. Foster County Public Health has a continuity of operations plans. The Carrington Fire Dept has bylaws that act as a continuity of operations plan.**
11. **Foster County and the cities of Carrington, Grace City, and McHenry do not have a crew camp ordinance. The city of Glenfield has a camper ordinance that serves as a crew camp ordinance.**
12. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have drought management plans.**
13. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have easements.
14. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have economic development plans through their local economic development authority/corporation. The county collects the revenue through mils and disperses it to each individual authority/corporation.
15. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have any dams with emergency action plans.
16. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry are included in the state of North Dakota's emergency operations plan.
17. Foster County Public Health maintains an evacuation and shelter plan. The cities of Carrington, Glenfield, Grace City, and McHenry are included in the county's plan.
18. **Foster County and the city of Carrington have FEMA Flood maps as they are enrolled in the National Flood Insurance Program (NFIP). The cities of Glenfield, Grace City, and McHenry are not enrolled and do not have flood maps.**
19. Foster County and the city Carrington have a flood insurance study. The cities of Glenfield, Grace City, and McHenry do not have a flood insurance study.
20. **Foster 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 Carrington, Glenfield, Grace City, and McHenry.**
21. **Foster County and the city of Carrington have flood ordinances. The cities of Glenfield, Grace City, and McHenry do not have flood ordinances.**

Table 7.1.4 – Planning and Regulatory Capabilities – Foster County, ND

	Planning and Regulatory Mitigation Capability	Foster County	City of Cartgn.	City of Glenfield	City of Grace City	City of McHenry
1	Abandoned Building/Nuisance Ordinance		X			
2	Building Codes	X	X	X	X	X
3	Building Permits	X	X			
4	Burn Bans	X	*	*	*	*
5	Capital Improvement Plan/Fund					
6	Chief Building Official/Inspector/Board		X			
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			
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			
19	Flood Insurance Study	X	X			
20	Flood Operations/Management Plan	X	*	*	*	*
21	Flood Ordinance	X	X			
22	Flood Risk Management Feasibility Study	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			
28	Local Emergency Operations Plan	X	*	*	*	*
29	National Flood Insurance Program (NFIP)	X	X			
30	Noise Control Ordinance		X			
31	Pandemic Influenza Response Plan	X	*	*	*	*
32	Planning Commission	X	X	X	X	X
33	Point of Dispensing (POD) Plan	X	*	*	*	*
34	Rural Development Guide					
35	Shelter and Mass Care Plan	X	*	*	*	*
36	Site Plan Review Requirements					
37	Storm Water Management Plan					
38	Strategic Plan	X	X			
39	Subdivision Ordinance					
40	Transportation Plan	*	*	*	*	*
41	Water Conservation Plan					
42	Zoning	X	X			

*Denotes planning and regulatory mitigation capability available through the county, contracted services, or an outside entity. ^ Denotes capability in progress.

22. Foster County and the city of Carrington have a flood risk management feasibility study. The cities of Glenfield, Grace City, and McHenry do not have flood risk management feasibility study.
23. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have a grain bin ordinance.**
24. **Foster County has a multi-jurisdictional multi-hazard mitigation plan that is updated every five years. The cities of Carrington, Glenfield, Grace City, and McHenry are included in this plan.**
25. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have a hazardous materials flow study through the N.D. Dept. of Emergency Services. CP Railway also has a hazardous materials flow study that is available upon request.
26. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have impact fees for new development.**
27. Foster County and the city of Carrington have land use plans in their zoning ordinances. The cities of Glenfield, Grace City, and McHenry do not have land use plans.
28. Foster County and the city of Carrington have separate local emergency operations plans. The cities of Glenfield, Grace City, and McHenry are included in the county's plan. Foster County Public Health has a local emergency operation plan.
29. **Foster County and the city of Carrington are enrolled in the National Flood Insurance Program (NFIP). The cities of Glenfield, Grace City, and McHenry are not enrolled and do not have flood maps.**
30. The city of Carrington has a noise control ordinance and an engine break ordinance. Foster County and the cities of Glenfield, Grace City, and McHenry do not have a noise control ordinance.
31. **Foster County Public Health maintains a pandemic influenza response plan. The cities of Carrington, Glenfield, Grace City, and McHenry are included in the county's plan.**
32. The Foster County has a planning and zoning commission. The city councils for the cities of Carrington, Glenfield, Grace City, McHenry serve as the planning and zoning commission.
33. **Foster County Public Health maintains a point of dispensing (POD) plan. The cities of Carrington, Glenfield, Grace City, and McHenry are included in the county's plan.**
34. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have a rural development guide.
35. **Foster County Public Health maintains a shelter and mass care plan. The cities of Carrington, Glenfield, Grace City, and McHenry are included in the county's plan.**
36. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have site plan review requirements.**
37. **Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry do not have storm water management plans.**
38. **Foster County and the cities Glenfield, Grace City, and McHenry do not have a strategic plan. Foster County Public Health a strategic plan. The City of Carrington has a strategic plan.**
39. Foster County and the city of Carrington do not have subdivision ordinances in its zoning ordinances. The cities of Glenfield, Grace City, and McHenry do not have zoning ordinances.
40. Foster County and the cities of Carrington, Glenfield, Grace City, and McHenry have a transportation plan through the N.D. Dept. of Transportation.
41. **Foster County and the cities Carrington, Glenfield, Grace City, and McHenry do not have a water conservation plan.**

42. Foster County and the city of Carrington have zoning ordinances. The cities of Glenfield, Grace City, and McHenry do not have zoning ordinances. All townships in Foster County have relinquished zoning authority to the county.

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 Foster 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 Foster 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 Foster 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

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.

FEMA, Pre-Disaster Mitigation Competitive (PDMC) Grant Program. The PDM 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 PDM program.

FEMA, 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/eqip/

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 Foster 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 Foster County are shown in Chapter 4, Profile and Inventory.

The incorporated cities in Foster County are shown alphabetically in the following chapter.

- 8.1: City of Carrington
- 8.2: City of Glenfield
- 8.3: City of Grace City
- 8.4: City of McHenry

8.1 City of Carrington, North Dakota

The following profile includes information specific to the city of Carrington 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, in section 8.1.4, and in Chapter 6, Mitigation Strategy.

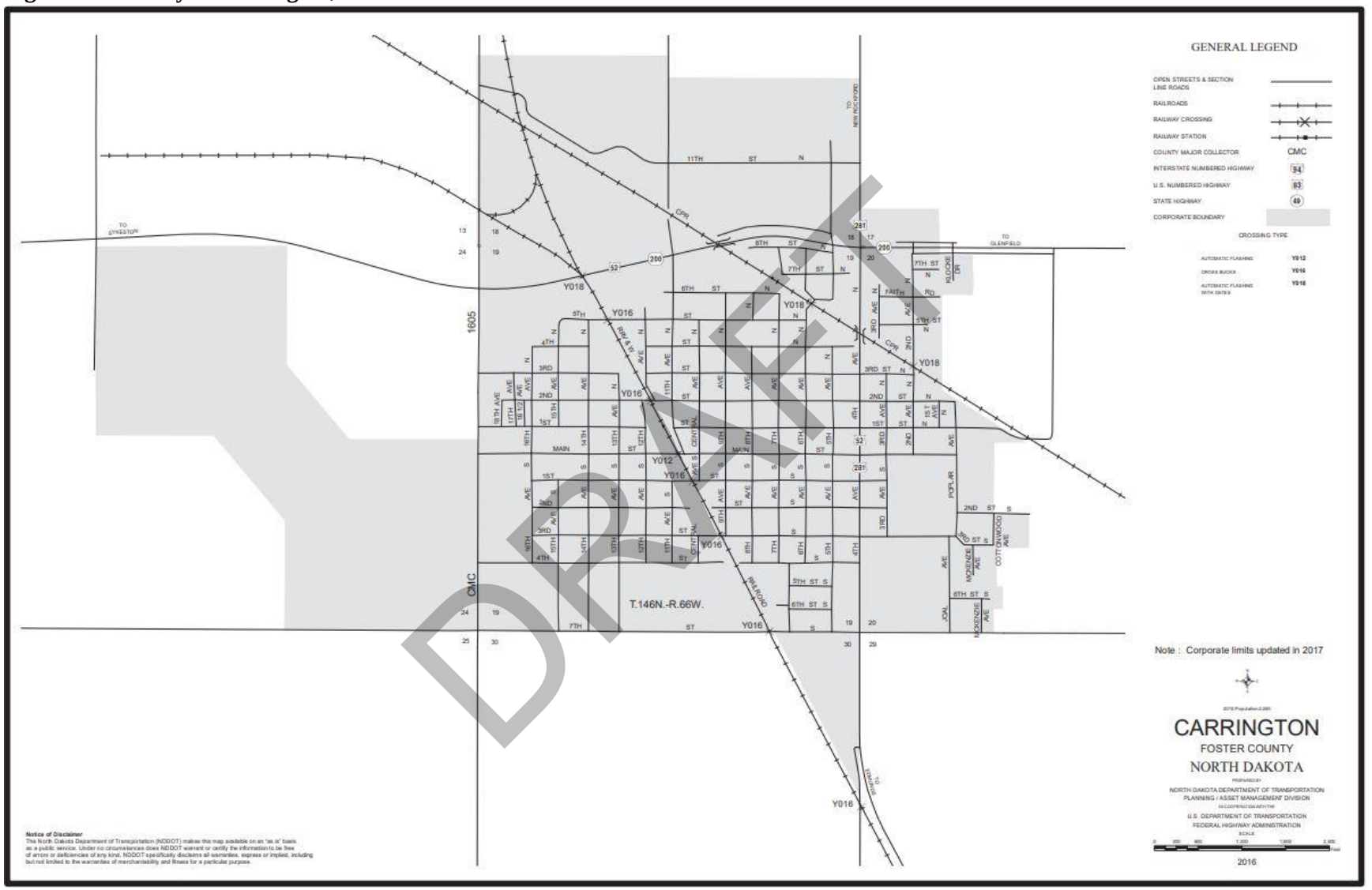
Plan Maintenance

Plan maintenance is shown in section 8.1.6.

Critical Facilities and Infrastructure

Figure 8.1.1 is a map of the city of Carrington provided by N.D. Dept. of Transportation.

Figure 8.1.1 – City of Carrington, 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 Carrington. 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 Carrington is located at the intersection of U.S. Highways 52/281 and N.D. Highway 200, and the crossroads of the Burlington Northern Santa Fe and Canadian Pacific railroads. The city is located approximately 120 miles northeast of the city of Bismarck, the state capital.

Population

Table 8.1.1 shows population trends for the city of Carrington from 1920 to 2010, with an estimate for 2019.

Per the 2010 U.S. Decennial Census, the city of Carrington has a population of 2,065 people, which is a decrease of 203 people (8.9 percent) from 2,268 people in 2000.

Table 8.1.1 – 1920 to 2010 City of Carrington, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	*2019 (est.)*
1,420	1,717	1,850	2,101	2,438	2,491	2,641	2,267	2,268	2,065	*1,980*

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2015 to 2019 American Community Survey 5-Year Estimate, the population of the city of Carrington consists of 497 individuals under the age of 20 and 504 individuals aged 65 and older.

Daycares. There are three daycares in the city of Carrington – Darline's Kiddy Corner, Carrington Preschool, and Small Steps.

Poverty. Per the 2015 to 2019 American Community Survey 5-Year Estimate, there are 84 households in the city of Carrington that live below the poverty line.

Public Schools. The Carrington Public School is in the city of Carrington. Children living in the city of Carrington and surrounding area, including rural Foster, Stutsman, and Wells Counties, attend the school.

Senior Housing Developments/Care Centers. Age-restricted and/or senior housing developments in the city of Carrington include Poplar Drive Court Apartments. The Golden Acres Manor is the only care center in the city of Carrington and greater Foster County.

Housing Units and Household Size

The 2015 to 2019 American Community Survey 5-Year Estimate shows there is a total of 1,114 housing units in the city consisting of 892 single-family homes, 16 mobile/RV homes, and 206 multifamily homes.

The 2015 to 2019 American Community Survey 5-Year Estimate shows there are 946 households in the city of Carrington resulting in an average household size of 2.15 people.

Businesses

Major employers in the city of Carrington include Dakota Growers Pasta Company, CHI-St Alexius Health Carrington Medical Center, Dakota Central, Northern Plains Cooperative, Leading Edge Equipment, High Plains Equipment, and Ottertail Power Company. Additional information on businesses and economic development in the city of Carrington or can be obtained by contacting Carrington Economic Development.

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 2015 and new and future development is anything planned, pending, and proposed development under construction.

New

Future

Critical Facilities. The following facilities were identified as critical in the city of Carrington.

- Carrington City Hall/Community Center
- Carrington Fire Hall
- Carrington Police Station
- CHI-St. Alexius Health Carrington Medical Center
- Foster County Courthouse

Infrastructure. The following infrastructure was identified as critical in the city of Carrington.

- The city of Carrington has a sanitary sewer with four lagoon cells and six lift stations.
- The city maintains a water tower and an underground water storage tank for drinking/potable water and fire suppression.
- The city of Carrington has an inert landfill.
- The city is of Carrington is located at the intersection of U.S. Highways 52/281 and N.D. Highway 200.
- The city is located at the crossroads of Canadian Pacific (CP) and Red River Valley & Western (RRVW) Railroads.

Emergency Response Services. The following emergency response services were identified in the city of Carrington.

- Foster County Ambulance provides ambulance services to the city of Carrington.
- The Carrington Fire Department provides fire protection services to the city of Carrington and the Carrington Rural Fire Protection District provides fire protection services to surrounding rural areas.
- The Carrington Police Department provides law enforcement services to the city of Carrington. The Foster County Sherriff's Office provides law enforcement services when requested.
- The nearest hospital is the CHI-St. Alexius Health Carrington Medical Center in the city of Carrington.
- Foster County Public Health is in the city of Carrington and provides public health services to the city of Carrington and greater Foster County.

Services and Utilities. The following services are provided in the city of Carrington.

- The city of Carrington provides garbage collection services to its residents.
- The city of Carrington maintains an inert landfill.
- The city of Carrington has its own sanitary sewer system consisting of six lift stations and four lagoon cells. There are no active septic systems in the city limits.
- The city has a storm water system consisting of bricks and mortar.
- The Foster County Independent is the official newspaper of the city of Carrington.
- The city of Carrington provides drinking/potable water to the city of Carrington.
- Electricity is provided by Otter Tail Power and Northern Plains Electric Cooperative.
- Natural gas is provided by Montana-Dakota Utilities in the city of Carrington.

- 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.

8.1.2 Risk Assessment and Hazard Scoring Notes

Table 8.1.2 summarizes the risk assessment scoring of the city of Carrington. 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 Foster County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment Scoring Summary

Risk Assessment			**Jurisdiction: City of Carrington**			
Natural Hazard	**Impact**	**Frequency**	**Likelihood**	**Vulnerability**	**Capabilities**	**Total**
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (Rural)						
Flood						
Geologic Hazard						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Adversarial Threats						
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Technological Threats						
Dam Failure						
Hazardous Material Release						
Transportation Incident						

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

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment

	Civil Disturbance	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • 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	• Never an occurrence of a major incident	• DAPL protesters were not active in the city
Likelihood	<u>More likely</u> • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	<u>Less likely</u> • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or significant tourist attraction • Presence of city police department and headquarters of county sheriff's office
Vulnerability	<u>More vulnerable</u> • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	<u>Less vulnerable</u> • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or a significant tourist attraction • Presence of city police department and headquarters of county sheriff's office

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment - Continued

	Criminal, Terrorist, Nation-State Attack	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • 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	• No occurrences • Miscellaneous property damage occurring in the city on an occasional basis	
Likelihood	<u>More likely</u> • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	<u>Less likely</u> • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or significant tourist attraction • Presence of city police department and headquarters of county sheriff's office
Vulnerability	<u>More vulnerable</u> • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	<u>Less vulnerable</u> • Sparse population • County not located near a major metropolitan population, international airport, stadiums, or a significant tourist attraction • Presence of city police department and headquarters of county sheriff's office

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	• Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release	• Human Injury/Death • School Closure • **Loss of Communication Systems** • Identity Theft – loss of wages and/or assets
Frequency	• Never an occurrence of a major attack	
Likelihood	More Likely • Carrington Public School • Foster County Courthouse • City utilities utilizing SCADA systems • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	Less Likely • Lack of major financial institutions or communication infrastructure
Vulnerability	More Vulnerable • Elderly population relying largely on landlines for communication purposes, remote medical care and equipment monitoring • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	Less Vulnerable • Lack of major financial institutions or communication infrastructure

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment - Continued

	Drought	
Impact	• 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	• Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds	• End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020
Likelihood	<u>More Likely</u> • Dry/wet cycle every five to eight years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation	<u>Less Likely</u> • Heavy precipitation
Vulnerability	<u>More Vulnerable</u> • Wildlife & hunting economy • Agriculture economy • Elderly population • Flat terrain/open topography contributes to conditions • Pastureland adjacent to structures and city limits • **City has a fire index sign but it needs to be installed**	<u>Less Vulnerable</u> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDES • Advanced communications such as internet and TV • City has a water tower

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment - Continued

	Dam Failure	
Impact	• 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**	• 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	• Never an occurrence	
Likelihood	More likely • 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**	Less likely • Dry periods of weather with little to no rain or lack of heavy snow fall • State agencies ongoing and continuous maintenance
Vulnerability	More vulnerable • Tier II sites and pipelines located in inundation areas • Lack of alternative housing or shelters to house displaced residents • Dover Dam west of the city of Carrington • Tollefson Dam east of the city of Carrington	Less vulnerable • Annual and ongoing dam inspections & routine maintenance • Foster County Nixle-Everbridge

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment - Continued

	Fire – Urban Fire/Structure Collapse	
Impact	• Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release	• Human Injury/Death • Increase Fire Potential • **Property damage on a significant scale if impacting downtown structures**
Frequency	• Occurrences of structures/vehicles being impacted every other year • **September 22, 2012.** Residential fire east of the city of Carrington approximately six miles resulting in the death of the owner. The cause of the fire is suspected to be a space heather. The fire required over 18,000-gallons of water to be ferried to the site.	• **Tufte Fire - February 25, 2017.** The initial call was received around 5 o'clock. The fire started in the same room where the children were sleeping and was noted most likely due to an electric space heater. There were no working smoke alarms in the home and the fire was found because the father had woken up to a noise. The three children perished and the family also lost their dog in the fire. That weekend six crew members were attending fire school in Minot. All crew members came back to relieve the first responding crew.
Likelihood	<u>More Likely</u> • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	<u>Less Likely</u> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Well-equipped fire department with trained volunteers
Vulnerability	<u>More Vulnerable</u> • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • **Fire Hall does not have a permanent or portable generator** • **Prolonged response times due to limited fire staff during the daytime** • **Presence of abandoned properties** • Presence of Tier II sites • Major industrial development (Dakota Pasta Growers)	<u>Less Vulnerable</u> • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Well-equipped fire department with trained volunteers • City has a water tower • Street signage for emergency services

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Fire – Rural & Wildland	
Impact	• 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	• 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	More Likely • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Severe summer weather with significant lightning • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites	Less Likely • Removal of CRP near city limits • Summer and winter weather with heavy precipitation
Vulnerability	More Vulnerable • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • **Lack of fire breaks around city limits** • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites • City has a fire index sign but it needs to be installed	Less Vulnerable • 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

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Flood	
Impact	**Blocked Roads:** • 5th Avenue South between 2nd St. North and 2nd St. South • 3rd St. North and 9th Avenue by the old grade school – two blocks in any direction • Intersection of Main St. and 12th Avenue • Intersection of 10th Ave and 1st St. North	• Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • **Runoff from buildings causes overland flooding**
Frequency	• Bi-annual occurrences of localized flooding of nearby township roads and highways • **Annual overland flooding occurrences at blocked roads listed above**	• Flash flooding occurs from heavy precipitation
Likelihood	More Likely • Rapid change of seasons resulting in excessive snow melt • High water table	Less Likely • Dry seasons and low precipitation • City performs storm water maintenance
Vulnerability	More Vulnerable • Rapid change of seasons resulting in excessive snow melt • High water table • Local topography of the city with closed basins • **The city's sanitary sewer and storm water systems are designed in a "barrel-vault" style with the sanitary sewer lines located directly above the storm water lines. The storm sewer system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence (sinkholes). The system is comprised mostly of clay tile, which allows ground water to infiltrate the system. Sinkholes in the system have resulted in city streets eroding, which has the potential to collapse.**	Less Vulnerable • Alternate routes were identified for townships roads • City performs storm water drainage maintenance • City enrolled in NFIP • City has flood ordinances

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Geologic Hazard	
Impact	• Delayed Emergency Response • Human Injury/Death • Loss of Economy	• Loss of Power • Property Damage
Frequency	• No incidents involving geologic hazards in or near city limits	
Likelihood	More Likely • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Likely • 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	More Vulnerable • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Vulnerable • 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 Carrington Jurisdiction Risk Assessment – Continued

	Hazardous Material Release	
Impact	• 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	• Small incidents of leaking anhydrous tanks bi-annually • Never any major pipeline spills reported • **See history section in Chapter 4.9 for a list of spill history in the city of Carrington**	
Likelihood	More Likely • Transportation of chemicals by truck through city limits • U.S. Highways 52/281 and N.D. Highway 200 • Storage of chemicals/fertilizers in city limits • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites	Less Likely • Private companies have HAZMAT certifications • Fire department has HAZMAT response training
Vulnerability	More Vulnerable • Transportation of chemicals by truck through city limits • U.S. Highways 52/281 and N.D. Highway 200 • Storage of chemicals/fertilizers in city limits • Presence of natural gas pipeline • City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western) • Presence of Tier II sites	Less Vulnerable • Fire departments have some HAZMAT training • Foster County Nixle-Everbridge • CHI-St. Alexius Health Carrington Medical Center • Fire department has HAZMAT response training

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Infectious Disease	
Impact	• 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	• 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	More Likely • 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	Less Likely • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
Vulnerability	More Vulnerable • Growing elderly population • Small population of children without immunization • Agriculture economy • Presence of abandoned properties and overgrown lots • **Golden Acres Manor** • **Carrington Public School**	Less Vulnerable • Advanced communications such as internet and tv • Public health and employment regulations for public facilities Immunizations & medications of local population • **CHI-St. Alexius Health Carrington Medical Center** • **Veterinarian services in the city**

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Severe Summer Weather	
Impact	**Blocked Roads:** • 5th Avenue South between 2nd St. North and 2nd St. South • 3rd St. North and 9th Avenue by the old grade school – two blocks in any direction • Intersection of Main St. and 12th Avenue • Intersection of 10th Ave and 1st St. North • 3rd St. South and McKenzie Avenue	• 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	• Property damage from tornados/straight-line winds in summer 2017 and 2019 • Windstorms occurring annually	• Annual occurrences of hailstorms • Two or three significant storms producing damage to trees and property annually
Likelihood	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	More Vulnerable • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Manual-activated emergency siren at Carrington Armory** • **Lack of permanent generators at critical facilities and infrastructure – See Project 1** • **The city's sanitary sewer and storm water systems are designed in a "barrel-vault" style with the sanitary sewer lines located directly above the storm water lines. The storm sewer system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence (sinkholes). The system is comprised mostly of clay tile, which allows ground water to infiltrate the system. Sinkholes in the system have resulted in city streets eroding, which has the potential to collapse.**	Less Vulnerable • Advanced warning and notification such as internet and TV • Adopted building codes and has enforcement • **Manual-activated emergency siren at Carrington Armory**

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Severe Winter Weather	
Impact	**Blocked Roads:** • All of 11th Ave North • Main St. from Golden Acres Manor to 66th Ave on the west side of the city • 16th Ave from Main St. to 3rd St. South • Pasta Ave near Dakota Growers Pasta Plant • 11th St. North • Any curvilinear streets and cul-de-sacs in city limits	• Evacuation (Localized) • Human Injury/Death – wind chill • Property Damage – repair of roofing, siding and drainage systems for homes, vehicles, sewer backups • Loss of Crops • Loss of Livestock • Loss of Power/Downed Power Lines • Shelter-in-place • **Infrastructure Degradation**
Frequency	• 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	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	More Vulnerable • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Manual-activated emergency siren at Armory** • **Lack of permanent generators at critical facilities and infrastructure – See Project 1** • **The city's sanitary sewer and storm water systems are designed in a "barrel-vault" style with the sanitary sewer lines located directly above the storm water lines. The storm sewer system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence (sinkholes). \Sinkholes in the system have resulted in city streets eroding, which has the potential to collapse.** • **City's snow-go snowblower is an outdated model and breaks down frequently. Replacement parts are hard to find resulting in the equipment being out of commission for extended periods of time.**	Less Vulnerable • Advanced warning and notification such as internet and TV • Adopted building codes and has enforcement • **Manual-activated emergency siren at Carrington Armory**

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Space Weather
Impact	• Loss of operation of the city hall, fire hall, critical facilities, lift station, etc. • Loss/outage of medical devices at private residences • Property damage from sewer backups due to loss of lift station
Frequency	• Never a recorded occurrence in Foster County or North Dakota
Likelihood	• 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	More Vulnerable • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent generator at pumphouse, lift station, community center, and fire hall • **Carrington Public School** • **CHI-St. Alexius Health Carrington Medical Center** • **Golden Acres Manor** Less Vulnerable • Local food production/households with gardens

Table 8.1.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Transportation Incident	
Impact	• **Blocked roads from inadequate road clearing** • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities	• 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	• Annual occurrences of accidents involving cars and/or farm equipment • Semi-rolled over at the roundabout at the intersection of U.S. Highways 52/281 and N.D. Highway 200 in October 2021	
Likelihood	More Likely • Intoxicated drivers • **High truck traffic from agriculture-related traffic**	Less Likely • No commercial passenger airport • Decrease in oil trains (from a frequency of one per hour) one the DAPL opened in 2017
Vulnerability	More Vulnerable • Intoxicated drivers • **High truck traffic from agriculture-related traffic** • U.S. Highways 52/281 and N.D. Highway 200 • **City is at the intersection of railroad infrastructure (Canadian Pacific and Red River Valley & Western)** • Presence of Tier II sites • Semis take the roundabout at intersection of U.S. Highways 52/281 and N.D. Highway 200 too fast • Wildlife	Less Vulnerable • No commercial passenger airport • **Presence of designated truck routes through city limits** • Fire departments have some HAZMAT training • Foster County Nixle-Everbridge • CHI-St. Alexius Health Carrington Medical Center • Roundabout at intersection of U.S. Highways 52/281 and N.D. Highway 200

8.1.3 Mitigation Strategy

The Foster 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 Carrington. It should be noted that some mitigation projects that pertain to all jurisdictions are included to encourage county-wide collaboration.

Problem Statement

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City of Carrington Project 1: Install generators at critical facilities and infrastructure.

Description/Benefit	Test existing generators and create regularly scheduled maintenance system. Install new generators to establish permanent source of backup power to maintain continued operation of the following critical facilities and infrastructure. New (permanent): Carrington Ambulance Bay, Carrington Armory (Emergency Operations Shelter), Carrington City Hall, Carrington Fire Hall, Carrington Police Department, Carrington Public School, CHI-St. Alexius Health Carrington Medical Center, Golden Acres Manor/Estates, master lift station. Upgrade (permanent): CHI-St. Alexius Health Carrington Medical Center, Foster County Courthouse, Foster County Public Health New portable: Carrington Fire Hall, Carrington Police Department, lift stations		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	City of Carrington and Foster County		
Project Status	New/Ongoing and Continue		
Priority	Very High		
Responsible Agency	City Council(s), County Commission, Emergency Services, Public Works, Carrington Public School, Public Health		
Partners	Emergency Management, Carrington Economic Development, Public Utilities, CHI-St. Alexius Health Carrington Medical Center, Golden Acres Manor/Estates		
Completion Timeframe	Ongoing	Cost	Project-specific
Funding Source	Public Utilities, Regional Council, RD. FEMA's Building Resilient Infrastructure and Communities (BRIC) Grant Program. State Homeland Security grants. 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	4	5	3	5	31

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Carrington Comprehensive/Land Use Plan Carrington Continuity of Operations Plan Carrington Strategic Plan Foster County LEOP & Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Include in city, county and/or local department's budget. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval by city council, county commission, or board.

City of Carrington Project 2: Upgrade manually-activated outdoor emergency siren at the Carrington Armory.

Description/Benefit	The outdoor emergency sirens at the Carrington Armory is manually activated and needs to be upgraded to provide radio-activation/dispatch-activation.		
Hazards Addressed	All		
Affected Jurisdiction(s)	City of Carrington		
Project Status	New/Ongoing and Continue		
Priority	High		
Responsible Agency	City Council(s), Emergency Services		
Partners	County Commission, Emergency Management, NDAC, 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. NDDES. 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Carrington Comprehensive/Land Use Plan Carrington Continuity of Operations Plan Carrington Strategic Plan Foster County LEOP & Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Include in city, county, or fire department's capital improvement plan. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval by city council, county commission, or board.

City of Carrington Project 3: Conduct engineering study to retrofit and/or update critical facilities and infrastructure.

Description/Benefit	The city's sanitary sewer and storm water systems are designed in a "barrel-vault" style with the sanitary sewer lines located directly above the storm water lines. The entire system needs to be redesigned and reconstructed. An engineering study needs to be completed to identify solutions to retrofit/upgrade both systems with the intent to complete separate.		
Hazard/Threat Addressed	Flood (overland), HAZMAT, Infectious Disease, Severe Summer Weather, Severe Winter Weather (All)		
Affected Jurisdiction(s)	City of Carrington		
Project Status	New		
Priority	Very High		
Responsible Agency	City Council(s), Public Works		
Partners	Emergency Management, Emergency Services, DWR, FEMA, NDDES, Public Health, engineering firms, private contractors		
Completion Timeframe	2 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	3	3	3	3	25

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Carrington Comprehensive/Land Use Plan Carrington Continuity of Operations Plan Carrington Strategic Plan Foster County LEOP & Mitigation Plan Foster 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 Carrington Project 4: Conduct engineering study to retrofit and/or upgrade the city's storm water system.

Description/Benefit	The storm sewer system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence (sinkholes). The system is comprised mostly of clay tile, which allows ground water to infiltrate the system. Sinkholes in the system have resulted in city streets eroding, which has the potential to collapse. Heavy precipitation events result in manhole covers popping out of the street. Flooded streets and water has backed-up into homes when the system is at or over capacity essentially becoming man-made overland flooding. • 5th Avenue South between 2nd St. North and 2nd St. South • 3rd St. North and 9th Avenue by the old grade school – two blocks in any direction • Intersection of Main St. and 12th Avenue • Intersection of 10th Ave and 1st St. North		
Hazard/Threat Addressed	Flood (overland), HAZMAT, Infectious Disease, Severe Summer Weather, Severe Winter Weather (All)		
Affected Jurisdiction(s)	City of Carrington		
Project Status	New		
Priority	Very High		
Responsible Agency	City Council(s), Public Works, engineering firms, private contractors, private property owners		
Partners	Emergency Management, Emergency Services, DWR, FEMA, NDDES, Water Resource Board		
Completion Timeframe	2 years	Cost	Project-specific
Funding Source	FEMA's Building Resilient Infrastructure and Communities (BRIC). DWR. Water Resource Board.		

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	3	3	25

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Carrington Comprehensive/Land Use Plan Carrington Continuity of Operations Plan Carrington Strategic Plan Foster County LEOP & Mitigation Plan Foster 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 Carrington Project 5: Update/expand existing and/or create new planning and regulatory capabilities to address existing and new development to strengthen local planning processes.

Description/Benefit	The city of Carrington needs a capital improvement plan to complement or become an annex to the city's strategic plan to strategize investments in critical facilities and infrastructure. The city's comprehensive plan and zoning ordinances need updating. The city's continuity of operations plan and building permits should be evaluated annually. **A list of plans, policies, codes and ordinances is shown in Chapter 7, Capability Assessment.**		
Hazard/Threat Addressed	All		
Affected Jurisdiction(s)	City of Carrington		
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

Planning Mechanisms Utilized	Plan Element	Process for Integration
All	Capability Assessment, Hazard History, Risk Assessment	Develop, review, and approve by city council.

8.2 City of Glenfield, North Dakota

The following profile includes information specific to the city of Glenfield 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.

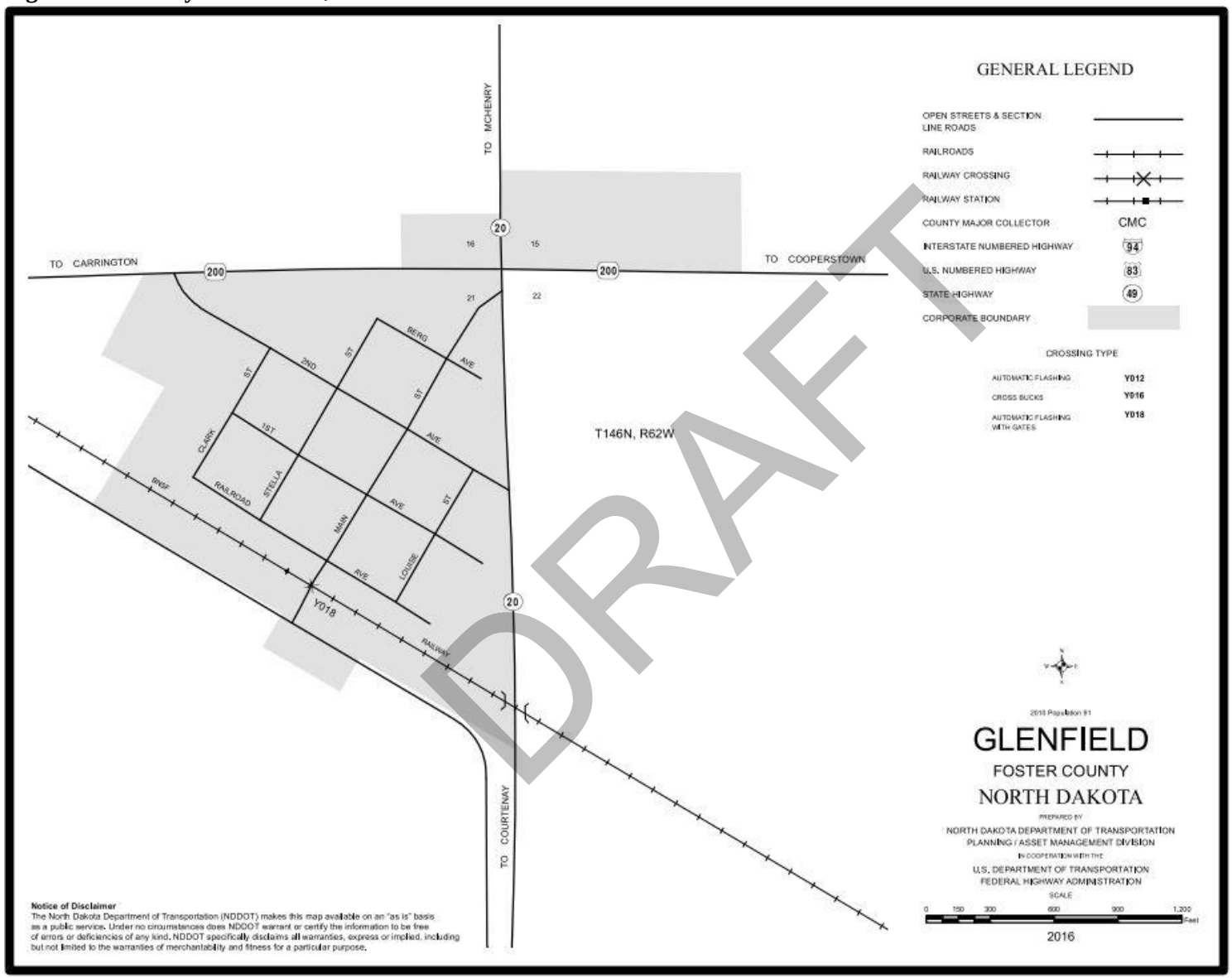
Plan Maintenance

Plan maintenance is shown in section 8.2.6.

Critical Facilities and Infrastructure

Figure 8.2.1 is a map of the city of Glenfield provided by the N.D. Dept. of Transportation.

Figure 8.2.1 – City of Glenfield, 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 Glenfield. 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 Glenfield is located on N.D. Highway 200 approximately 25 miles east of the city of Carrington, the county seat. The Burlington Northern Santa Fe railroad traverses the city.

Population

Table 8.2.1 shows population trends for the city of Glenfield from 1920 to 2020.

Per the 2020 U.S. Decennial Census, the city of Glenfield has a population of 94 people, which is an increase of three people (3.3 percent) from 91 people in 2010.

Table 8.2.1 – 1920 to 2020 City of Glenfield, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
--	--	--	--	129	127	164	118	134	91	94

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2015 to 2019 American Community Survey 5-Year Estimate, the population of the city of Glenfield consists of 40 individuals under the age of 20 and 18 individuals aged 65 and older.

Daycares. There are no daycares in the city of Glenfield.

Poverty. Per the 2015 to 2019 American Community Survey 5-Year Estimate, there is one household in the city of Glenfield that live below the poverty line.

Public Schools. The Midkota Public School is in the city of Glenfield. Children living in the city of Glenfield and surrounding area rural areas of Eddy, Foster, Griggs, Nelson, and Stutsman Counties attend the school.

Senior Housing Developments/Care Centers. There are no age-restricted, senior housing developments, or care centers in the city of Glenfield.

Housing Units and Household Size

The 2015 to 2019 American Community Survey 5-Year Estimate shows there is a total of 54 housing units in the city consisting of 32 single-family homes, 13 mobile/RV homes, and nine multifamily homes.

According to the Mayor of Glenfield, there is a total of 49 housing units in the city consisting of 31 single-family homes, eight mobile/RV homes, and 10 multifamily homes.

The 2015 to 2019 American Community Survey 5-Year Estimate shows there are 42 households in the city of Glenfield resulting in an average household size of 2.38 people.

Businesses

The major employer in the city of Glenfield is the Midkota Public School. Additional information on businesses and economic development in the city of Carrington or can be obtained by contacting Carrington Economic Development.

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 2015 and new and future development is anything planned, pending, and proposed development under construction.

New

- A poll barn constructed in 2018
- A small shop was constructed in 2015
- A new addition to the school was completed in 2018 along with a new parking lot when the Legvik house was moved
- New park equipment was installed
- Two new trailer houses on main street were constructed
- One trailer house was demolished
- A VFW memorial was constructed

Future

- Two properties are scheduled to be demolished within the next year
- Electrical, sewage and new camper hookups are scheduled for spring 2022

Critical Facilities. The following facilities were identified as critical in the city of Glenfield.

- Glenfield City Hall/Community Center
- Glenfield Fire Hall
- Midkota Public School

Infrastructure. The following infrastructure was identified as critical in the city of Glenfield.

- The city of Glenfield has a sanitary sewer with two lagoon cells and a lift station.
- The city maintains an underground water storage tank for drinking/potable water and fire suppression.
- The city of Glenfield does not have an inert landfill.
- The city is of Glenfield is located on N.D. Highways 20 and 200, and the BNSF railroad.

Emergency Response Services. The following emergency response services were identified in the city of Glenfield.

- Griggs County Ambulance provides ambulance services to the city of Glenfield.
- The Glenfield Rural Fire Protection District provides fire protection services to the city and surrounding rural areas.
- The Foster County Sherriff's Office provides law enforcement services to the city of Glenfield.
- The nearest hospital is the CHI-St. Alexius Health Carrington Medical Center in the city of Carrington.
- Foster County Public Health is in the city of Carrington and provides public health services to the city of Carrington and greater Foster County.

Services and Utilities. The following services are provided in the city of Glenfield.

- Brager Disposal of Cooperstown provides garbage collection services to the city of Glenfield.
- The city of Glenfield does not have an inert landfill.
- The city of Glenfield has its own sanitary sewer system consisting of one lift station and two lagoon cells. There are no active septic systems in the city limits.
- The city has a storm water system consisting of culverts and drainage ditches.
- The Foster County Independent is the official newspaper of the city of Glenfield.
- Greater Ramsey Water District provides drinking/potable water to the city of Glenfield.
- Electricity is provided by Otter Tail Power.
- Natural gas is not available in the city of Glenfield.
- Fuel oil and propane are used as an alternative heating source and is provided by companies chosen by the individual consumer. Electric heat is also used as an alternative heating source.
- Moore Liberty Griggs County Telephone Company (MLGC) 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 Glenfield 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 Foster County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment Scoring Summary

Risk Assessment			**Jurisdiction: City of Glenfield**			
Natural Hazard	**Impact**	**Frequency**	**Likelihood**	**Vulnerability**	**Capabilities**	**Total**
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (Rural)						
Flood						
Geologic Hazard						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Adversarial Threats						
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Technological Threats						
Dam Failure						
Hazardous Material Release						
Transportation Incident						

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

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment

	Civil Disturbance	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • Human Injury/Death	• Increased Public Safety Runs • Loss/Overcrowded Medical Facilities • Loss of Potable Water • Property Damage (Structure) • Property Damage (Vehicle) • Mass Casualties/Fatalities • Lockdown of Midkota Public School
Frequency	• Never an occurrence of a major incident	• DAPL protesters were not active in the city
Likelihood	<u>More Likely</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad • City located at intersection of N.D. Highways 20 and 200 – both serve as major agriculture and commercial trucking arteries in the state	<u>Less Likely</u> • Small town with no major regional/state attractions • Sparse population
Vulnerability	<u>More Vulnerable</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad • City located at intersection of N.D. Highways 20 and 200 – both serve as major agriculture and commercial trucking arteries in the state	<u>Less Vulnerable</u> • Small town with no major regional/state attractions • Sparse population

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment - Continued

	Criminal, Terrorist, Nation-State Attack	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • Human Injury/Death • Lockdown of Midkota Public School	• 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	• No occurrences • Miscellaneous property damage occurring in the city on an occasional basis	
Likelihood	<u>More Likely</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad • City located at intersection of N.D. Highways 20 and 200 – both serve as major agriculture and commercial trucking arteries in the state	<u>Less Likely</u> • Small town with no major regional/state attractions • Sparse population
Vulnerability	<u>More Vulnerable</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad • City located at intersection of N.D. Highways 20 and 200 – both serve as major agriculture and commercial trucking arteries in the state	<u>Less Vulnerable</u> • Small town with no major regional/state attractions • Sparse population

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	• Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release	• Human Injury/Death • School Closure • **Loss of Communication Systems** • Identity Theft – loss of wages and/or assets
Frequency	• Never an occurrence of a major attack	
Likelihood	More Likely • Small town with lack of technological infrastructure to defend against cyber attacks • Midkota Public School • Presence of hazardous liquid pipeline • Presence of BNSF railroad	Less Likely • Lack of major financial institutions or communication infrastructure
Vulnerability	More Vulnerable • 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 • Midkota Public School (loss of records) • Presence of hazardous liquid pipeline • Presence of BNSF railroad • Some city records are on paper and not digital	Less Vulnerable • Lack of major financial institutions or communication infrastructure • Some city records are on paper and not digital

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment - Continued

	Dam Failure	
Impact	• 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**	• 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	• Never an occurrence	
Likelihood	More Likely • 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**	Less Likely • Dry periods of weather with little to no rain or lack of heavy snow fall • State agencies ongoing and continuous maintenance
Vulnerability	More Vulnerable • Tier II sites and pipelines located in inundation areas • Lack of alternative housing or shelters to house displaced residents • Dover Dam west of the city of Carrington • Tollefson Dam east of the city of Carrington	Less Vulnerable • Annual and ongoing dam inspections & routine maintenance • Foster County Nixle-Everbridge

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment - Continued

	Drought	
Impact	• 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	• Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds	• End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020
Likelihood	<u>More Likely</u> • Dry/wet cycle every six years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation	<u>Less Likely</u> • Heavy precipitation
Vulnerability	<u>More Vulnerable</u> • 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> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDES • Advanced communications such as internet and TV

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment - Continued

	Fire – Urban Fire/Structure Collapse	
Impact	• Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release	• Human Injury/Death • Increase Fire Potential • **Property damage on a significant scale if impacting downtown structures**
Frequency	• Occurrences of structures/vehicles being impacted every five years	• Three structure fires and three vehicle fires between January 1, 2000, and December 31, 2019.
Likelihood	More Likely • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems	Less Likely • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses
Vulnerability	More Vulnerable • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • **Fire Hall does not have a permanent or portable generator** • **Prolonged response times due to limited fire staff during the daytime** • **Presence of abandoned properties** • **City does not have a water tower** • **Fire department lacks adequate equipment**	Less Vulnerable • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Fire department with trained volunteers • Street signage for emergency services

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Fire – Rural & Wildland	
Impact	• 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** • **Disruption of wildlife habitat**
Frequency	• 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	More Likely • 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 hazardous liquid pipeline • Presence of BNSF railroad • Presence of Tier II sites	Less Likely • Removal of CRP near city limits • Summer and winter weather with heavy precipitation
Vulnerability	More Vulnerable • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • **Lack of fire breaks around city limits** • Presence of hazardous liquid pipeline • Presence of BNSF railroad • Presence of Tier II sites • Lack of fire index sign	Less Vulnerable • 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

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Flood	
Impact	**<u>Blocked Roads:</u>** • School Avenue and Louise Street • Clark Avenue and Church Street • Midkota High School parking lot on School Avenue and Clark Street • Areas near the city park • Area near Tough-T Manufacturing floods	• Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • **Runoff from buildings causes overland flooding** • **Ground seepage around homes**
Frequency	• Bi-annual occurrences of localized flooding of nearby township roads and highways • **Annual overland flooding occurrences at blocked roads listed above**	• Flash flooding occurs from heavy precipitation
Likelihood	<u>More Likely</u> • Rapid change of seasons resulting in excessive snow melt • High water table	<u>Less Likely</u> • Dry seasons and low precipitation • City performs storm water drainage maintenance
Vulnerability	<u>More Vulnerable</u> • 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 / no flood ordinances • **Outdated pumps at the lift station** • City lacks an adequate storm water system • City park in low-lying area • The storm sewer system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence (sinkholes). The system is comprised of copper pipe, clay tile, PVC (in some sections), which allows ground water to infiltrate the system. Sinkholes in the system have resulted in city streets collapsing.	<u>Less Vulnerable</u> • Alternate routes were identified for townships roads • City performs storm water drainage maintenance

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Geologic Hazard	
Impact	• Delayed Emergency Response • Human Injury/Death • Loss of Economy	• Loss of Power • Property Damage
Frequency	• No incidents involving geologic hazards in or near city limits	
Likelihood	More Likely • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Likely • 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	More Vulnerable • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Vulnerable • 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 Glenfield Jurisdiction Risk Assessment – Continued

	Hazardous Material Release	
Impact	• 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	• Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported	
Likelihood	More Likely • Storage of chemicals/fertilizers in city limits • Presence of hazardous liquid pipeline • Presence of BNSF railroad • Presence of Tier II sites • City located at intersection of N.D. Highways 20 and 200 – both serve as major agriculture and commercial trucking arteries in the state	Less Likely • Private companies have HAZMAT certifications • State training for farmers to handle ag chemicals
Vulnerability	More Vulnerable • Agriculture economy and related industries • Storage of chemicals/fertilizers in city limits • **No hospital or medical clinic in city limits** • **Lack of outdoor emergency siren** • Presence of BNSF railroad and hazardous liquid pipeline • Presence of Tier II sites • City located at intersection of N.D. Highways 20 and 200 – both serve as major agriculture and commercial trucking arteries in the state	Less Vulnerable • Fire departments have some HAZMAT training • State training for farmers to handle ag chemicals

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Infectious Disease	
Impact	• 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	• 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	More Likely • 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	Less Likely • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
Vulnerability	More Vulnerable • 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** • **Midkota Public School**	Less Vulnerable • 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**

Table 8.2.2 – City of Carrington Jurisdiction Risk Assessment – Continued

	Severe Summer Weather	
Impact	**Blocked Roads:** • School Ave and Main St. • Church Ave • Park Road	• 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	• Property damage from tornados/straight-line winds in summer 2017 and 2019 • Windstorms occurring annually	• Annual occurrences of hailstorms • Two or three significant storms producing damage to trees and property annually
Likelihood	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	More Vulnerable • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Lack of outdoor emergency siren** • **Lack of permanent generator at fire hall, community center, public school and lift station** • **Midkota Public School** • **Lacks building code enforcement** • **Outdated pumps at the lift station**	Less Vulnerable • Advanced warning and notification such as internet and TV

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Severe Winter Weather	
Impact	**<u>Blocked Roads:</u>** • N.D. Highways 20 and 200 • All city streets become blocked: School Ave, Main St., Louise St., Stella St., Railroad St., Clark St., Church Ave, Berg Ave	• 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	• 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	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	<u>More Vulnerable</u> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Lack of outdoor emergency siren** • **Lack of permanent generator at fire hall, community center, public school and lift station** • **Midkota Public School** • **Lacks building code enforcement** • **Outdated pumps at the lift station**	<u>Less Vulnerable</u> • Advanced warning and notification such as internet and TV

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Space Weather
Impact	• 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	• Never a recorded occurrence in Foster County or North Dakota
Likelihood	• 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	More Vulnerable • Agriculture economy • All critical facilities and infrastructure that require electricity for operation – water and sewer system • Advanced communication systems (internet, TV, etc.) • **Lack of permanent generator at fire hall, community center, public school and lift station** • **Midkota Public School** Less Vulnerable • Local food production/households with gardens

Table 8.2.2 – City of Glenfield Jurisdiction Risk Assessment – Continued

	Transportation Incident	
Impact	• **Blocked roads from inadequate road clearing** • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities	• 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	• Annual occurrences of accidents involving cars and/or farm equipment	
Likelihood	More Likely • Intoxicated drivers • **High truck traffic from agriculture-related traffic**	Less Likely • No commercial passenger airport • Decrease in oil trains (from a frequency of one per hour) one the DAPL opened in 2017
Vulnerability	More Vulnerable • Intoxicated drivers • **High truck traffic from agriculture-related traffic** • N.D. Highways 20 and 200 • Presence of BNSF railroad • Presence of Tier II sites • Midkota Public School	Less Vulnerable • No commercial passenger airport • **Presence of designated truck routes through city limits** • Fire departments have some HAZMAT training • Foster County Nixle-Everbridge

8.2.3 Mitigation Strategy

The Foster 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 Glenfield. 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 Glenfield lacks sources of backup power at critical facilities and infrastructure. The outdoor emergency siren is outdated/inactive. The city's storm water system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence. Sinkholes have resulted in city streets collapsing. Flooded streets have resulted in backup of water into homes and businesses. The pumps at the lift station are outdated and can lose functionality during high precipitation events. The city does not have building permits.

Installation of generators for backup power, installation of a dispatch/radio-activated emergency siren, engineering to retrofit/upgrade the storm water system, installation of new pumps at the lift station, development of building permits, and education and outreach are a priority for the city.

City of Glenfield Project 1: Install permanent generators at critical facilities and infrastructure.

Description/Benefit	Test existing generators and create regularly scheduled maintenance system. Install new generators to establish permanent source of backup power to maintain continued operation of the following critical facilities and infrastructure. <u>Install New</u> • Glenfield Fire Hall • Glenfield Community Center • Midkota Public School • Lift station		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	City of Glenfield		
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	3	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>
Foster County LEOP & Mitigation Plan Foster 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 Glenfield Project 2: Install dispatch-activated outdoor emergency siren.

Description/Benefit	The city's current outdoor emergency siren is outdated/inactive and nonfunctional. The city needs to install a new dispatch-activated siren.		
Hazards Addressed	All		
Affected Jurisdiction(s)	City of Glenfield		
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	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. NDDES. 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP & Mitigation Plan Foster 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 Glenfield Project 3: Conduct engineering study to retrofit and/or upgrade the city's storm water system.

Description/Benefit	The storm sewer system is inundated during high precipitation events, saturated ground conditions, shifting soils, and land subsidence (sinkholes). The system is comprised of copper pipe, clay tile, PVC (in some sections), which allows ground water to infiltrate the system. Sinkholes in the system have resulted in city streets collapsing. Flooded streets and backup into homes has occurred when the system is at or over capacity, essentially becoming man-made overland flooding. • School Avenue and Louise Street • Clark Avenue and Church Street • Midkota High School parking lot on School Avenue • Areas near the city park		
Hazard/Threat Addressed	Flood (overland), Infectious Disease, Severe Summer Weather, Severe Winter Weather (All)		
Affected Jurisdiction(s)	City of Glenfield		
Project Status	New		
Priority	Medium/High		
Responsible Agency	City Council(s), Public Works, Midkota Public School, engineering firms, private contractors, private property		
Partners	Emergency Management, Emergency Services, DWR, FEMA, NDDES, Water Resource Board		
Completion Timeframe	2 years	Cost	Project-specific
Funding Source	FEMA's Building Resilient Infrastructure and Communities (BRIC). DWR. Water Resource Board.		

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	3	1	3	25

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP & Mitigation Plan Foster 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 Glenfield Project 4: Develop and implement building permits

Description/Benefit	To ensure new and existing structures adhere to building standards to withstand impacts from hazards and keep people safe.		
Hazard/Threat Addressed	All		
Affected Jurisdiction(s)	City of Glenfield		
Project Status	Ongoing and Continue		
Priority	Medium		
Responsible Agency	City Council(s), County Commission		
Partners	NDACo, NDDC, NDLC, NDTOA, ND Fire Marshal's Office		
Completion Timeframe	2 years	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	3	5	5	5	33

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Identify as adoption of buildings codes as an objective and/or action in the county's comprehensive plan. Encourage jurisdictions to adopt. Enforcement is the second part.

City of Glenfield Project 5: Purchase and install new lift station pumps.

Description/Benefit	The two pumps for the lift stations are nearing the end of useful life and are inundated by overland flooding during incidents of high precipitation from severe summer weather and severe winter weather events.		
Hazards Addressed	Flood, Infectious Disease, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	City of Glenfield		
Project Status	New		
Priority	Very High		
Responsible Agency	City Council(s), Emergency Services		
Partners	Emergency Management, NDLC, Regional Council, private contractors		
Completion Timeframe	2 to 3 years	Cost	TBD
Funding Source	Local budgets. N.D. League of Cities. FEMA's Building resilient Infrastructure and Communities (BRIC) Grant.		

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	4	5	34

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP & Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Identify the cost and scope of the project. Include in city's budget/capital improvement plan. Apply for grant funding or purchase directly using existing sales tax revenue or budgets. Approval city council.

8.3 City of Grace City, North Dakota

The following profile includes information specific to the city of Grace City 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.

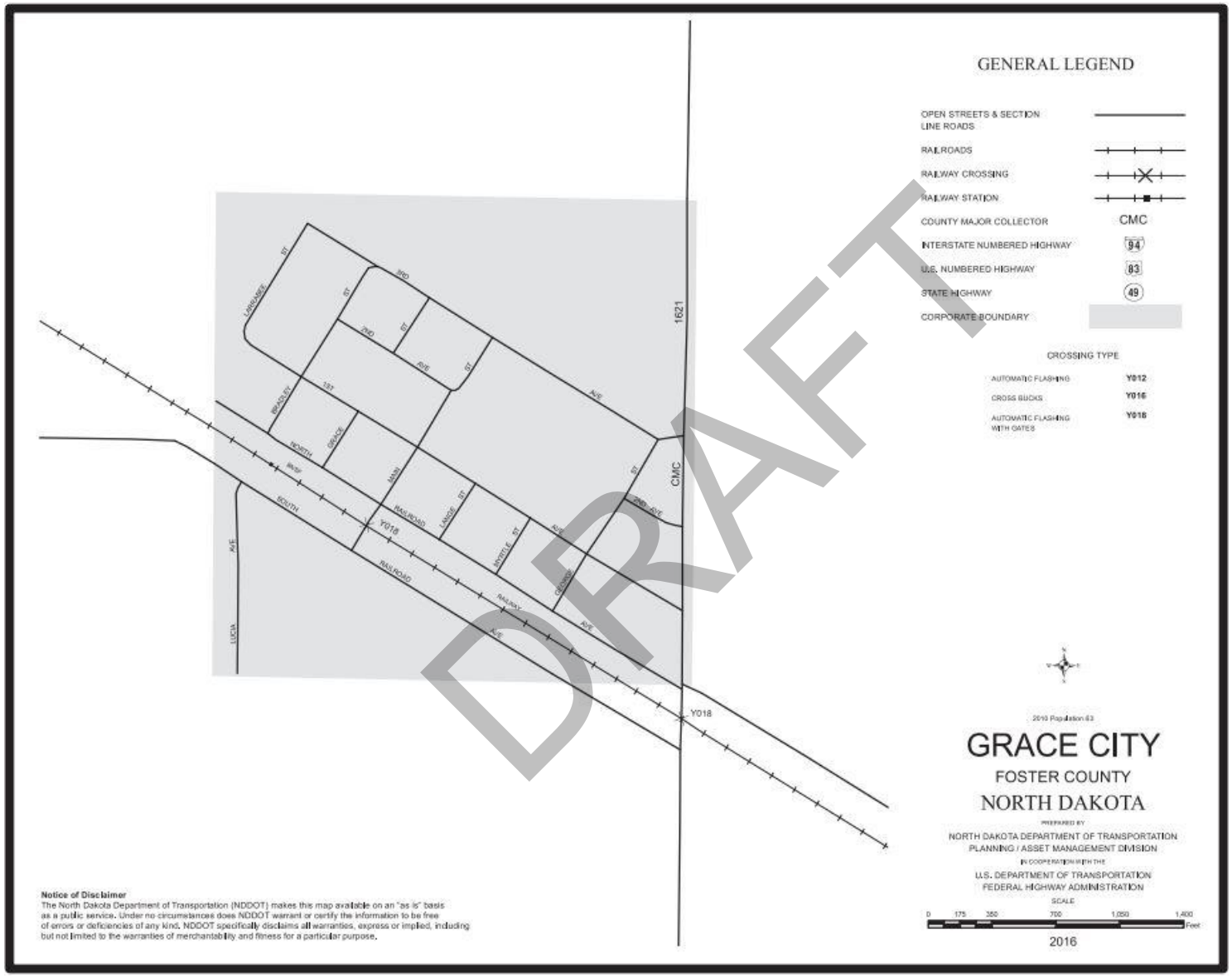
Plan Maintenance

Plan maintenance is shown in section 8.3.6.

Critical Facilities and Infrastructure

Figure 8.3.1 is a map of the city of Grace City provided by the N.D. Dept. of Transportation.

Figure 8.3.1 – City of Grace City, 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 Grace City. 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 Grace City is located on 92nd Ave NE approximately 21 miles east-northeast of the city of Carrington, the county seat. The Burlington Northern Santa Fe railroad traverses the city.

Population

Table 8.3.1 shows population trends for the city of Grace City from 1920 to 2020.

Per the 2020 U.S. Decennial Census, the city of Grace City has a population of 53 people, which is a decrease of 10 people (15.9 percent) from 71 people in 2010.

Table 8.3.1 – 1920 to 2010 City of Grace City, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
--	--	--	--	--	--	--	108	71	63	53

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2015 to 2019 American Community Survey 5-Year Estimate, the population of the city of Grace City consists of 32 individuals under the age of 20 and 12 individuals aged 65 and older.

Daycares. There are no daycares in the city of Grace City.

Poverty. Per the 2015 to 2019 American Community Survey 5-Year Estimate, there are eight households in the city of Grace City that live below the poverty line.

Public Schools. There are no public schools in the city of Grace City.

Senior Housing Developments/Care Centers. There are no age-restricted, senior housing developments, or care centers in the city of Grace City.

Housing Units and Household Size

The 2015 to 2019 American Community Survey 5-Year Estimate shows there is a total of 39 housing units in the city consisting of 29 single-family homes, no mobile/RV homes, and 10 multifamily homes.

The 2015 to 2019 American Community Survey 5-Year Estimate shows there are 31 households in the city of Grace City resulting in an average household size of 2.74 people.

Businesses

There are no major employers in the city of Grace City. Additional information on businesses and economic development in the city of Carrington or can be obtained by contacting Carrington Economic Development.

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 2015 and new and future development is anything planned, pending, and proposed development under construction.

No new and future development was identified at the time of this plan update for the city of Grace City.

Critical Facilities. The following facilities were identified as critical in the city of Grace City.

- Grace City City Hall/Community Center

Infrastructure. The following infrastructure was identified as critical in the city of Grace City.

- The city of Grace City does not have a sanitary sewer system. Residents utilize septic systems.
- The city of Grace City has an inert landfill.
- The BNSF railroad traverses the city.

Emergency Response Services. The following emergency response services were identified in the city of Grace City.

- Foster County Ambulance provides ambulance services to the city of Grace City.
- The Carrington Rural Fire Protection District provides fire protection services to the city and surrounding rural areas.
- The Foster County Sherriff's Office provides law enforcement services to the city of Grace City.
- The nearest hospital is the CHI-St. Alexius Health Carrington Medical Center in the city of Carrington.
- Foster County Public Health is in the city of Carrington and provides public health services to the city of Carrington and greater Foster County.

Services and Utilities. The following services are provided in the city of Grace City.

- Brager Disposal of Cooperstown provides garbage collection services to the city of Grace City.
- The city of Grace City maintains an inert landfill.
- The city of Grace City does not have a sanitary sewer system. Residents utilize septic systems.
- The city has a storm water system consisting of culverts and drainage ditches.
- The Foster County Independent is the official newspaper of the city of Grace City.
- Greater Ramsey Water District provides drinking/potable water to the city of Grace City.
- Electricity is provided by Otter Tail Power.
- Natural gas is not available in the city of Grace City.

- 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.

8.3.2 Risk Assessment and Hazard Scoring Notes

Table 8.3.2 summarizes the risk assessment scoring of the city of Grace City. 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 Foster County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment Scoring Summary

Risk Assessment			**Jurisdiction: City of Grace City**			
Natural Hazard	**Impact**	**Frequency**	**Likelihood**	**Vulnerability**	**Capabilities**	**Total**
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (Rural)						
Flood						
Geologic Hazard						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Adversarial Threats						
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Technological Threats						
Dam Failure						
Hazardous Material Release						
Transportation Incident						

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

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment

	Civil Disturbance	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • 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	• Never an occurrence of a major incident	• DAPL protesters were not active in the city
Likelihood	<u>More Likely</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad	<u>Less Likely</u> • Small town with no major regional/state attractions • Sparse population
Vulnerability	<u>More Vulnerable</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad	<u>Less Vulnerable</u> • Small town with no major regional/state attractions • Sparse population

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment - Continued

	Criminal, Terrorist, Nation-State Attack	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • 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	• No occurrences • Miscellaneous property damage occurring in the city on an occasional basis	
Likelihood	<u>More Likely</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad	<u>Less Likely</u> • Small town with no major regional/state attractions • Sparse population
Vulnerability	<u>More Vulnerable</u> • Lack of local active/continuous law enforcement coverage • Presence of hazardous liquid pipeline • Presence of BNSF railroad	<u>Less Vulnerable</u> • Small town with no major regional/state attractions • Sparse population

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	• Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release	• Human Injury/Death • School Closure • **Loss of Communication Systems** • Identity Theft – loss of wages and/or assets
Frequency	• Never an occurrence of a major attack	
Likelihood	More Likely • Small town with lack of technological infrastructure to defend against cyber attacks • Presence of hazardous liquid pipeline • Presence of BNSF railroad	Less Likely • Lack of major financial institutions or communication infrastructure • No public school
Vulnerability	More Vulnerable • 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 • Presence of hazardous liquid pipeline • Presence of BNSF railroad	Less Vulnerable • Lack of major financial institutions or communication infrastructure • No public school • City records are on paper

Table 8.3.3 – City of Grace City Jurisdiction Risk Assessment - Continued

	Dam Failure	
Impact	• 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**	• 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	• Never an occurrence	
Likelihood	More likely • 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**	Less likely • Dry periods of weather with little to no rain or lack of heavy snow fall • State agencies ongoing and continuous maintenance
Vulnerability	More vulnerable • Tier II sites and pipelines located in inundation areas • Lack of alternative housing or shelters to house displaced residents • Dover Dam west of the city of Carrington • Tollefson Dam east of the city of Carrington	Less vulnerable • Annual and ongoing dam inspections & routine maintenance • Foster County Nixle-Everbridge

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment - Continued

	Drought	
Impact	• 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	• Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds	• End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020
Likelihood	<u>More Likely</u> • 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> • Heavy precipitation
Vulnerability	<u>More Vulnerable</u> • 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> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDES • Advanced communications such as internet and TV

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment - Continued

	Fire – Urban Fire/Structure Collapse	
Impact	• Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release	• Human Injury/Death • Increase Fire Potential • **Property damage on a significant scale if impacting downtown structures**
Frequency	• Occurrences of structures/vehicles being impacted every five years	• A fire was started by sunflowers in a bin at Dalgren Elevator and smoldered for several days in 2017/2018
Likelihood	More Likely • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems	Less Likely • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses
Vulnerability	More Vulnerable • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • **No fire department** • **Presence of abandoned properties** • **City does not have a water tower**	Less Vulnerable • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Street signage for emergency services

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Fire – Rural & Wildland	
Impact	• 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	• 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	More Likely • 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 hazardous liquid pipeline • Presence of BNSF railroad • Presence of Tier II sites	Less Likely • Removal of CRP near city limits • Summer and winter weather with heavy precipitation
Vulnerability	More Vulnerable • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • **Lack of local fire department** • Presence of hazardous liquid pipeline • Presence of BNSF railroad • Presence of Tier II sites • Lack of fire index sign	Less Vulnerable • 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

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Flood	
Impact	• Blocked Roads • Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • Runoff from buildings causes overland flooding	
Frequency	• Bi-annual occurrences of localized flooding of nearby township roads and highways	• Flash flooding occurs from heavy precipitation
Likelihood	<u>More Likely</u> • Rapid change of seasons resulting in excessive snow melt • High water table	<u>Less Likely</u> • Dry seasons and low precipitation • City performs storm water maintenance
Vulnerability	<u>More Vulnerable</u> • 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	<u>Less Vulnerable</u> • Alternate routes were identified for townships roads • City performs storm water drainage maintenance

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Geologic Hazard	
Impact	• Delayed Emergency Response • Human Injury/Death • Loss of Economy	• Loss of Power • Property Damage
Frequency	• No incidents involving geologic hazards in or near city limits	
Likelihood	More Likely • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Likely • 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	More Vulnerable • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Vulnerable • 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 Grace City Jurisdiction Risk Assessment – Continued

	Hazardous Material Release	
Impact	• 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	• Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported	
Likelihood	More Likely • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of hazardous liquid pipeline • Presence of BNSF railroad • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant	Less Likely • Private companies have HAZMAT certifications
Vulnerability	More Vulnerable • 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** • **Lack of outdoor emergency siren** • Presence of hazardous liquid pipeline and BNSF railroad • Presence of Tier II sites • Presence of elevator, fertilizer plant, and anhydrous plant	Less Vulnerable • Fire departments have some HAZMAT training

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Infectious Disease	
Impact	• 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	• 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	More Likely • 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	Less Likely • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
Vulnerability	More Vulnerable • 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**	Less Vulnerable • 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 Grace City Jurisdiction Risk Assessment – Continued

	Severe Summer Weather	
Impact	• 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	• Property damage from tornados/straight-line winds in summer 2017 and 2019 • Windstorms occurring annually	• Annual occurrences of hailstorms • Two or three significant storms producing damage to trees and property annually
Likelihood	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	<u>More Vulnerable</u> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Lack of outdoor emergency siren** • **Lack of permanent generator at community center and lift station** • **Lacks building code enforcement**	<u>Less Vulnerable</u> • Advanced warning and notification such as internet and TV • No public school

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Severe Winter Weather	
Impact	• 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	• 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	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	<u>More Vulnerable</u> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Lack of outdoor emergency siren** • **Lack of permanent generator at community center and lift station** • **Lacks building code enforcement**	<u>Less Vulnerable</u> • Advanced warning and notification such as internet and TV • No public school

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Space Weather
Impact	• 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	• Never a recorded occurrence in Foster County or North Dakota
Likelihood	• 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	More Vulnerable • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent generator at former schoolhouse/community center and lift station Less Vulnerable • Local food production/households with gardens • Lack of public school

Table 8.3.2 – City of Grace City Jurisdiction Risk Assessment – Continued

	Transportation Incident	
Impact	• **Blocked roads from inadequate road clearing** • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities	• 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	• Annual occurrences of accidents involving cars and/or farm equipment	
Likelihood	More Likely • Intoxicated drivers • **High truck traffic from agriculture-related traffic**	Less Likely • No commercial passenger airport • Decrease in oil trains (from a frequency of one per hour) one the DAPL opened in 2017
Vulnerability	More Vulnerable • Intoxicated drivers • **High truck traffic from agriculture-related traffic** • Presence of BNSF railroad • Presence of Tier II sites	Less Vulnerable • No commercial passenger airport • **Presence of designated truck routes through city limits** • Fire departments have some HAZMAT training • Foster County Nixle-Everbridge • No major state highways • No public school

8.3.3 Mitigation Strategy

The Foster 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 Grace City. 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 Grace City lacks sources of backup power at critical facilities and infrastructure. The city also does not have an outdoor emergency siren. The city does not have building permits.

Installation of generators for backup power, installation of a dispatch/radio-activated emergency siren, development of building permits, and education and outreach are a priority for the city.

City of Grace City Project 1: Purchase 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. • The city needs a portable generator for its lift station. • Former schoolhouse, which now serves as the Senior Center/Community Center and shelter, needs a permanent generator.		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	City of Grace City		
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	Social	Technical	Social	Technical	Social	Technical
5	5	5	5	5	5	5	5

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP & Mitigation Plan Foster 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 Grace City Project 2: Install dispatch-activated outdoor emergency siren.

Description/Benefit	The city of Grace City lacks an outdoor emergency siren dispatch activated.		
Hazards Addressed	All		
Affected Jurisdiction(s)	City of Grace City		
Project Status	Ongoing and Continue		
Priority	Very High		
Responsible Agency	City Council(s), Emergency Services		
Partners	County Commission, Emergency Management, NDAC, 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. NDDES. 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP & Mitigation Plan Foster 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 Grace City Project 3: Develop and implement building permits

Description/Benefit	To ensure new and existing structures adhere to building standards to withstand impacts from hazards and keep people safe.		
Hazard/Threat Addressed	All		
Affected Jurisdiction(s)	City of Grace City		
Project Status	Ongoing and Continue		
Priority	Medium		
Responsible Agency	City Council(s), County Commission		
Partners	NDACo, NDDC, NDLC, NDTOA, ND Fire Marshal's Office		
Completion Timeframe	2 years	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	3	5	5	5	33

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Identify as adoption of buildings codes as an objective and/or action in the county's comprehensive plan. Encourage jurisdictions to adopt. Enforcement is the second part.

8.4 City of McHenry, North Dakota

The following profile includes information specific to the city of McHenry 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.

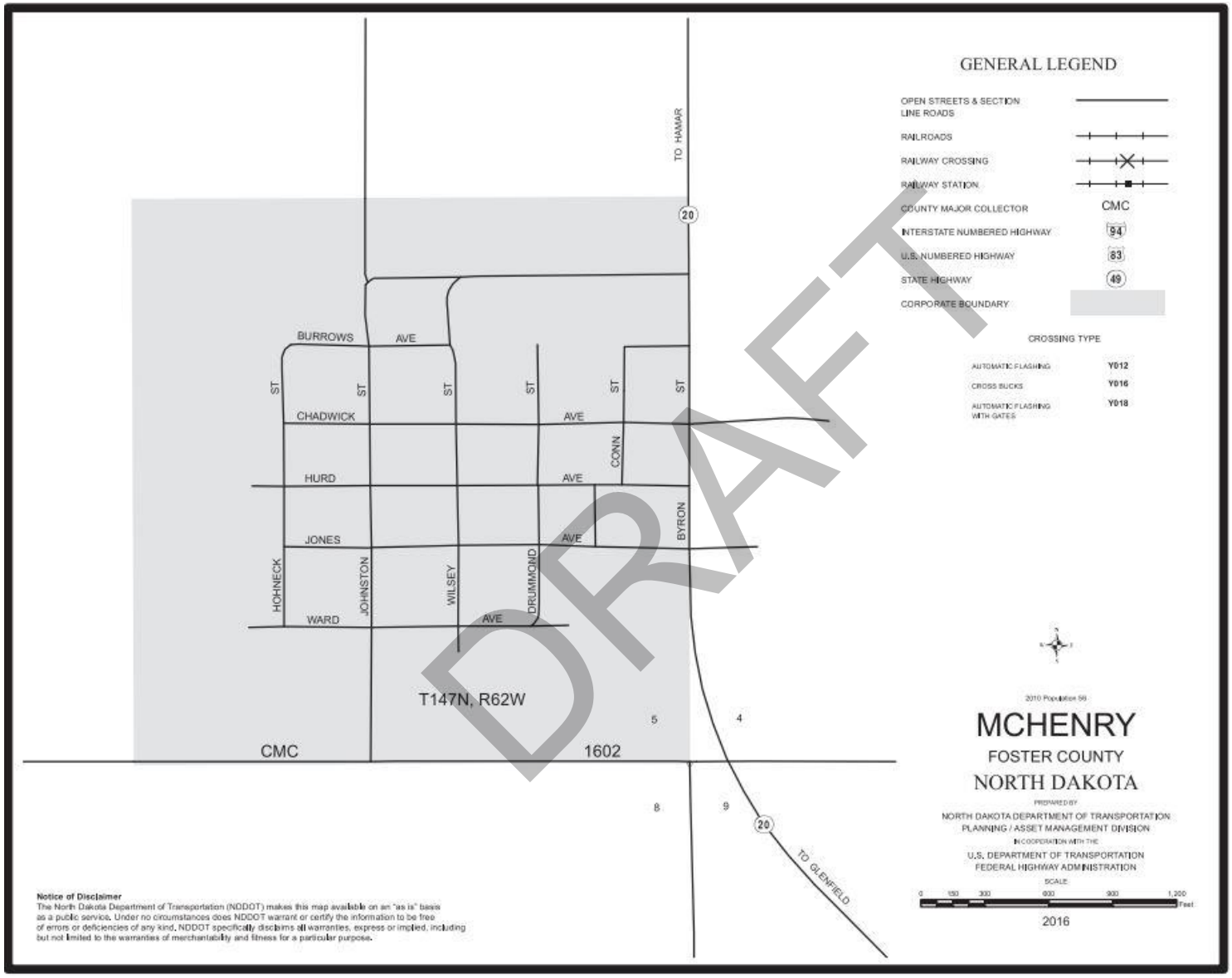
Plan Maintenance

Plan maintenance is shown in section 8.4.6.

Critical Facilities and Infrastructure

Figure 8.4.1 is a map of the city of McHenry provided by the N.D. Dept. of Transportation.

Figure 8.4.1 – City of McHenry, North Dakota



Source(s): 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 McHenry. 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 McHenry is located on N.D. Highway 20 approximately 35 miles northeast of the city of Carrington, the county seat.

Population

Table 8.4.1 shows population trends for the city of McHenry from 1920 to 2020.

Per the 2020 U.S. Decennial Census, the city of McHenry has a population of 64 people, which is an increase of eight people (14.3 percent) from 56 people in 2010.

Table 8.4.1 – 1920 to 2010 City of McHenry, North Dakota Population Statistics

1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
299	219	250	189	155	152	113	85	71	56	64

Source(s): U.S. Decennial Census; American Community Survey, 5-Year Estimates

Vulnerable Populations

Age. Per the 2015 to 2019 American Community Survey 5-Year Estimate, the population of the city of McHenry consists of four individuals under the age of 20 and 10 individuals aged 65 and older.

Daycares. There are no daycares in the city of McHenry.

Poverty. Per the 2015 to 2019 American Community Survey 5-Year Estimate, there are no on households in the city of McHenry that live below the poverty line.

Public Schools. There is not a public school in the city of McHenry.

Senior Housing Developments/Care Centers. There are no age-restricted, senior housing developments, or care centers in the city of McHenry.

Housing Units and Household Size

The 2015 to 2019 American Community Survey 5-Year Estimate shows there is a total of 39 housing units in the city consisting of 35 single-family homes, four mobile/RV homes, and no multifamily homes.

The 2015 to 2019 American Community Survey 5-Year Estimate shows there are 20 households in the city of McHenry resulting in an average household size of 1.65 people.

Businesses

There are no major employers in the city of McHenry. Additional information on businesses and economic development in the city of Carrington or can be obtained by contacting Carrington Economic Development.

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 2015 and new and future development is anything planned, pending, and proposed development under construction.

No new and future development was identified at the time of this plan update for the city of McHenry.

Critical Facilities. The following facilities were identified as critical in the city of McHenry.

- McHenry City Hall/Community Center
- McHenry Fire Hall

Infrastructure. The following infrastructure was identified as critical in the city of McHenry.

- The city of McHenry has a sanitary sewer with two lagoon cells and a lift station.
- The city maintains an underground water storage tank for drinking/potable water and fire suppression.
- The city of McHenry has an inert landfill.
- The city is of McHenry is located on N.D. Highway 20.

Emergency Response Services. The following emergency response services were identified in the city of McHenry.

- Foster County Ambulance provides ambulance services to the city of McHenry.
- The McHenry Rural Fire Protection District provides fire protection services to the city and surrounding rural areas.
- The Foster County Sherriff's Office provides law enforcement services to the city of McHenry.
- The nearest hospital is the CHI-St. Alexius Health Carrington Medical Center in the city of Carrington.
- Foster County Public Health is in the city of Carrington and provides public health services to the city of Carrington and greater Foster County.

Services and Utilities. The following services are provided in the city of McHenry.

- Brager Disposal of Carrington provides garbage collection services to the city of McHenry.
- The city of McHenry maintains an inert landfill.
- The city of McHenry has its own sanitary sewer system consisting of one lift station and two lagoon cells. There are no active septic systems in the city limits.
- The city has a storm water system consisting of culverts and drainage ditches.
- The Foster County Independent is the official newspaper of the city of McHenry.

- Greater Ramsey Water District provides drinking/potable water to the city of McHenry.
- Electricity is provided by Otter Tail Power.
- Natural gas is not available in the city of McHenry.
- Fuel oil and propane are used as an alternative heating source and is provided by companies chosen by the individual consumer.
- Moore Liberty Griggs County Telephone Company (MLGC) 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 McHenry. 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 Foster County are found in Chapter 4, Threat and Hazard Identification Assessment in each respective hazard profile.

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment Scoring Summary

Risk Assessment			**Jurisdiction: City of McHenry**			
Natural Hazard	**Impact**	**Frequency**	**Likelihood**	**Vulnerability**	**Capabilities**	**Total**
Drought						
Fire – Urban/Structure Collapse						
Fire – Wildland (Rural)						
Flood						
Geologic Hazard						
Infectious Disease						
Severe Summer Weather						
Severe Winter Weather						
Space Weather						
Adversarial Threats						
Civil Disturbance						
Criminal, Terrorist or Nation-State Attack						
Cyberattack						
Technological Threats						
Dam Failure						
Hazardous Material Release						
Transportation Incident						

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

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment

	Civil Disturbance	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • 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	• Never an occurrence of a major incident	• DAPL protesters were not active in the city
Likelihood	More Likely • Lack of local active/continuous law enforcement coverage	Less Likely • Small town with no major regional/state attractions • Sparse population • No railroad infrastructure or pipelines
Vulnerability	More Vulnerable • Lack of local active/continuous law enforcement coverage	Less Vulnerable • Small town with no major regional/state attractions • Sparse population • No railroad infrastructure or pipelines

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment - Continued

	Criminal, Terrorist, Nation-State Attack	
Impact	• Blocked Roads • Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public and private) • HAZMAT Release – oil trains and natural gas pipeline • 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	• No occurrences • Miscellaneous property damage occurring in the city on an occasional basis	
Likelihood	<u>More Likely</u> • Lack of local active/continuous law enforcement coverage	<u>Less Likely</u> • Small town with no major regional/state attractions • Sparse population • No railroad infrastructure or pipelines
Vulnerability	<u>More Vulnerable</u> • Lack of local active/continuous law enforcement coverage	<u>Less Vulnerable</u> • Small town with no major regional/state attractions • Sparse population • No railroad infrastructure or pipelines

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment - Continued

	Cyberattack	
Impact	• Business Interruptions • Delayed Emergency Response • Financial Hardship/Strain (public) • HAZMAT Release	• Human Injury/Death • School Closure • **Loss of Communication Systems** • Identity Theft – loss of wages and/or assets
Frequency	• Never an occurrence of a major attack	
Likelihood	More Likely • Small town with lack of technological infrastructure to defend against cyber attacks	Less Likely • Lack of major financial institutions or communication infrastructure • No public school • No railroad infrastructure or pipelines
Vulnerability	More Vulnerable • 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	Less Vulnerable • Lack of major financial institutions or communication infrastructure • No public school • No railroad infrastructure or pipelines • City records are on paper

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment - Continued

	Dam Failure	
Impact	• 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**	• 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	• Never an occurrence	
Likelihood	More likely • 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**	Less likely • Dry periods of weather with little to no rain or lack of heavy snow fall • State agencies ongoing and continuous maintenance
Vulnerability	More vulnerable • Tier II sites and pipelines located in inundation areas • Lack of alternative housing or shelters to house displaced residents • Dover Dam west of the city of Carrington • Tollefson Dam east of the city of Carrington	Less vulnerable • Annual and ongoing dam inspections & routine maintenance • Foster County Nixle-Everbridge

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment - Continued

	Drought	
Impact	• 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	• Severe Drought of 1961/1962, 1988/1989 to 1991/1992 • Summer of 2017, local producers forced to sell off portions of their herds	• End of July through winter of 2016 – county reached severe drought status • Severe drought in summer/fall of 2020
Likelihood	<u>More Likely</u> • Dry/wet cycle every five to eight years • Climatic patterns will result in an eventual drought of significance • Lack of precipitation	<u>Less Likely</u> • Heavy precipitation
Vulnerability	<u>More Vulnerable</u> • 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 lacks a water tower	<u>Less Vulnerable</u> • Financial assistance programs made available by the state and federal government • Burn Ban by county emergency management • Fire Index monitoring and mapping from NDDES • Advanced communications such as internet and TV

Table 8.4.2 – City of Glenfield Jurisdiction Risk Assessment - Continued

	Fire – Urban Fire/Structure Collapse	
Impact	• Building Collapse • Delayed Emergency Response • Evacuation (Localized) • Explosion • HAZMAT Release	• Human Injury/Death • Increase Fire Potential • **Property damage on a significant scale if impacting downtown structures**
Frequency	• Occurrences of structures/vehicles being impacted every five years	• One structure fire and three vehicle fires between January 1, 2000, and December 31, 2019.
Likelihood	More Likely • Age of structures on main street • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems	Less Likely • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Well-equipped fire department with trained volunteers
Vulnerability	More Vulnerable • Age of structures • Increased use of electric heaters • Outdated electric wiring in older homes and structures • Outdated heating systems • **Fire Hall does not have a permanent or portable generator** • **Prolonged response times due to limited fire staff during the daytime** • **Presence of abandoned properties** • **City lacks a water tower**	Less Vulnerable • Better building standards and maintenance of structures • Smoke detectors in public buildings and private homes/businesses • Well-equipped fire department with trained volunteers • Street signage for emergency services

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Fire – Rural & Wildland	
Impact	• 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	• 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	More Likely • 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	Less Likely • Removal of CRP near city limits • Summer and winter weather with heavy precipitation • No pipelines • No railroad infrastructure
Vulnerability	More Vulnerable • Agricultural burn-off • High winds annually and dry conditions – when present • Pastureland adjacent to structures and city limits • Large fire district – strained coverage/resources • **Lack of fire breaks around city limits** • Presence of Tier II sites • Lack of fire index sign	Less Vulnerable • 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 • No pipelines • No railroad infrastructure

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Flood	
Impact	• **<u>Blocked Roads:</u> N.D. Highway 20** • Delayed Emergency Response • Flooding (Highway & Structure) • Human Injury/Death • Property Damage / Sewer Backup • **Runoff from buildings causes overland flooding** • **Inundation of city's sanitary sewer system from Alkali Lake causing outages of the system**	
Frequency	• Bi-annual occurrences of localized flooding of nearby township roads and highways	• Flash flooding occurs from heavy precipitation
Likelihood	<u>More Likely</u> • Rapid change of seasons resulting in excessive snow melt • High water table	<u>Less Likely</u> • Dry seasons and low precipitation • City performs storm water maintenance
Vulnerability	<u>More Vulnerable</u> • 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 • City lacks an adequate storm water system • **Flooding from Alkali Lake impacts the functionality of the sanitary sewer lagoon for the city of McHenry causing outages and results in sewage seeping into the lake.**	<u>Less Vulnerable</u> • Alternate routes were identified for townships roads • City performs storm water drainage maintenance

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Geologic Hazard	
Impact	• Delayed Emergency Response • Human Injury/Death • Loss of Economy	• Loss of Power • Property Damage
Frequency	• No incidents involving geologic hazards in or near city limits	
Likelihood	More Likely • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Likely • 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	More Vulnerable • All North Dakota counties are in EPA Radon Zone 1 • Drought and periods of heavy precipitation exacerbate expansive/unstable soils	Less Vulnerable • 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 McHenry Jurisdiction Risk Assessment – Continued

	Hazardous Material Release	
Impact	• 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	• Small incidents of leaking anhydrous tanks bi-annually • Never any major spills reported	
Likelihood	More Likely • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits • Presence of Tier II sites	Less Likely • Private companies have HAZMAT certifications • **No pipelines or railroad infrastructure**
Vulnerability	More Vulnerable • Agriculture economy and related industries • Transportation of chemicals by truck through city limits • Storage of chemicals/fertilizers in city limits and on farmsteads in large tanks near city limits • **No hospital or medical clinic in city limits** • Presence of Tier II sites	Less Vulnerable • Fire departments have some HAZMAT training • **Lack of outdoor emergency siren** • **No pipelines or railroad infrastructure**

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Infectious Disease	
Impact	• 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	• 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	More Likely • 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	Less Likely • Advanced communications such as internet and tv • Public health and employment regulations for public facilities
Vulnerability	More Vulnerable • 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**	Less Vulnerable • 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 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Severe Summer Weather	
Impact	• 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	• Property damage from tornados/straight-line winds in summer 2017 and 2019 • Windstorms occurring annually	• Annual occurrences of hailstorms • Two or three significant storms producing damage to trees and property annually
Likelihood	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	<u>More Vulnerable</u> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Lack of outdoor emergency siren** • **Lack of permanent generator at fire hall, lift station and the senior center (city hall/community center/shelter)** • **Lacks building code enforcement**	<u>Less Vulnerable</u> • Advanced warning and notification such as internet and TV • No public school

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Severe Winter Weather	
Impact	• 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	• 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	• Climatic patterns will result in numerous annual occurrences of the hazard	
Vulnerability	<u>More Vulnerable</u> • High elderly population • Presence of mobile homes • Aging infrastructure (roads and electrical systems) • **Lack of outdoor emergency siren** • **Lack of permanent generator at fire hall, lift station and the senior center (city hall/community center/shelter)** • **Lacks building code enforcement**	<u>Less Vulnerable</u> • Advanced warning and notification such as internet and TV • No public school

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Space Weather
Impact	• 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	• Never a recorded occurrence in Foster County or North Dakota
Likelihood	• 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	More Vulnerable • Agriculture economy • All critical facilities and infrastructure that require electricity for operation • Advanced communication systems (internet, TV, etc.) • Lack of permanent generator at fire hall, lift station and the senior center (city hall/community center/shelter) Less Vulnerable • Local food production/households with gardens • Lack of public school

Table 8.4.2 – City of McHenry Jurisdiction Risk Assessment – Continued

	Transportation Incident	
Impact	• **Blocked roads from inadequate road clearing** • Human Injury/Death • Increased Fire Potential • Loss of Transportation/Accessibility • Mass Casualties/Fatalities	• 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	• Annual occurrences of accidents involving cars and/or farm equipment	
Likelihood	More Likely • Intoxicated drivers • **High truck traffic from agriculture-related traffic**	Less Likely • No commercial passenger airport • Decrease in oil trains (from a frequency of one per hour) one the DAPL opened in 2017
Vulnerability	More Vulnerable • Intoxicated drivers • **High truck traffic from agriculture-related traffic** • N.D. Highway 20 • Presence of Tier II sites	Less Vulnerable • No commercial passenger airport • **Presence of designated truck routes through city limits** • Fire departments have some HAZMAT training • Foster County Nixle-Everbridge • No railroad infrastructure • No public school

8.4.3 Mitigation Strategy

The Foster 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 McHenry. 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 McHenry lacks sources of backup power at critical facilities and infrastructure. The city also does not have an outdoor emergency siren. The city's sanitary sewer system is inundated by Alkali Lake during high precipitation events causing outages in the system and the potential for release of hazardous materials into the natural environment. The city does not have building permits.

Installation of generators for backup power, installation of a dispatch/radio-activated emergency siren, a full engineering study for Alkali Lake, development of building permits, and education and outreach are a priority for the city.

City of McHenry Project 1: Purchase and 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. • Purchase a portable generator for the city's lift station • Permanent generator for McHenry Fire Hall (serves as a shelter) • Permanent generator for the Senior Center (serves as a city hall/community center and shelter)		
Hazards Addressed	All hazards		
Affected Jurisdiction(s)	City of McHenry		
Project Status	New/Ongoing and Continue		
Priority	Very High		
Responsible Agency	City Council, 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	3	5	33

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Foster County LEOP & Mitigation Plan Foster 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 McHenry Project 2: Install dispatch-activated outdoor emergency siren.

Description/Benefit	The city of McHenry lacks an outdoor emergency siren activated by dispatch.		
Hazards Addressed	All		
Affected Jurisdiction(s)	City of McHenry		
Project Status	Ongoing and Continue		
Priority	Very High		
Responsible Agency	City Council, Emergency Services		
Partners	County Commission, Emergency Management, NDAC, 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. NDDES. 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

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP & Mitigation Plan Foster 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.

Foster County Project AT-6/City of McHenry Project 3: Conduct engineering study for Alkali Lake to eliminate impacts of overland flooding to the City of McHenry.

Description/Benefit	High water on Alkali Lake, which receives water from an adjacent unnamed lake also experiencing high water, causes flooding impacts to roadways to the City of McHenry, McHenry Township, and the ND Dept. of Transportation. The city's sanitary sewer lagoon system is located adjacent to the lake and would be completely inundated before Alkali Lake reaches its natural outlet elevation. A preliminary engineering study has been completed by Foster County Water Board in conjunction with Moore Engineering, Inc. The preliminary study identified installation of a two-mile pipeline to eliminate impacts of overland flooding. **See Figure 8.4.1 for an aerial image of the McHenry Sanitary Sewer Lagoons and Alkali Lake.**		
Hazards Addressed	Flood (Overland), Infectious Disease, Hazardous Material Release, Severe Summer Weather, Severe Winter Weather		
Affected Jurisdiction(s)	Foster County and City of McHenry		
Project Status	New		
Priority	Very High		
Responsible Agency	City Council(s), County Commission, Emergency Management, Foster County Water Board		
Partners	Emergency Services, DWR, FEMA, Public Works, NRCS, engineering firms		
Completion Timeframe	End of 2022	Cost	TBD
Funding Source	Local budgets. FEMA's Building Resilient Infrastructure and Communities (BRIC). DWR Cost Share. Clean Water State Revolving Fund. 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	4	4	5	3	1	3	25

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element Utilized	Process for Integration
Alkali Lake High Water Outlet Feasibility Study (preliminary) Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Procure bids and evaluate options. Select firm to complete the study. Consider options. Approval and adoption by city councils and/or county commission.

Figure 8.4.1 City of McHenry Sanitary Sewer Lagoons

Source(s): City of McHenry

City of McHenry Project 4: Develop and implement building permits

Description/Benefit	To ensure new and existing structures adhere to building standards to withstand impacts from hazards and keep people safe.		
Hazard/Threat Addressed	All		
Affected Jurisdiction(s)	City of McHenry		
Project Status	Ongoing and Continue		
Priority	Medium		
Responsible Agency	City Council(s), County Commission		
Partners	NDACo, NDDC, NDLC, NDTOA, ND Fire Marshal's Office		
Completion Timeframe	2 years	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	3	5	5	5	33

Integration of Mitigation Plan Requirements into Local Planning Mechanisms

Planning Mechanisms Utilized	Plan Element	Process for Integration
Foster County LEOP Foster County Mitigation Plan Foster County THIRA	Capability Assessment, Hazard History, Risk Assessment	Identify as adoption of buildings codes as an objective and/or action in the county's comprehensive plan. Encourage jurisdictions to adopt. Enforcement is the second part.

10. Plan Maintenance

Mitigation planning for Foster 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

Foster 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 Foster 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 Foster 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 Foster 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 Foster County. The public is encouraged to share input on the plan.

10.1 Foster 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 Foster 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: Foster County Emergency Manager
1000 5th St. N
Carrington, ND 58421

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)	