

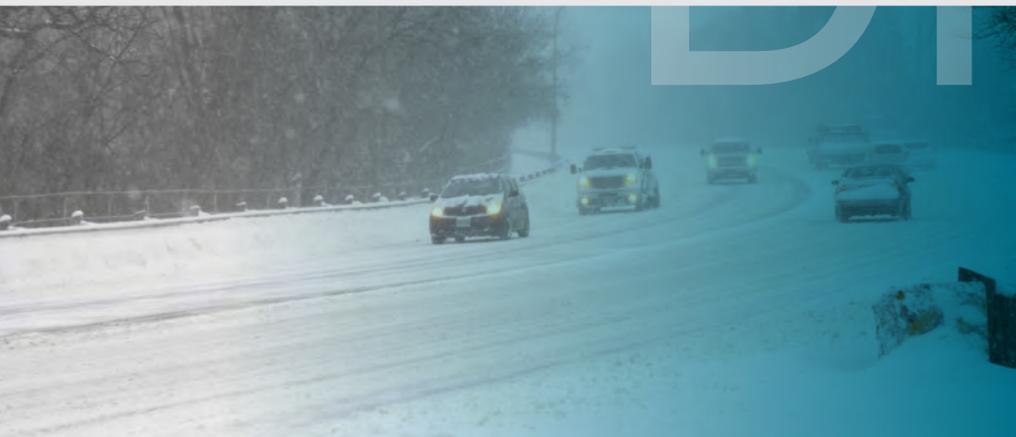
MCLEAN COUNTY



FEMA



MULTI-HAZARD MITIGATION PLAN



SEPTEMBER 2015

**Multi-Hazard Mitigation Plan
McLean County, ND**

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Executive Summary

Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Mitigation actions may be implemented before, during or after an event; however, they are most successful when based on a long-term plan developed before a disaster occurs.

Hazard mitigation planning involves two main elements:

- Hazard profiles that include an assessment of community risks and vulnerabilities
- A mitigation strategy that identifies actions to reduce or eliminate the impact of hazards on the community

A list of priority hazards was developed through historic data analysis and public input. A summary of hazard risk in McLean County, as well as key issues for each priority hazard, can be found on the following pages.

McLean County Risk Summary													
	Rural County	Benedict	Butte	Coleharbor	Garrison	Max	Mercer	Riverdale	Ruso	Turtle Lake	Underwood	Washburn	Wilton
Drought	M	M	M	M	M	M	M	M	M	M	M	M	M
Flood	M	L	L	L	M	L	L	L	L	L	L	L	L
Geologic Hazards	L	L	L	L	L	L	L	L	L	L	L	L	L
Severe Summer Weather	H	H	H	H	H	H	H	H	H	H	H	H	H
Severe Winter Weather	H	H	H	H	H	H	H	H	H	H	H	H	H
Wildland Fire	M	M	M	M	M	M	M	M	M	M	M	M	M
Communicable Disease	L	L	L	L	L	L	L	L	L	L	L	L	L
Dam Failure	L	L	L	L	L	L	L	L	L	L	L	L	L
Hazardous Materials Release	M	M	M	M	M	M	M	M	M	M	M	M	M
Homeland Security Incident	L	L	L	L	L	L	L	L	L	L	L	L	L
Urban Fire	L	L	L	L	L	L	L	L	L	L	L	L	L

H = High, M = Moderate, L = Low

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Drought Key Issues

- Agriculture is a key component of the county's economy. A significant drought has the potential to greatly affect the industry and the county as a whole.
- Recent population growth has resulted in an increased demand for potable water. Maintaining an adequate water supply may become difficult if this growth continues, particularly during times of drought.

Flood Key Issues

- McLean County experiences approximately one flood event every two years. Flood events in the county are primarily related to heavy rainfall and snowmelt runoff.
- Many roads and bridges in the county are commonly washed-out or inundated during flooding events.

Geologic Hazards Key Issues

- The county is in an area of minimal hazard for earthquakes.
- Much of county is within a moderate susceptibility/low incidence landslide hazard area as defined by USGS.

Severe Summer Weather Key Issues

- McLean County averages approximately nine days per year with a summer storm event. Severe wind and hail are the most common summer storm events in the county, and tornadoes are also a possibility in the region.

Severe Winter Weather Key Issues

- McLean County averages approximately six days per year with a winter storm event. Severe winter weather events in the county include winter storm, high wind, heavy snow, blizzard, extreme cold/wind chill and ice storm.
- A winter storm event that causes a power outage may make it difficult for residents to heat their homes. Elderly residents and residents in mobile homes are the most vulnerable to extreme cold temperatures. Approximately 3,500 residents in the county are elderly or live in a mobile home.

Wildland and Rangeland Fire Key Issues

- McLean County experiences a wildfire greater than 100 acres approximately once per year. Most wildfires in the county cause minimal property damage.

Communicable Disease Key Issues

- Human and agricultural disease have the potential to greatly impact the health and economy of the county.
- Some areas of the county have large amounts of standing water during the spring and summer months, which can attract potentially disease-carrying insects.

Dam Failure Key Issues

- Garrison Dam would have a large regional impact in the event of failure, but there are few properties in McLean County located within the dam failure inundation area.

Hazardous Materials Incident Key Issues

- Many residents in the county, including all city residents, live in a potential hazard area for a hazardous materials incident. There were 20 reported hazardous materials incidents in the county between 2000 and 2014.

Homeland Security Incident Key Issues

- Terrorism and violence are an ongoing concern, but it is very unlikely a large-scale event will occur in the county.

Urban Fire Key Issues

- There is no history of large-scale urban fire in the county, but it is an ongoing concern.

The mitigation strategy was developed by identifying actions that will help to resolve key issues. The strategy is summarized in the following table. Also included in the table are several preparedness and response action items that were discussed during the planning process.

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McLean County Action Items				
Priority	Action	Hazard	Cost	Time Frame
Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
Moderate	Coordinate with landowners to identify water sources for fire suppression	Wildfire	Staff Time	2016
High	Install generators for McLean-Sheridan water plant and well field	Multiple Hazards	\$25,000 - \$50,000	2017
Moderate	Improve inter-department radio communication	Multiple Hazards	Varies	2017
Low	Acquire and remove repetitive loss properties from the floodplain	Flooding	Varies	2018
High	Drainage improvements and/or elevation for rural roads throughout the county	Flooding	Varies	Ongoing
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing

Benedict Action Items				
Priority	Action	Hazard	Cost	Time Frame
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Butte Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Install generator at emergency shelter	Multiple Hazards	\$25,000 - \$50,000	2016
Moderate	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
High	Replace warning siren	Severe Summer Weather	\$8,000 - \$15,000	2017
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Coleharbor Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Participate in NFIP workshop	Flooding	Staff Time	2016
Moderate	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing

Garrison Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Install generator at City Hall/emergency shelter and school auditorium/emergency shelter	Multiple Hazards	\$25,000 - \$50,000 per generator	2016
Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
Moderate	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
Moderate	Expand municipal storm water system into southern area of town	Flooding	\$250,000+	2017
High	Install additional warning siren	Severe Summer Weather	\$8,000 - \$15,000	2017
Moderate	Develop insect control system during periods of standing water	Communicable Disease	Varies	Ongoing
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Max Action Items				
Priority	Action	Hazard	Cost	Time Frame
Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
High	Install generator at city hall/civic center/shelter	Multiple Hazards	\$25,000 - \$50,000	2017
Moderate	Install railroad crossing arms on 3rd Avenue SE	Multiple Hazards	\$250,000	2018
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Riverdale Action Items				
Priority	Action	Hazard	Cost	Time Frame
Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
High	Install generator at water treatment plant	Multiple Hazards	\$25,000 - \$50,000	2017
Moderate	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing

Ruso Action Items				
Priority	Action	Hazard	Cost	Time Frame
Moderate	Distribute weather radios to homeowners	Multiple Hazards	\$30 per radio	2017
Low	Public education	Multiple Hazards	Staff Time	Ongoing
High	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Turtle Lake Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Remove culvert beneath old railroad tracks	Flooding	\$5,000	2016
Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
Moderate	Upgrade warning siren control system	Severe Summer Weather	\$5,000 - \$10,000	2017
High	Elevate County Road 27 near Turtle Lake	Flooding	\$50,000+	2018
High	Upgrade municipal storm water system	Flooding	\$250,000+	2019
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Underwood Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Require hazardous materials facilities to provide status reports to the fire department	Hazardous Materials Release	Staff Time	2016
Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
High	Install generator at city hall/shelter	Multiple Hazards	\$25,000 - \$50,000	2017
Moderate	Address overflow flooding issues from pond north of the city	Flooding	Varies	2017
High	Conduct engineering study to identify solutions for flooding issues on the city's west side	Flooding	\$75,000	2018
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Washburn Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Install generators at Memorial Building/shelter and water treatment plant	Multiple Hazards	\$25,000 - \$50,000 per generator	2016
Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
Low	Install signage to identify emergency shelters	Multiple Hazards	\$50 - \$250 per sign	2016
High	Replace culverts that pass through coulee on east side of town	Flooding	\$20,000 - \$50,000	2017
Moderate	Replace drinking water intake along Missouri River	Flooding	\$500,000+	2018
Moderate	Upgrade storm water system along Custer Drive	Flooding	\$100,000 - \$400,000	2019
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Wilton Action Items				
Priority	Action	Hazard	Cost	Time Frame
High	Repair warning siren on north side of town	Severe Summer Weather	\$3,000 - \$15,000	2016
Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
High	Generator for Memorial Hall/emergency shelter	Multiple Hazards	\$25,000 - \$50,000	2017
Low	NFIP training for staff	Flooding	Staff Time	Ongoing
Low	Public education	Multiple Hazards	Staff Time	Ongoing
Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Multi-Hazard Mitigation Plan

Chapter 1: Introduction

Hazard Mitigation Planning

Natural and human-caused hazards have a direct impact on residents and property in McLean County. While it is impossible to eliminate most hazards, it is possible to mitigate their negative effects. Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Mitigation actions may be implemented before, during or after an event; however, they are most successful when based on a long-term plan developed before a disaster occurs. Successful mitigation actions must be practical, cost-effective, politically acceptable and supported by a sound planning process.

The plan is organized into five chapters:

Chapter 1: Introduction

- General plan overview

Chapter 2: Study Area Background

- Background information about each participating jurisdiction and identification of critical facilities

Chapter 3: Hazard Risks and Vulnerabilities

- Hazard profiles, assessment of risks and vulnerabilities, identification of key issues and potential action items

Chapter 4: Mitigation Strategy

- Identification of goals and action items to mitigate risks of hazards in the community

Chapter 5: Plan Maintenance

- Procedures for monitoring, evaluating and updating the plan

Purpose

The purpose of the plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property and the environment from natural and human-caused hazards. The Federal Emergency Management Agency (FEMA) identifies the primary benefits of hazard mitigation planning as:

- Identifying actions for risk reduction that are agreed upon by stakeholders and the public.
- Focusing resources on the greatest risks and vulnerabilities.
- Building partnerships by involving citizens, organizations and businesses.
- Increasing education and awareness of threats and hazards, as well as their risks.
- Communication priorities to state and federal officials.
- Aligning risk reduction with other community objectives.

The plan includes a risk and vulnerability assessment that residents, organizations, local governments and other interested participants can utilize when planning for hazards. The plan also includes an evaluation of mitigation projects that will assist each adopting jurisdiction in reducing risk and preventing loss from future hazard events.

Additionally, all participating jurisdictions are eligible to apply for funds through FEMA's Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program and Flood Mitigation Assistance (FMA) program to help fund the implementation of mitigation projects.

Authority

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides legal basis for state, local and Tribal governments to reduce risks from natural hazards through mitigation planning. All state, local and Tribal governments are required to have an approved

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Multi-Hazard Mitigation Plan

Multi-Hazard Mitigation Plan to receive funding for certain types of non-emergency disaster assistance, including mitigation projects.

This plan is an update of McLean County's 2009 Multi-Hazard Mitigation Plan. Hazard mitigation plans are required by FEMA to be updated every five years to maintain the jurisdiction's eligibility for grant funding.

Jurisdictions that participated in the planning process and are adopting the plan by the official method of approval based on legal authority are listed in Table 1.1. To be eligible for future funds through the Hazard Mitigation Grant Program, Pre-Disaster Mitigation program and Flood Mitigation Assistance program, jurisdictions must either adopt the plan and participate in the planning process or be sponsored by a jurisdiction that has done so. Approval and adoption documentation can be found in Appendix A.

Jurisdiction	Adoption Date
McLean County	
Benedict	
Butte	
Coleharbor	
Garrison	
Max	
Riverdale	
Ruso	
Turtle Lake	
Underwood	
Washburn	
Wilton	

Planning Process

FEMA identifies four essential steps to the hazard mitigation planning process:

- **Resource organization:** Involving interested community members, and reaching out to critical stakeholders and those with technical expertise required during the planning process.
- **Risk assessment:** Identifying hazard characteristics and potential consequences, including effects on critical facilities.

- **Development of mitigation strategies:** Determining priorities and ways to minimize effects of identified hazards.
- **Plan implementation and progress monitoring:** Implementing the plan brings it to life and periodic monitoring ensures the plan remains relevant as conditions change.

The success of the plan and implementation of action items is dependent on public participation during all four steps of the planning process. Public involvement for the plan included Planning Team meetings, public meetings, city council/commission meetings and a public survey. Local planning documents were also reviewed and incorporated into the document when applicable. Detailed information about the planning process can be found in Appendix B.

Acknowledgements

Numerous elected officials, City and County staff, and members of the public participated in the planning process. The project would not have been possible without the assistance of Planning Team members (identified in Appendix B) and members of the public who participated in public meetings, completed the survey or submitted comments through the project website.

The project was primarily funded with a grant awarded through the FEMA Hazard Mitigation Grant Program, administered by the North Dakota Department of Emergency Services (DES). Guidance from state and FEMA staff was instrumental in completing the project.

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Multi-Hazard Mitigation Plan

Chapter 2: Study Area Background

Jurisdictional Information

McLean County is located in central North Dakota, just north of the Missouri River. Its total area is 1,489,920 acres, making it more than twice as large as the state's median county size of 739,000 acres. The county includes 12 incorporated cities: Benedict, Butte, Coleharbor, Garrison, Max, Mercer, Riverdale, Ruso, Turtle Lake, Underwood, Washburn and Wilton (partially located in Burleigh County). Washburn is the county seat and Garrison has the largest population. The county also has several unincorporated communities. Most do not have significant populations and are primarily included in this plan as reference points.

The Fort Berthold Indian Reservation is located on the western end of the county. It is home for the Mandan, Hidatsa and Arikara Nation, also known as the Three Affiliated Tribes. The Reservation consists of 988,000 total acres, with approximately 300,000 acres in McLean County. The Tribal headquarters is New Town, located in Mountrail County. The Reservation is not a participating jurisdiction with this plan.

A general map of the county, including major features and neighboring jurisdictions, is shown in Figure 2.1. Major roadways include US Highway 83, and numerous State Highways. The county is also served by three railroad lines.

Lake Sakakawea, a reservoir on the Missouri River, forms much of the southern border of the county. The lake was created with the completion of Garrison Dam in 1956.

Population and Demographics

Summarized demographic information for McLean County and North Dakota is shown in Table 2.1. The county is generally older than the state overall, with a median age of 48.9 and 21.2 percent of residents at least 65 years of age. The county's population density of 4.5 persons per square mile is approximately half the statewide rate. Nearly all residents identify themselves as White not Hispanic. The county's poverty level and median income is roughly comparable to the state.

	McLean County	North Dakota
Population	9,517	723,393
Persons under 5 years	5.8%	6.7%
Persons under 18 years	21.3%	22.5%
Persons 65 years and over	21.2%	14.2%
Median Age	48.9	36.4
Persons per square mile	4.5	10.5
White not Hispanic	90.7%	87.3%
Hispanic or Latino	2.0%	2.9%
American Indian or Alaska Native	7.1%	5.4%
Black or African American	0.3%	1.8%
Asian	0.1%	1.2%
Two or More Races	1.7%	1.9%
Foreign born	0.7%	2.7%
Language other than English spoken at home	4.2%	5.3%
High school graduates, age 25+	90.5%	90.9%
Median household income	\$53,565	\$53,741
Persons below poverty level	10.9%	11.9%
Average household size (persons)	2.23	2.31

Source: US Census Bureau; 2013 Annual Estimate used for population, age and race/ethnicity; 2009-2013 American Community Survey used for other demographic information

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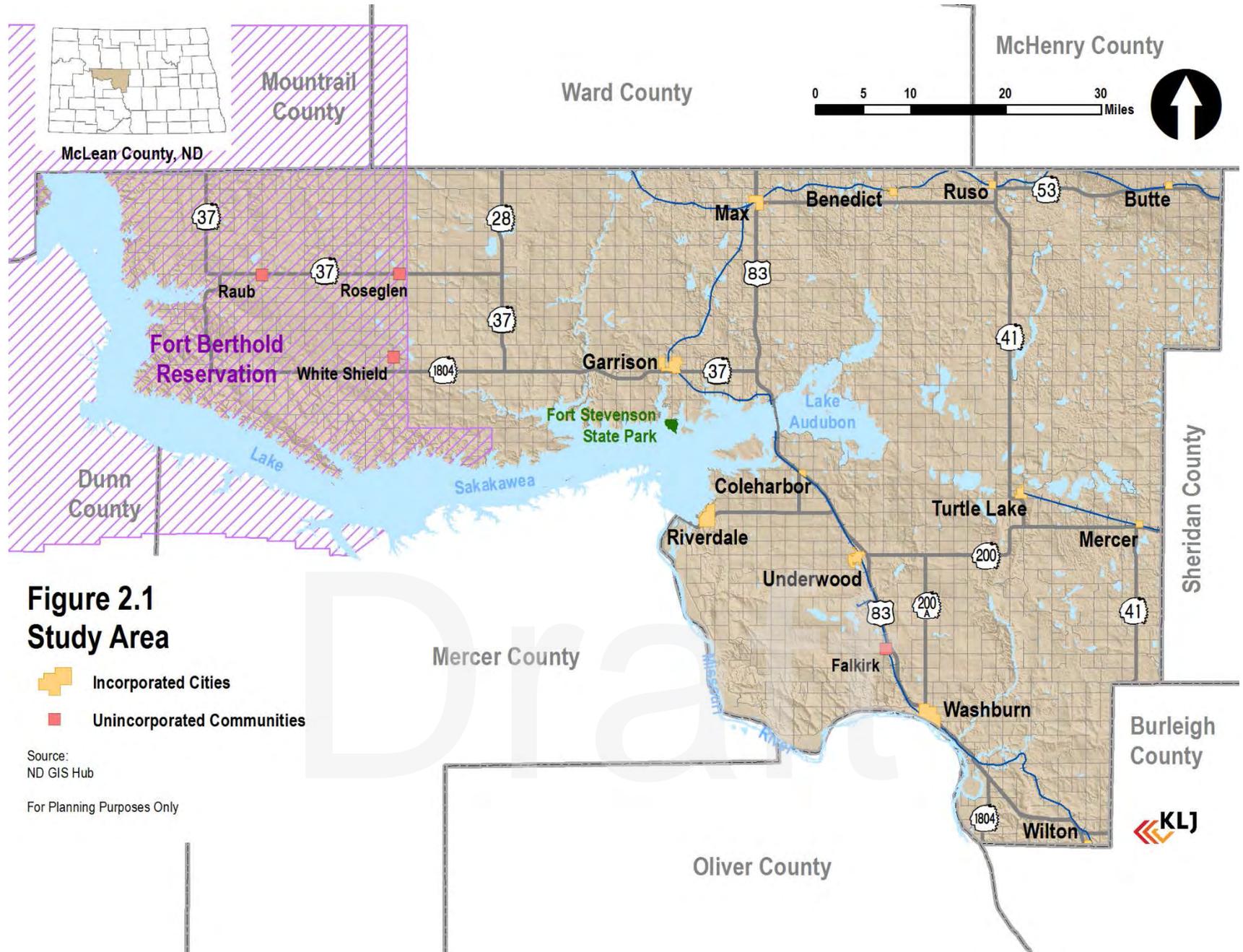


Figure 2.1
Study Area

-  Incorporated Cities
-  Unincorporated Communities

Source:
ND GIS Hub

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McLean County

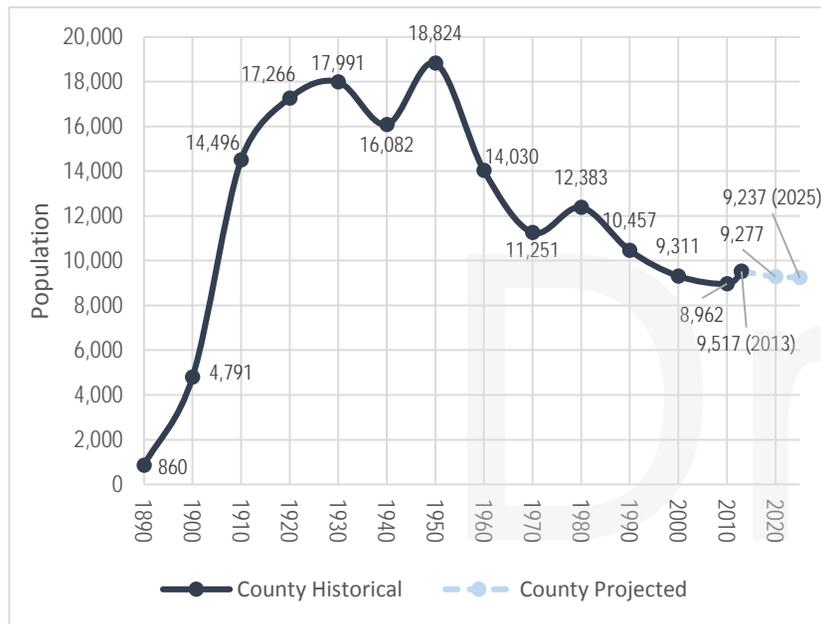
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Population trends for the county are shown in Figure 2.2. The county generally experienced declining population from 1950 to 2010. The trend has recently reversed, with the county experiencing a 6.2 percent population increase from 2010 to 2013.

Recent population trends for each city are summarized in Table 2.2. Many cities experienced large population declines from 2000 to 2010; however, these trends have reversed in recent years and nearly every city experienced population gains from 2010 to 2013.

Estimates from the NDSU Department of Agribusiness and Applied Economics indicate that the county's population will slightly decline or remain steady through 2025. It is important to note that the population projections are based off 2010 census figures, so they do not include the recent population gains.

Figure 2.2 - McLean County Historical and Projected Population



Source: US Census Bureau (Historical); North Dakota Statewide Housing Needs Assessment, NDSU Department of Agribusiness and Applied Economics, released September 2012 (Projected)

City	2000	2010	% Change 2000-2010	2013	% Change 2000-2013
Benedict	53	66	24.5%	68	3.0%
Butte	92	68	-26.1%	71	4.4%
Coleharbor	106	79	-25.5%	85	7.6%
Garrison	1,318	1,453	10.2%	1,552	6.8%
Max	278	334	20.1%	349	4.5%
Mercer	86	94	9.3%	97	3.2%
Riverdale	273	205	-24.9%	222	8.3%
Ruso	6	4	-33.3%	4	0.0%
Turtle Lake	580	581	0.2%	598	2.9%
Underwood	812	778	-4.2%	775	-0.4%
Washburn	1,389	1,246	-10.3%	1,324	6.3%
Wilton	807	711	-11.9%	732	3.0%

Source: US Census Bureau, Decennial Census (2000 and 2010), Annual Estimates Program (2013)

Population density is shown in Figure 2.3. Most of the county is very low density, with two or less persons per acre.

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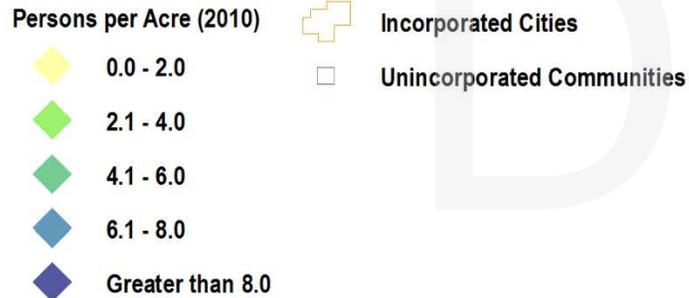
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McLean County, ND



Figure 2.3
Population Density



Source:
US Census Bureau, 2010 Decennial Census
ND GIS Hub

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Climate and Weather

Aggregated weather statistics for the county are shown in Table 2.3. Weather extremes in the county are shown in Table 2.4. The NWS Cooperative Network Weather Station in Washburn is used for aggregate data because it has the longest available period of record in the county. Additional weather statistics can be found in Appendix C.

Washburn				
	Temperature (° F)		Precipitation (In.)	Snow Fall (In.)
	<i>Avg Daily Max</i>	<i>Avg Daily Min</i>	<i>Avg Monthly</i>	<i>Avg Monthly</i>
Jan	20.2	-0.7	0.39	6.1
Feb	25.6	3.8	0.42	5.4
Mar	38.0	16.1	0.64	6.8
Apr	56.8	30.7	1.50	3.9
May	68.7	42.1	2.29	0.9
Jun	77.1	51.6	3.50	0.1
Jul	84.4	57.0	2.50	0.0
Aug	83.1	54.7	1.84	0.0
Sep	72.5	44.7	1.50	0.2
Oct	58.7	33.1	1.01	1.9
Nov	38.9	18.8	0.51	4.4
Dec	25.9	6.5	0.37	6.0
Ann	54.2	29.9	16.47	35.8

Note: Aggregated Monthly Statistics 8/1/1893-7/31/2011
 Source: NWS Cooperative Network Weather Station, Washburn 329195 (High Plains Regional Climate Center)

Highest Max Temperature	115° F	7/7/1936
Lowest Min Temperature	-45° F	2/16/1936
Highest Daily Precipitation	3.95"	7/30/1956
Greatest Snowfall	17.0"	2/28/1951

Note: Aggregated Monthly Statistics 8/1/1893-7/31/2011
 Source: NWS Cooperative Network Weather Station, Washburn 329195 (High Plains Regional Climate Center)

Economy

The agriculture industry is the driving force of the McLean County economy. The industry is tracked by annual survey through the National Agricultural Statistics Service. Summarized survey information is shown in Table 2.5. Spring wheat is the most common crop, accounting for 60 percent of the county's harvested acreage in 2014. Cattle and calves make up almost the entirety of the county's livestock industry. The USDA Census of Agriculture indicates that in 2012 the total value of crops sold in the county was \$270,674,000 and the total value of livestock was \$22,732,000.

Crop (2014)	Acres Harvested	Production
Spring Wheat (excl Durum)	280,000	14,292,000 bu
Soybeans	80,200	2,880,000 bu
Corn, Grain	71,000	8,404,000 bu
Sunflower	24,300	27,551,000 lb
Barley	8,800	628,000 bu
Oats	3,000	253,000 bu
Livestock (2013)	Inventory	
Cattle and Calves	40,000	
Sheep and Lambs	700	

Source: USDA National Agricultural Statistics Service annual survey

McLean County

Multi-Hazard Mitigation Plan

Energy production is another significant element of the county's economy. Garrison Dam includes a hydro-electric generating plant that produces an average of 240 megawatts. Located near Underwood, Great River Energy Coal Creek Station is the world's largest lignite-fired generating facility, with a peak production of 1.2 gigawatts. It is supplied by the nearby Falkirk Mine, which annually produces more than eight million tons of lignite coal. There is estimated to be more than three billion tons of recoverable lignite coal in McLean County. The Blue Flint Ethanol Facility, also located near Underwood, produces approximately 50 million gallons of ethanol per year.



Great River Energy Coal Creek Station located near Underwood. The facility is the largest lignite-fired generating plant in the world.

Source: Todd-Wadena Electric Cooperative

Countywide workforce data is compiled by the Job Service North Dakota Labor Market Information Center. The county's largest employers are shown in Table 2.6. A majority of the top employers in 2013 were from utilities, education and health care.

Table 2.6 - McLean County Largest Employers, 2013

Rank	Employer	Industry
1	(Nondisclosable)	(Nondisclosable)
2	Great River Energy	Utilities
3	Garrison Memorial Hospital	Hospitals
4	Garrison School District	Educational Services
5	Benedictine Living Center	Care Facilities
6	Community Memorial Hospital	Hospitals
7	Krause's Super Valu	Food and Beverage Stores
8	(Nondisclosable)	(Nondisclosable)
9	McLean County	Government
10	Washburn School Dist #4	Educational Services

Source: 2013 Quarterly Census of Employment and Wages, Job Service ND, Labor Market Information Center

Critical Facilities

An important element to hazard mitigation planning is to determine critical facilities that may need special consideration during the preparation of mitigation action items and the risk assessment. Critical facilities fall into several categories:

- Facilities that are essential to the health and welfare of the entire population, and may become especially important following hazard events.
- Utility systems whose disruption would have a significant impact.
- Facilities containing a high density of population, especially those containing vulnerable populations. Examples include schools, retirement homes and large employers.
- Facilities that are a key element to the local economy, and could cause significant economic damage if their function was disrupted.
- Historic, cultural and natural resource areas that are important to the community.

Critical facilities in McLean County can be found in Appendix D. The facilities found in the appendix are a revised version of the facilities list found in the 2009 plan. Critical facilities are discussed in each hazard profile found in Chapter 3.

McLean County

Multi-Hazard Mitigation Plan

Chapter 3: Hazard Risks and Vulnerabilities

Hazards Overview

McLean County is subject to numerous natural and human-caused hazards. Many hazards are capable of creating significant levels of damage and having a negative effect on the local economy.

Table 3.1 lists Presidential Disaster Declarations for McLean County from 1989 to 2014. There were 32 Presidential Disaster Declarations in North Dakota during the period, and McLean County was designated for 14 of them. The most recent declared disasters were the flooding and winter storm events of 2013.

Table 3.1 - McLean County Presidential Disaster Declarations, 1989-2014		
Year	Declaration	Hazard(s)
2013	DR 4128	Flooding, Severe Storms
2011	DR 1981	Flooding
2010	DR 1901	Severe Winter Storms
2009	DR 1829	Severe Storms, Flooding
2005	DR 1616	Winter Storms
2003	DR 1483	Severe Storms, High Winds
2001	DR 1376	Flooding
2000	DR 1334	Flooding, Severe Storms
1999	DR 1279	Severe Storms, Tornadoes, Snow and Ice, Flooding, Ground Saturation, Landslides and Mudslides
1997	DR 1174	Severe Storms, Flooding
1997	DR 1157	Severe Winter Storms
1996	DR 1118	Flooding
1995	DR 1050	Flooding, Severe Storms
1993	DR 1001	Flooding, Severe Storms

Source: FEMA

The 2014 North Dakota Multi-Hazard Mitigation Plan served as the basis for selecting the hazards profiled in this chapter. Shortage or Outage of Critical Materials or Infrastructure, Structure Collapse, Transportation Accident and Windstorm are profiled as separate hazards in the statewide plan; however, in this plan the risks and impacts associated with those hazards are discussed in other applicable hazard profiles and do not receive individual recognition.

Profiled natural hazards:

- Drought
- Flood
- Geologic Hazards
- Severe Summer Weather
- Severe Winter Weather
- Wildland Fire

Profiled human-caused/technological hazards:

- Communicable Disease
- Dam Failure
- Hazardous Materials Release
- Homeland Security Incident
- Urban Fire

Natural hazards are listed first, followed by human-caused/technological hazards. Each profiled hazard includes the following information:

- *Hazard Profile*: Definition of the hazard and general overview.
- *Local Risk*: Previous occurrences and specific risk for the jurisdiction, including population, critical facilities and property.
- *Existing Capabilities*: Current actions taken by the jurisdiction to address the hazard.
- *Key Issues*: The primary issues that affect the jurisdiction and the basis for determining action items.
- *Potential Action Items*: A preliminary list of action items to address key issues. These items are refined and prioritized in Chapter 4.

The profiles include an analysis of the probability and magnitude of each event to determine overall hazard risk. Probability is the chance that the hazard event will occur within the county in the next year. Magnitude is the percentage of residents and property that could be significantly affected by the hazard event in a worst-case scenario.

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Criteria used to determine probability, magnitude and overall risk class are shown below. Historical data from previous events was utilized to determine probability and magnitude when possible. Risk class is determined for the rural county (unincorporated areas) and each incorporated city.

Probability

Low: less than 10 percent probability in the next year

Moderate: 10-100 percent probability in the next year

High: more than 100 percent probability in the next year

Magnitude

Low: less than 5 percent of jurisdiction exposed

Moderate: 5-10 percent of jurisdiction exposed

High: more than 10 percent of jurisdiction exposed

		Magnitude		
		Low	Moderate	High
Probability	Low	Low	Low	Moderate
	Moderate	Low	Moderate	High
	High	Moderate	High	High

Hazard statistics for recent years are provided from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center's Storm Data and Unusual Weather Phenomena database. The Storm Data and Unusual Weather Phenomenon database provides a comprehensive list of weather events along with vital information about each event. Information from the database is provided in the corresponding hazard profiles and Appendix C. For McLean County, the database includes information about flooding, severe summer weather and severe winter weather. Statistics for other hazards are provided by a variety of sources, as noted in each corresponding profile.

McLean County

Multi-Hazard Mitigation Plan

Drought

All Jurisdictions	<i>Overall Risk:</i> Moderate <i>Probability:</i> Moderate (once per decade, approximately 10 percent annual probability) <i>Magnitude:</i> Moderate (economic impact on entire county)
Seasonal Pattern	None, but impacts may be greater during Spring and Summer
Duration	Months/Years
Primary Impacts	Agricultural loss (crops, livestock) Economic loss Increased fire potential Loss of potable water Pest infestation

Hazard Profile

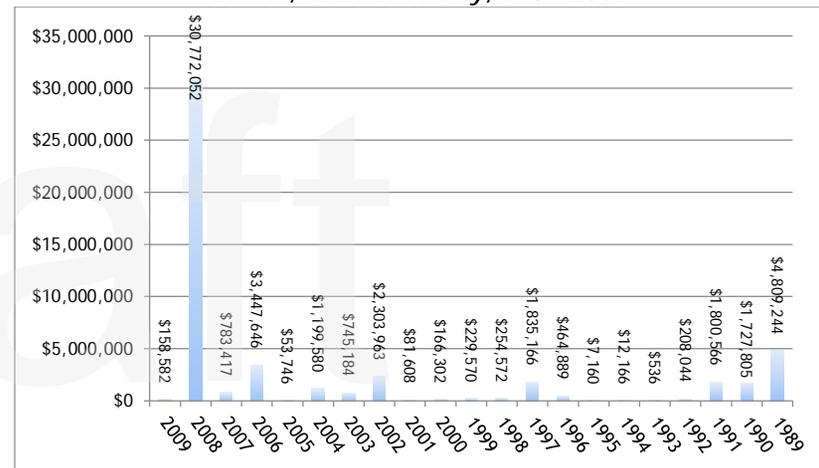
Drought is generally defined as a deficiency of precipitation over an extended period. If severe enough, this deficiency has potential to reduce soil moisture and water below the minimum necessary for sustaining plant, animal and human life systems. It is a normal, recurrent phenomenon that takes place in nearly all climate zones. Droughts appear gradually, and it is often difficult to pinpoint their beginning and end. Droughts can last multiple years, and even persist over decades. Significant droughts in North Dakota occur approximately once per decade. Previous droughts include the 1930s, 1950s, early 1960s, mid 1970s, early 1980s, 1988 through 1991, 2002 through 2004 and 2006.

Droughts are often measured by impacts, most notably agricultural damage and municipal water supply shortage. The impacts are highly variable based on time of year, amount of stored water in the soil, and meteorological factors such as temperature, humidity and wind. Impacts are also greatly affected by human factors such as local water demand and water management practices.

Local Risk

- It is difficult to predict when a drought will appear. Historic trends show that wetter-than-normal periods tend to alternate with drier-than-normal periods. **The average annual precipitation in the county is 16.47 inches** as recorded by the National Weather Service Cooperative Network weather station in Washburn. The county's **lowest annual precipitation is 5.66 inches**, which was recorded in 1936. It is important to note, however, that numerous factors beyond rainfall contribute to drought status, which can make it difficult to predict and classify droughts.
- Historical drought occurrences can be measured by looking at impacts. Federal indemnity programs provide financial assistance to help reduce the impact of drought-related agricultural losses. Figure 3.1 shows indemnity payments for McLean County from 1989-2009. The figure shows that **2008 had the largest drought indemnity payments** during the time period. Drought losses occurred during the late 1980s and early 1990s, and were scattered throughout the 2000s. Based on previous regional trends, a severe drought can be expected approximately once per decade.

Figure 3.1 - Federal Indemnity Payments for Drought-Related Losses, McLean County, 1989-2009



Source: National Drought Mitigation Center

McLean County

Multi-Hazard Mitigation Plan

Vulnerability

Population

- Drought has no direct impact on human life, but it **greatly increases the risk of wildfire**, which is a potentially life-threatening hazard. Drought accompanied by high temperatures can **increase the threat of heat-related illness** for persons who spend a significant amount of time outdoors or do not have adequately-cooled homes. The **highest recorded temperature in the county (at the Washburn monitoring station) is 115 degrees Fahrenheit recorded in July 1936**. Elderly persons are at increased risk of heat-related illness. According to the most recent American Community Census estimates, approximately **2,018 residents in the county are 65 years of age or older**. The estimated number of residents age 65 or older for each jurisdiction are summarized below.
 - Benedict: 22 residents (34 percent)
 - Butte: 34 (27 percent)
 - Coleharbor: 8 (10 percent)
 - Garrison: 383 (28 percent)
 - Max: 45 (13 percent)
 - Mercer: 19 (32 percent)
 - Riverdale: 37 (20 percent)
 - Ruso: no estimate available
 - Turtle Lake: 142 (33 percent)
 - Underwood: 158 (22 percent)
 - Washburn: 223 (18 percent)
 - Wilton: 145 (19 percent)
- **Prolonged drought could affect water supplies**. Bottled water could be brought in as an emergency measure, but a lack of household water could create health and sanitation issues for residents. Water is supplied by a mix of municipal water systems, rural water systems and personal wells. McLean County is part of three rural water districts: McLean-Sheridan Water District, Garrison Rural Water District and North Prairie Rural Water District. Garrison and McLean-Sheridan Rural Water Districts, Garrison and the Riverdale/Underwood systems obtain their water from Lake Sakakawea.

Critical Facilities

- No critical facility in the county is physically impacted by drought.

Property

- Drought can have a significant economic impact on agriculture and related industries. Federal indemnity payments, previously shown in Figure 3.2, are an indicator of drought-related agricultural losses. **Since 1989, the year with the greatest payments was 2008, with \$31 million paid by the USDA to reduce the economic impact of drought**. Agriculture is the primary economic driver in the county, and local economic success of each city ultimately relies on a healthy agriculture industry.
- The statewide Multi-Hazard Mitigation Plan includes information about crop insurance payments from the USDA Risk Management Agency. **Drought-related crop insurance payments in McLean County from 2003 to 2012 totaled \$38.1 million**. Based on a statewide rate of 89 percent of crops being insured, **total estimated damages for the county were \$42.8 million**.
- It is difficult to measure direct economic loss for livestock producers. Cattle and calves numbers regularly fluctuate based on a wide number of factors. Impacts on livestock producers include **reduced rangeland productivity, high cost/unavailability of water for livestock, disruption of reproductive cycles and the cost of finding supplemental feed or pasture**.
- Beyond agricultural impacts, there is also a greater threat of structure damage in drought-affected areas, as **drought increases the risk of wildfire and may create water shortages that inhibit adequate fire response**. Structure vulnerability from wildfire is discussed in more detail in the wildland fire section of this chapter.

Future Development

- Public water systems are monitored by the North Dakota Department of Health, and water permit applications are maintained by the North Dakota State Water Commission and US Army Corps of Engineers.

McLean County

Multi-Hazard Mitigation Plan

Existing Capabilities

- The USDA Farm Service Agency has field offices located in Garrison and Turtle Lake, and North Dakota State University Extension has a field office located in Washburn. Both agencies offer general education relating to drought management best practices. The USDA Farm Service Agency field office assists with the distribution of drought indemnity payments to agricultural producers.

Key Issues and Potential Action Items

- *Key Issue:* Agriculture is a key component of the county's economy. A significant drought has the potential to greatly affect the industry and the county as a whole.
 - *Potential Action Item:* Continue supporting the USDA Farm Service Agency and North Dakota State University Extension and provide assistance as needed to local farmers and ranchers.
 - *Potential Action Item:* Develop emergency response plan that includes coordination with local livestock producers.
- *Key Issue:* Recent population growth has resulted in an increased demand for potable water. Maintaining an adequate water supply may become difficult if this growth continues, particularly during times of drought.
 - *Potential Action Item:* Expand municipal water storage.
 - *Potential Action Item:* Educate residents in each community about water saving techniques to help preserve water supplies.
 - *Potential Action Item:* Increase the supply of treated water that could be available for industrial applications.

Draft

McLean County

Multi-Hazard Mitigation Plan

Flood

Rural County	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Moderate (3 reported event days 1996-2014) <i>Magnitude:</i> Moderate (history of damages over \$500,000)</p>	Riverdale	<p><i>Overall Risk:</i> Low <i>Probability:</i> Moderate (two reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>
Benedict	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>	Ruso	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>
Butte	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>	Turtle Lake	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>
Coleharbor	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>	Underwood	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>
Garrison	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Moderate (3 reported event days 1996-2014) <i>Magnitude:</i> Moderate (history of damages over \$300,000)</p>	Washburn	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (1 reported event day 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>
Max	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (1 reported event day 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>	Wilton	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>
Mercer	<p><i>Overall Risk:</i> Low <i>Probability:</i> Low (no reported event days 1996-2014) <i>Magnitude:</i> Low (not located in identified floodplain, impacts possible from flash flooding)</p>	Seasonal Pattern	March - October
		Primary Impacts	<p>Agricultural loss (crops, livestock) Blocked roads Economic loss Human loss and injuries Localized evacuation Permanent loss of businesses Power loss Property damage or loss Release of hazardous materials</p>

McLean County

Multi-Hazard Mitigation Plan

Hazard Profile

Primary causes of flooding in North Dakota include heavy rain/flash flooding, rapid snowmelt/ice jams and increased seasonal moisture. Flooding can occur in riverine zones or flat areas that lack adequate drainage.

Typical insurance policies do not cover flood damages, so FEMA created the National Flood Insurance Program (NFIP) to provide flood insurance for property owners. The NFIP makes flood insurance available to residents in NFIP-participating communities that adopt and enforce floodplain management ordinances and follow other basic requirements.

A Flood Insurance Rate Map (FIRM) is created to determine flood insurance rates for each participating community. The FIRM identifies Special Flood Hazard Areas (SFHA) that have a one percent annual chance of flooding, commonly referred to as the 100-year floodplain. Areas outside the SFHA are considered to be in the Non-Special Flood Hazard Area (NSFHA). Structures in the NSFHA may still be at risk from flooding; according to FEMA, one in every four floods occurs in an NSFHA. Flood insurance is required for all property owners who acquire a loan from a federally regulated, supervised or insured financial institution for the acquisition or improvement of land, facilities or structures located within an SFHA.

Local Risk

- NFIP participation is summarized in Table 3.2. All participating jurisdictions have a floodplain administrator and actively-enforced floodplain management ordinances. Action items to strengthen the NFIP compliance of all participating jurisdictions is included in Chapter 4.

Jurisdiction	Total Participating Properties	Insured Value of Participating Properties	Claims Since 1978	Total Paid Since 1978
McLean County	0	\$0	0	\$0
Coleharbor	0	\$0	0	\$0
Garrison	2	\$560,000	2	\$7,784
Max	0	\$0	3	\$55,136
Underwood	0	\$0	3	\$3,742
Washburn	0	\$0	0	\$0
Wilton	0	\$0	0	\$0

Note: Policy and claim information as of 1/31/2015

- McLean County was included in 10 flood-related Presidential Disaster Declarations between 1989 and 2014.
- The most significant flooding issue in the county is localized ponding resulting from heavy precipitation. There is minimal history of riverine flooding events affecting the county, but the Missouri River and Lake Sakakawea can experience elevated water levels during the spring season.
- Recent flood events in McLean County are summarized in Table 3.3. The county averages one flood event every two years. Flood event classification criteria and a detailed listing of events can be found in Appendix C.

Flood Events	Event Days*	Annual Probability	Event Days per Year
Total	10	52.6%	0.5
Flood	5	26.3%	0.3
Flash Flood	5	26.3%	0.3

*Number of days with a reported event

Source: National Climatic Data Center Storm Events Database

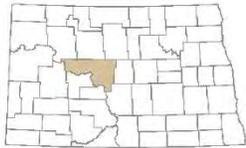
McLean County

Multi-Hazard Mitigation Plan

- The National Climatic Data Center Storm Events Database includes brief summaries of significant storm events. A selection of recent flood events within McLean County are summarized below.
 - *June 6, 1999.* Six inches of rain fell in a three-hour period in Garrison. Several businesses and 115 homes were flooded, resulting in damages over \$300,000.
 - *June 1, 2005.* Rainfall of four inches flooded a total of 36 homes and businesses in Max. Damages were estimated at \$60,000.
 - *June 26, 2005.* Streets in Garrison flooded after receiving two inches of rain in a short period of time. Total damages were estimated at \$10,000.
 - *July 30, 2008.* Garrison received 3.43 total inches of rain, with 2.62 inches falling within one hour. Many city streets were flooded, and water was flowing into some basements. Total damages were estimated at \$25,000.
 - *March - April, 2009.* Significant overland flooding occurred near Raub due to rapid runoff from snowmelt. Flooding damaged 35 homes and many rural roads. Total damages were estimated at over \$500,000.
- The National Climatic Data Center Storm Events Database categorizes storm events by location. **Between 1996 and 2014 there were three flood event days in Garrison, two in Raub, two in Riverdale, one in Washburn, one in Max and one in a rural area of the county.**
- **The largest flooding issue in rural areas of the county is inundated roads due to generally rising water levels in the region.** Flooding issues for rural roads are exacerbated during periods of heavy rain. Some minor roads have been abandoned due to year-round water issues. Structures in rural areas of the county are generally not impacted by flooding. No structures were damaged during the 2011 flood event.
- **The most common impact on structures in the county is flooded basements due to saturated soil.** Rising water levels have increased the amount of saturated soil in the county and increased the number of flooded basements.
- Garrison experiences localized flooding issues during heavy rain due to inadequate drainage. The southern half of town does not have storm sewers, which causes streets and basements to frequently flood during rain events.
- The Mercer wastewater treatment lagoons are at risk of inundation due to rising water levels in the area.
- Underwood is located near a slough and has flooding during heavy rain events. Water flowing from north to south through the city is an issue. The city is currently spending \$3 million on a drainage project that will help alleviate flooding issues caused by water from the north. Water coming from the west is also an issue. An engineering study is needed to determine possible solutions to flooding caused by water from the west.
- Washburn has a coulee located on the east side of town. Culverts running through the coulee are no longer adequate and need to be replaced. The city's drinking water intake in the Missouri River was damaged during the 2011 flooding event. Custer Drive has flooding issues during heavy rain events due to inadequate drainage and needs an updated storm water system.
- The US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) maintains river gauges at several points in the county to track ice jams. **CRREL has recorded 12 ice jams in the county since 1959.** Most ice jams in the county have occurred along small creeks and resulted in no reported damages. Nine of the reported ice jams occurred prior to 1962. The most recently reported ice jams were at Deepwater Creek near Raub in 2004 and 2010.
- FEMA Digital Flood Insurance Rate Maps (DFIRMs) were completed for the county in 2010. The DFIRMs for the county are shown in Figures 3.3, 3.4, 3.5 and 3.6. The DFIRMs identify areas of enhanced flooding risk. Zone A (also known as a 100-year floodplain or Special Flood Hazard Area) presents a one percent annual chance of flooding. This equates to approximately a one in four chance of flooding during a 30-year mortgage.

McLean County

Multi-Hazard Mitigation Plan

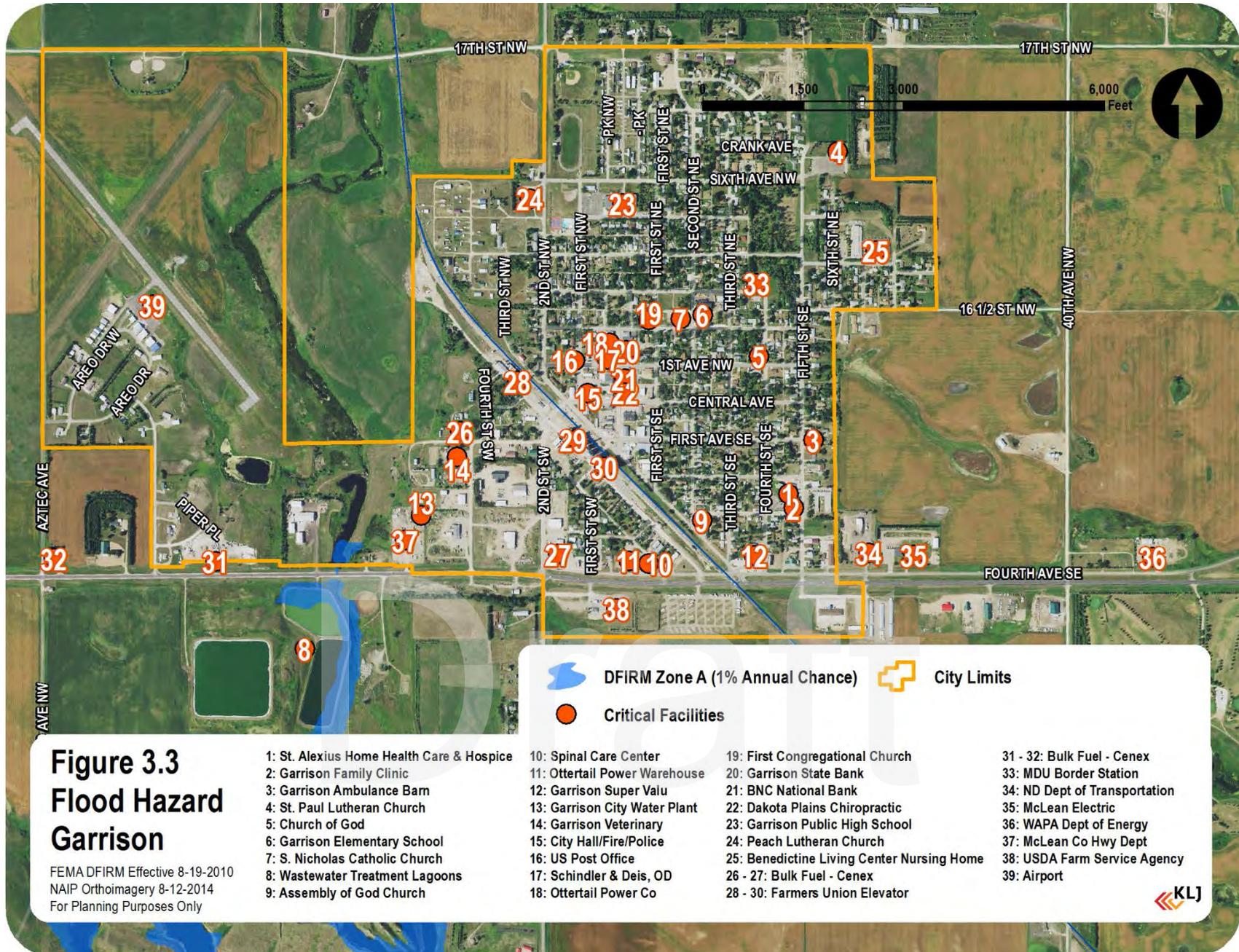


McLean County, ND



McLean County

Multi-Hazard Mitigation Plan



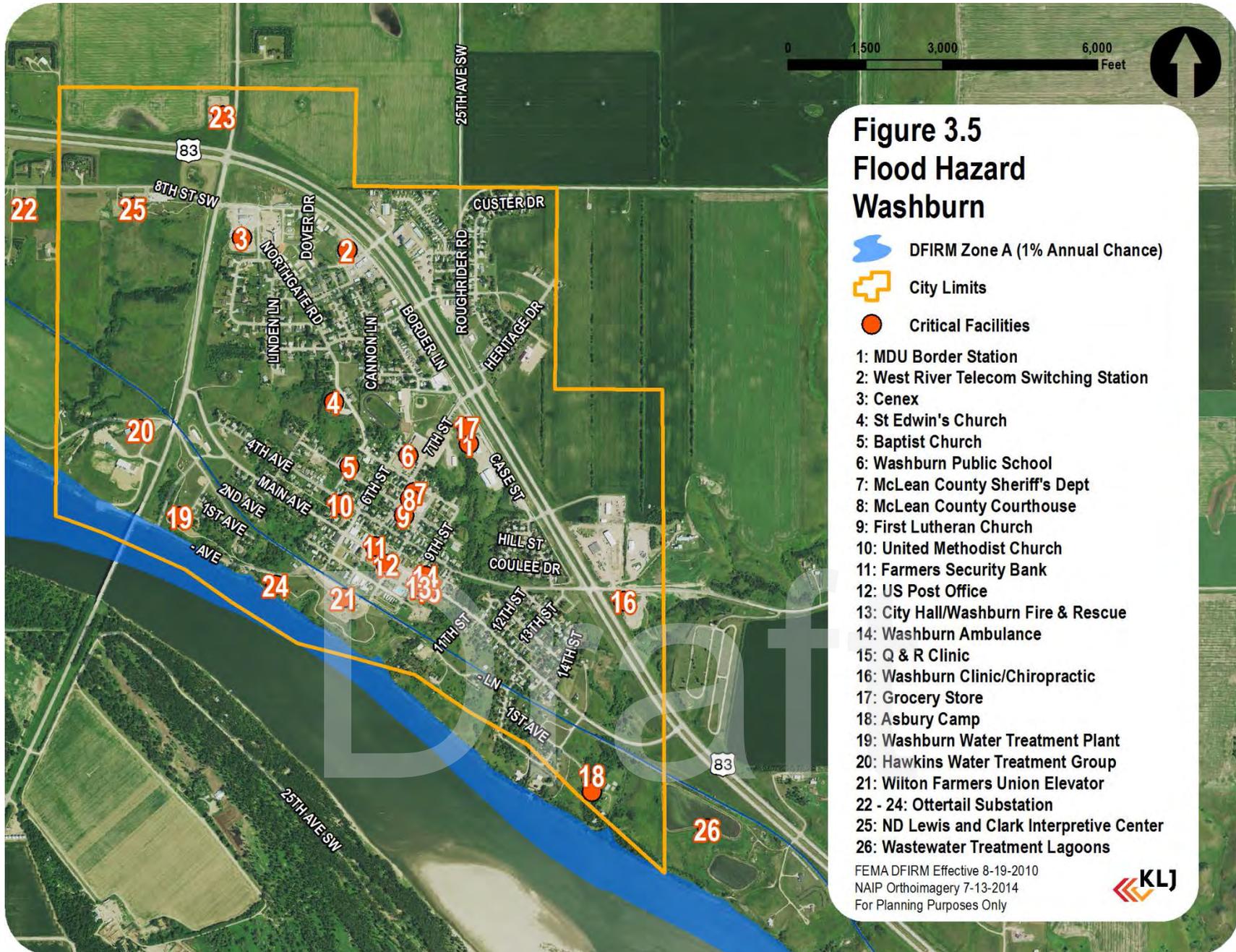
McLean County

Multi-Hazard Mitigation Plan



McLean County

Multi-Hazard Mitigation Plan



**Figure 3.5
Flood Hazard
Washburn**

-  DFIRM Zone A (1% Annual Chance)
-  City Limits
-  Critical Facilities

- 1: MDU Border Station
- 2: West River Telecom Switching Station
- 3: Cenex
- 4: St Edwin's Church
- 5: Baptist Church
- 6: Washburn Public School
- 7: McLean County Sheriff's Dept
- 8: McLean County Courthouse
- 9: First Lutheran Church
- 10: United Methodist Church
- 11: Farmers Security Bank
- 12: US Post Office
- 13: City Hall/Washburn Fire & Rescue
- 14: Washburn Ambulance
- 15: Q & R Clinic
- 16: Washburn Clinic/Chiropractic
- 17: Grocery Store
- 18: Asbury Camp
- 19: Washburn Water Treatment Plant
- 20: Hawkins Water Treatment Group
- 21: Wilton Farmers Union Elevator
- 22 - 24: Ottetail Substation
- 25: ND Lewis and Clark Interpretive Center
- 26: Wastewater Treatment Lagoons

FEMA DFIRM Effective 8-19-2010
 NAIP Orthoimagery 7-13-2014
 For Planning Purposes Only



McLean County

Multi-Hazard Mitigation Plan

Vulnerability

Population

- Aerial photography shows that there are no residences located within a designated floodplain.
- Flash flooding events can be potentially dangerous, particularly if people try to travel during an event. There is no history of injuries or fatalities associated with flash flooding in the county.

Critical Facilities

- The Garrison wastewater treatment lagoons are located within a designated floodplain; however, the lagoons are elevated and have no history of flooding damages.
- No critical facilities have a history of flood-related impacts.

Property

- The statewide Multi-Hazard Mitigation Plan includes information about crop insurance payments from the USDA Risk Management Agency. Flood-related crop insurance payments in McLean County from 2003 to 2012 totaled \$50 million. Based on a statewide rate of 89 percent of crops being insured, total estimated damages for the county were \$55.6 million. Over a ten-year period this results in an annualized loss of \$5.6 million.
- The most significant flooding event in terms of recorded damages since 1996 was snowmelt runoff in spring 2009 that resulted in \$500,000 of damage to homes and rural roads near Raub. A flash flooding event in June 1999 resulted in damages of \$300 to homes and businesses in Garrison.
- Repetitive loss properties are tracked for communities that participate in the NFIP. There is one repetitive loss property in McLean County. The property experienced two loss events with an average payment of \$3,892. Repetitive loss properties are addressed in the mitigation strategy found in Chapter 4.
- No structures in the county are located within a designated floodplain.

Future Development

- All communities in the county with a history of flooding participate in the NFIP and have floodplain regulations that limit future growth into high risk areas.
- A levee construction project is currently underway to reduce flooding risk in Lisbon.

Existing Capabilities

- McLean County, Coleharbor, Garrison, Max, Underwood and Washburn have floodplain administrators and floodplain ordinances that are actively enforced.

Key Issues and Potential Action Items

- *Key Issue:* McLean County experiences approximately one flood event every two years. Flood events in the county are primarily related to heavy rainfall and snowmelt runoff.
 - *Potential Action Item:* Conduct NFIP workshop to educate public about benefits of flood insurance.
 - *Potential Action Item:* Improve natural stream function to reduce overflow volume in floodplain area.
 - *Potential Action Item:* Place riprap on river banks to help prevent erosion.
 - *Potential Action Item:* Improve municipal drainage.
 - *Potential Action Item:* Acquire and remove high risk properties in the floodplain.
 - *Potential Action Item:* Consider joining the NFIP Community Rating System (CRS) program.
 - *Potential Action Item:* Install sewer backflow prevention valves on select facilities.
- *Key Issue:* Many roads and bridges in the county are commonly washed-out or inundated during flooding events.
 - *Potential Action Item:* Adopt policy for minimum culvert size to help prevent washouts.
 - *Potential Action Item:* Elevate commonly-impacted roads or bridges.

McLean County

Multi-Hazard Mitigation Plan

Geologic Hazards

All Jurisdictions *Overall Risk: Low*
Probability: Low (the county is in a low probability area for a significant earthquake, the western half of the county is located in a moderate susceptibility landslide area)
Magnitude: Low (no history of recorded damages)

Seasonal Pattern May - October

Primary Impacts Agricultural loss (crops, livestock)
Economic loss
Human loss and injuries
Increased stress on medical services
Permanent loss of businesses
Power loss
Property damage or loss
Release of hazardous materials

Hazard Profile

Geologic hazards include landslide, earthquake and mining.

The US Geological Survey (USGS) defines a landslide as a movement of rock, soil, artificial fill, or a combination thereof on a slope in a downward or outward direction. The primary causes of landslides are slope saturation by water from intense rainfall, snowmelt, or changes in groundwater levels on primarily steep slopes, earthen dams, and the banks of lakes, reservoirs, canals and rivers.

An earthquake is defined by USGS as a sudden movement of the earth, caused by the abrupt release of strain that has accumulated over a long time. North Dakota is not an area known for earthquake activity; however, many small earthquakes may occur throughout the state.

Mining hazards are related to mine, drilling and energy production disasters. The mining hazard in North Dakota is focused primarily in the Bakken region in the western part of the state. Energy production hazards are addressed in the hazardous materials section of this plan.

Local Risk

- Figure 3.6 shows potential earthquake hazard areas in the contiguous United States. McLean County has a two-percent probability of exceeding a peak ground acceleration of 0.02 to 0.04 in the next 50 years. According to the Pacific Northwest Seismic Network, a ground acceleration of 0.014 to 0.039 can result in a light perceived shaking and no damages. There is no significant earthquake history in the county.

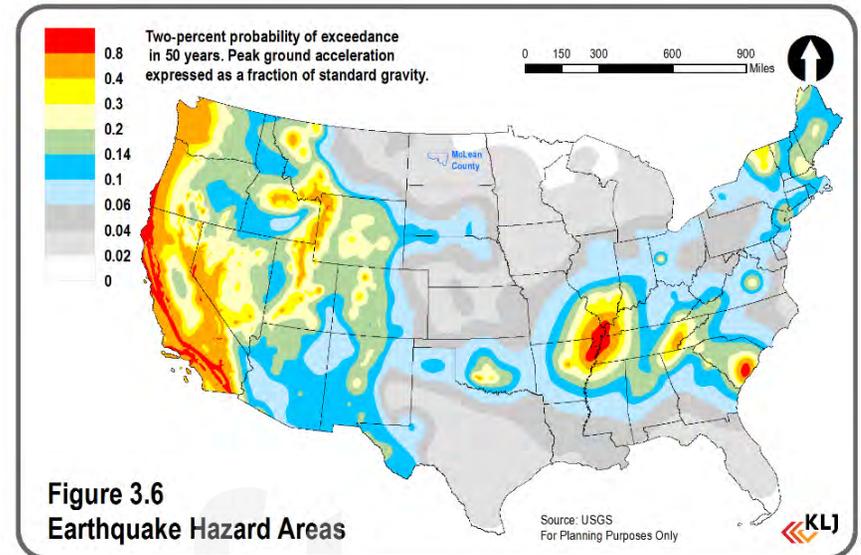


Figure 3.6
Earthquake Hazard Areas

- Much of the county is in a moderate susceptibility/low incidence landslide area according to the USGS. The hazard area is shown in Figure 3.7. It is important to note that these areas are delineated at a national scale and not intended for precise analysis.
- Small landslides can occur throughout the county during periods of significant moisture. Common areas for landslides are the bluffs along rivers. There is no history of a landslide causing significant damage in the county, but rural roads have been damaged in the past.

McLean County

Multi-Hazard Mitigation Plan



McLean County, ND



Figure 3.7
Landslide Hazard Areas

-  High Incidence/Susceptibility
-  High Incidence
-  Moderate Incidence
-  High Susceptibility
-  Moderate Susceptibility
-  Incorporated Cities
-  Unincorporated Communities

Source:
US Geological Survey
ND GIS Hub

For Planning Purposes Only



McLean County

Multi-Hazard Mitigation Plan

Vulnerability

Population

- No earthquake event in the county has resulted in injuries or fatalities, and according to the USGS the probability of a significant earthquake in the county is very low. In the event of a significant earthquake, residents in very old structures may be the most vulnerable. According to the most recent American Community Survey estimates, approximately 900 housing units in the county (16 percent of total) were built before 1939. Applying the county's average household size of 2.23 persons, **there are approximately 2,000 persons in the county with an enhanced vulnerability to earthquakes.** Note that this analysis does not include structure information for workplaces, which would have a large impact on potential vulnerability for an earthquake during daytime hours. The estimated number of structures built before 1939 and vulnerable residents for each city is summarized below.
 - Benedict: 18 residential structures (40 residents, 59 percent)
 - Butte: 21 (47, 66 percent)
 - Coleharbor: 15 (33, 39 percent)
 - Garrison: 77 (172, 11 percent)
 - Max: 25 (56, 16 percent)
 - Mercer: 10 (22, 23 percent)
 - Riverdale: 7 (16, 7 percent)
 - Ruso: no estimate available
 - Turtle Lake: 35 (78, 13 percent)
 - Underwood: 61 (136, 18 percent)
 - Washburn: 84 (187, 14 percent)
 - Wilton: 84 (187, 26 percent)
- The amount of residents in the hazard area identified in Figure 3.7 can be calculated by analyzing census block populations from the 2010 US Census. All census blocks with a centroid within the hazard area were considered for this analysis. **There are 6,525 residents living within the moderate susceptibility landslide area.** Six cities are completely within the hazard area: Coleharbor, Garrison, Riverdale, Underwood, Washburn and Wilton. It is important to note that this area is delineated at a national scale and not intended for precise analysis. The number of residents actually vulnerable to landslide is most likely significantly lower.

- Erosion along railroad tracks in 2011 caused a derailment that resulted in the death of the train conductor. Landslide risk along the tracks has been mitigated by the railroad operators.

Critical Facilities

- According to the USGS Earthquake Hazard Area map shown in Figure 3.6, a potential earthquake in McLean County would most likely only result in a light perceived shaking and no damages. The oldest facilities in each jurisdiction, including city halls, churches and grain elevators, would be most likely to experience some damages. There is no history of earthquakes in the county causing structure damage.
- The moderate susceptibility landslide hazard area identified in Figure 3.7 includes 105 critical facilities. The hazard area is very generalized, and it is likely that very few of these facilities are actually vulnerable to landslide. There is no history of landslides in the county causing structure damage.

Property

- According to the USGS Earthquake Hazard Area map shown in Figure 3.6, a potential earthquake in McLean County would most likely only result in a light perceived shaking and no damages. If damages were to occur, it is likely that only the county's oldest structures would be impacted. According to the most recent American Community Survey estimates, there are approximately 900 housing units in the county that were built before 1939. Information for each city is found in the population section of this profile. Age information is not available for other types of structures in the county.
- There are six incorporated cities located within the moderate susceptibility landslide area in Figure 3.7: Coleharbor, Garrison, Riverdale, Underwood, Washburn and Wilton. Additionally, approximately half of the county is within the hazard area. The hazard area is very generalized, and it is likely that very few of the properties in the area are vulnerable. There is no history of landslides in the county causing structure damage.

McLean County

Multi-Hazard Mitigation Plan

Future Development

- Coleharbor, Garrison, Underwood and Washburn have adopted the North Dakota state building code. The state building code consists of the 2012 International Building Code, International Residential Code, International Mechanical Code and International Fuel Gas Code published by the International Code Council. The code includes provisions that prohibit construction on areas with steep slopes and provides general standards that contribute to earthquake resiliency.

Existing Capabilities

- State building code prohibits construction on steep slopes and provides general standards that contribute to earthquake resiliency.

Key Issues and Potential Action Items

- *Key Issue:* The county is in an area of minimal hazard for earthquakes.
 - *Potential Action Item:* Adopt the North Dakota state building code throughout the entire county.
- *Key Issue:* Much of county is within a moderate susceptibility/low incidence landslide hazard area as defined by USGS.
 - *Potential Action Item:* Define detailed high susceptibility landslide hazard areas based on soil type, and topography and incorporate into county subdivision regulations.
 - *Potential Action Item:* Improve base material, elevate or relocate roads that may be impacted.
 - *Potential Action Item:* Adopt the North Dakota state building code throughout the entire county.

McLean County

Multi-Hazard Mitigation Plan

Severe Summer Weather

All Jurisdictions	<i>Overall Risk:</i> High <i>Probability:</i> High (Approximately nine event days per year countywide) <i>Magnitude:</i> High (Potential for damages totaling millions of dollars and many fatalities)
Seasonal Pattern	May - October
Primary Impacts	Agricultural loss (crops, livestock) Economic loss Human loss and injuries Increased stress on medical services Permanent loss of businesses Power loss Property damage or loss Release of hazardous materials

Strong winds often form on the leading edge of severe storms, and gusts more than 100 MPH are possible.

Hail presents a hazard for property, crops, livestock and occasionally human life. Hail events range from an area of a few acres up to hundreds of square miles, although small events are most common. Hailstones can fall to the surface at more than 100 MPH, and reach more than seven inches in diameter; however, most hailstones do not exceed two inches in diameter.

Lightning strikes pose multiple threats to life and property. A lightning strike can electrocute humans and animals, vaporize materials, cause fire and cause an electrical surge that may damage equipment. Human deaths from lightning strikes are somewhat uncommon. According to the National Oceanic and Atmospheric Administration, there were 12 recorded lightning fatalities in North Dakota from 1959-2013. Florida led the nation during that time period with 471 lightning fatalities. Livestock deaths and property damage are the most common lightning-related threats in North Dakota.

Hazard Profile

The elements of severe summer weather include tornadoes, wind, hail and lightning.

Tornadoes are the most destructive weather phenomenon on earth. They can produce winds ranging from 65 MPH to more than 300 MPH, and pose severe danger to life and property. Peak tornado season is from June to August, and most occur during evening hours. Tornadoes typically travel from southwest to northeast at a speed between 30 and 70 MPH, and are generally on the ground for less than 10 minutes; however, tornado characteristics are highly unpredictable and can change rapidly.

Tornado severity is recorded with the Enhanced Fujita (EF) Scale, which replaced the Fujita (F) Scale in 2007. Wind speed estimates are determined by the damage created by a tornado. The EF Scale includes ratings from zero (65 to 85 MPH wind speeds) to five (wind speeds over 200 MPH).

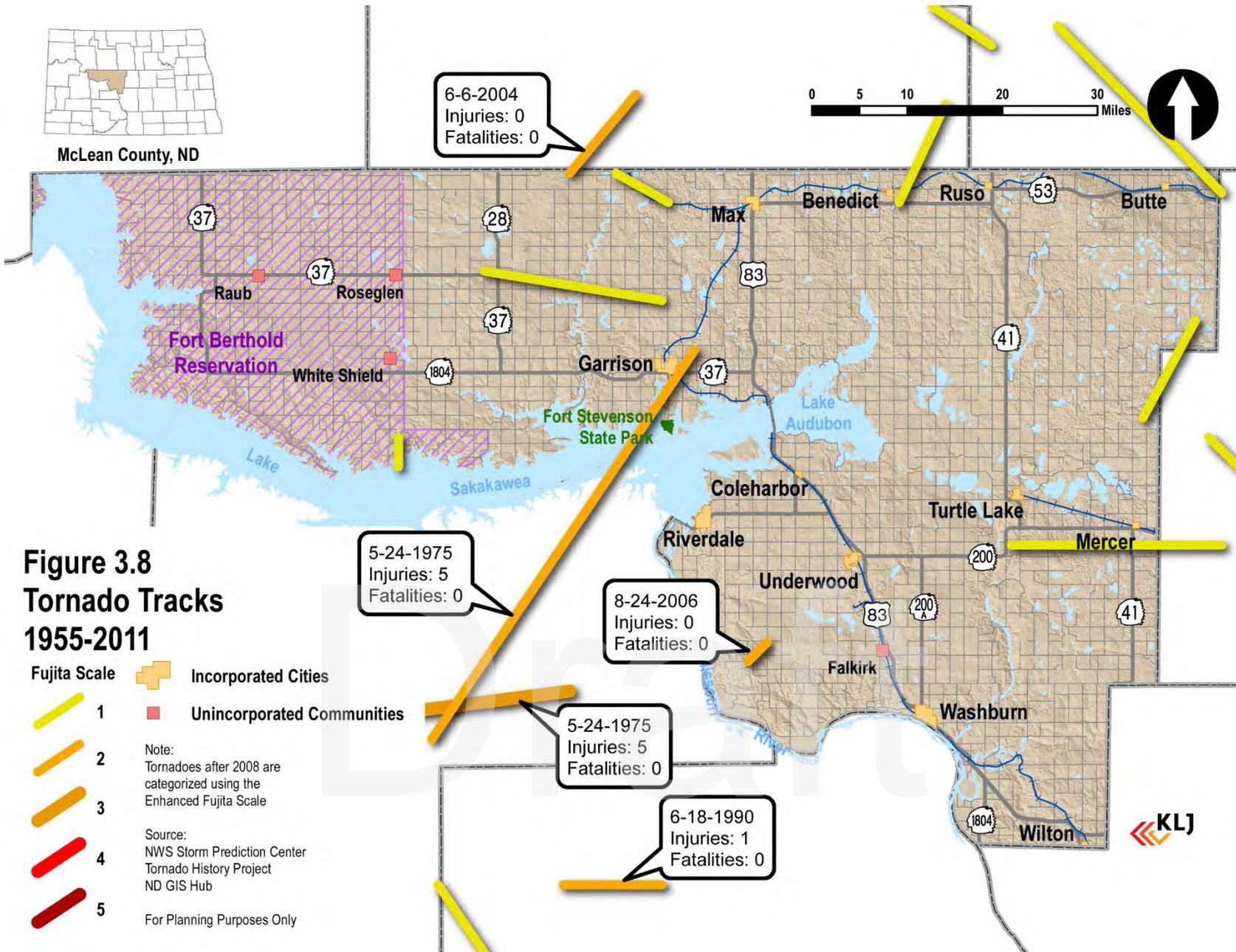
Straight-line winds are a common element of severe summer storms, and typically responsible for most damage associated with the storms.

Local Risk

- McLean County was included in eight summer storm-related Presidential Disaster Declarations between 1989 and 2014.
- Severe summer weather events in McLean County are summarized in Table 3.5. **On average, a severe summer weather event occurs in the county approximately nine days per year.** Summer weather classification criteria and a detailed listing of events can be found in Appendix C.

McLean County

Multi-Hazard Mitigation Plan



McLean County

Multi-Hazard Mitigation Plan

Vulnerability

Population

- The entire population is vulnerable to a severe summer storm event. Residents living in homes without a basement or permanent foundations are particularly vulnerable to tornado and wind events. There are approximately 677 mobile homes in McLean County according to the most recent American Community Survey Estimates. Applying the county's average household size of 2.23 persons, there are approximately 1,510 persons in the county with an enhanced vulnerability to severe summer weather. The estimated number of mobile homes and vulnerable residents for each city is summarized below. The remaining mobile homes are located in rural areas.
 - Benedict: 4 mobile homes (9 residents, 13 percent)
 - Butte: 1 (2, 3 percent)
 - Coleharbor: 3 (7, 8 percent)
 - Garrison: 38 (85, 5 percent)
 - Max: 13 (29, 8 percent)
 - Mercer: 1 (2, 2 percent)
 - Riverdale: 2 (4, 2 percent)
 - Ruso: no estimate available
 - Turtle Lake: 5 (11, 2 percent)
 - Underwood: 4 (9, 1 percent)
 - Washburn: 46 (103, 8 percent)
 - Wilton: 41 (91, 12 percent)
 - Major recreation areas in the county include Lake Sakakawea, Lake Audubon, Indian Hills Resort, Sportsmen's Centennial Park, Fort Stevenson State Park, East Totten Trail Campground, Downstream Campground (below Garrison Dam), Ft. Mandan, Brush Lake and Strawberry Lake. The county has hundreds of campsites and RV sites, many of which are not located near adequate shelter in the event of severe summer weather.
- #### Critical Facilities
- All critical facilities are vulnerable to a severe summer storm event. Facilities with an increased vulnerability include schools, special care centers, tall buildings, electrical infrastructure and event facilities.
 - Rural areas of the county:
 - Coal Creek Station
 - Snake Creek and Ottetail substations
 - Fort Stevenson State Park
 - Falkirk Elevator
 - White Shield School
 - Benedict:
 - Concordia Lutheran Church
 - Ottetail Substation
 - Butte:
 - St. Paul Lutheran Church
 - Coleharbor:
 - Ottetail substation
 - Garrison:
 - St. Alexius Home Health Care and Hospice
 - Benedictine Living Center Nursing Home
 - Farmers Union Elevator
 - Garrison Elementary School
 - Garrison Public High School
 - The city has six churches
 - Ottetail substations
 - Max:
 - Farmers Elevator
 - The city has two churches
 - Max Public School
 - Ottetail substation
 - Mercer:
 - No identified facilities with increased vulnerability
 - Riverdale:
 - Riverdale Church
 - Ruso:
 - No identified facilities with increased vulnerability
 - Turtle Lake:
 - Turtle Lake-Mercer School
 - St. Alexius Home Health Care

McLean County

Multi-Hazard Mitigation Plan

- Community Memorial Hospital
- The city has three churches
- Ottertail substation
- Equity Elevator and Trading Co
- Underwood:
 - Prairieview Nursing Home
 - Benson Quinn Co Elevator
 - Underwood Public School
 - Ottertail substation
 - The city has three churches
- Washburn:
 - Washburn Public School
 - Asbury Camp
 - McLean County Courthouse
 - Wilton Farmers Union Elevator
 - Ottertail substations
 - ND Lewis and Clark Interpretive Center
 - The city has four churches
- Wilton:
 - Ottertail substation
 - Elevator
 - The city has three churches
 - Basic Care Facility
 - Water Tower

Property

- The 2014 statewide Multi-Hazard Mitigation Plan documents claims paid to cover damages on local government facilities and property insured by the state. From 1989 to 2013, claims were paid for the following hazards in McLean County.
 - Hail: \$95,720
 - Lightning: \$84,086
 - Wind: \$70,166
- The 2014 statewide Multi-Hazard Mitigation Plan also documents damage claims for public school facilities. From 1989 to 2013, claims were paid for the following hazards in McLean County.
 - Hail: \$65,186
 - Lightning: \$6,200

- Wind: \$10,459

- The most damaging summer storm event recorded by the National Climatic Data Center since 1996 is a wind event in July 2006 that caused an estimated \$3 million in damages near Coleharbor.

Future Development

- Coleharbor, Garrison, Underwood and Washburn have adopted the North Dakota state building code. The North Dakota State Building Code consists of the 2012 International Building Code, International Residential Code, International Mechanical Code and International Fuel Gas Code published by the International Code Council. The code includes a provision that buildings must be constructed to withstand a wind load of 75 MPH constant velocity and three-second gusts of 90 MPH.

Existing Capabilities

- Each city has at least one tornado siren and an identified emergency shelter.

Key Issues and Potential Action Items

- *Key Issue:* McLean County averages approximately nine days per year with a summer storm event. Severe wind and hail are the most common summer storm events in the county, and tornadoes are also a possibility in the region.
 - *Potential Action Item:* Cover windows in select critical facilities with shatter-resistant film.
 - *Potential Action Item:* Offer information about weather-resistant building best practices.
 - *Potential Action Item:* Install and maintain surge protection on critical equipment.

McLean County

Multi-Hazard Mitigation Plan

Severe Winter Weather

All Jurisdictions	<p><i>Overall Risk:</i> High</p> <p><i>Probability:</i> High (Approximately six event days per year countywide)</p> <p><i>Magnitude:</i> High (Potential for damages totaling millions of dollars with fatalities)</p>
Seasonal Pattern	October - April
Primary Impacts	<p>Agricultural loss (crops, livestock)</p> <p>Blocked roads</p> <p>Economic loss</p> <p>Exposure risks to people, pets, livestock and wildlife</p> <p>Freezing pipes</p> <p>Human loss and injuries</p> <p>Increased stress on medical services</p> <p>Power loss</p> <p>Property damage or loss</p> <p>School closure</p> <p>Vehicle accidents</p>

An ice storm produces heavy and damaging accumulations of ice due to a combination of rain and below freezing surface temperatures. Accumulated ice can bring down trees and power lines and poses a threat to motorists, pedestrians and livestock.

Extreme cold is a common occurrence in North Dakota during the winter months. Cold temperatures are amplified when combined with wind, creating dangerous wind chills. Exposure to extreme cold temperatures and wind chill can damage tissue (frostbite) and lower the body's core temperature (hypothermia), presenting a risk to both humans and livestock.

Local Risk

- McLean County was included in three winter storm-related Presidential Disaster Declarations between 1989 and 2014.
- A summary of the severe winter weather events in McLean County is shown in Table 3.7. **On average, a severe winter weather event occurs in the county approximately six days per year.** Generally classified "winter storm" and extreme cold/wind chill events are most common. Winter weather classification criteria and a detailed listing of events can be found in Appendix C.

Hazard Profile

Elements of severe winter weather include blizzards, heavy snow, ice storms and extreme cold. These elements can produce life-threatening situations and are a threat to people and property.

A blizzard is defined by the National Weather Service as a storm producing winds of 35 mph or more, with snow and/or blowing snow reducing visibility to less than 0.25 miles for at least three hours. A closely related weather event known as a surface blizzard occurs when heavy winds blow snow that has already fallen. Both traditional and surface blizzards can reduce visibility, disrupting transportation and communication systems in the area.

Heavy snow is defined as six or more inches of snow in 12 hours, or eight or more inches of snow in 24 hours. Heavy snow can damage property and make roads impassable for extended periods.

Table 3.6 - Severe Winter Weather Events in McLean County, 1996-2014

Winter Storm Events	Event Days*	Annual Probability	Event Days per Year
<i>Total</i>	112	589.5%	5.9
Winter Storm	31	163.2%	1.6
Blizzard	29	152.6%	1.5
Extreme Cold/Wind Chill	25	131.6%	1.3
Heavy Snow	13	68.4%	0.7
High Wind	9	47.4%	0.5
Winter Weather	5	26.3%	0.3

*Number of days with a reported event

Source: National Climatic Data Center Storm Events Database

McLean County

Multi-Hazard Mitigation Plan

- Blowing snow resulting in road hazards was a commonly identified impact during stakeholder meetings. Wind is particularly strong coming off Lake Sakakawea and Lake Audubon.
- **Power loss happens occasionally** throughout the county during severe winter storms. Ottertail Power transmission lines are generally buried, but the terrain in some areas of the county makes line burial impractical.

Vulnerability

Population

- Residents living in mobile homes, recreational vehicles, or poorly insulated homes may find it difficult to adequately heat their homes during cold temperature events. There are approximately 677 mobile homes in McLean County according to the most recent American Community Survey Estimates. Applying the county's average household size of 2.23 persons, there are approximately 1,510 persons in the county with an enhanced vulnerability to severe winter weather. The estimated number of mobile homes and vulnerable residents for each city is summarized below. The remaining mobile homes are located in rural areas.
 - Benedict: 4 mobile homes (9 residents, 13 percent)
 - Butte: 1 (2, 3 percent)
 - Coleharbor: 3 (7, 8 percent)
 - Garrison: 38 (85, 5 percent)
 - Max: 13 (29, 8 percent)
 - Mercer: 1 (2, 2 percent)
 - Riverdale: 2 (4, 2 percent)
 - Ruso: no estimate available
 - Turtle Lake: 5 (11, 2 percent)
 - Underwood: 4 (9, 1 percent)
 - Washburn: 46 (103, 8 percent)
 - Wilton: 41 (91, 12 percent)
- Wind, ice, heavy snow and cold temperatures can combine to create hazardous conditions and “trap” residents in their homes without heat or electricity. Elderly residents may be especially vulnerable to this hazard as they are more likely to have

limited mobility, especially in the event of hazardous road conditions. Approximately 2,018 residents in the county are 65 years of age or older. The estimated number of residents age 65 or older for each jurisdiction are summarized below.

- Benedict: 22 residents (34 percent)
- Butte: 34 (27 percent)
- Coleharbor: 8 (10 percent)
- Garrison: 383 (28 percent)
- Max: 45 (13 percent)
- Mercer: 19 (32 percent)
- Riverdale: 37 (20 percent)
- Ruso: no estimate available
- Turtle Lake: 142 (33 percent)
- Underwood: 158 (22 percent)
- Washburn: 223 (18 percent)
- Wilton: 145 (19 percent)

- People required to travel on a daily basis face increased road hazards. According to the Job Service North Dakota Labor Market Information Center, the labor force in McLean County is approximately 4,856 people (51 percent of the total population).

Critical Facilities

- A winter storm event that “traps” fire and ambulance responders within the facility would severely limit the emergency response capability of the county.
- A severe winter storm event would most likely require closure of schools. A winter storm event that begins mid-day could present issues for students leaving school.
- Power outages and loss of heating could impact the elderly and populations that require assistance for daily living who are located in special care facilities.
- Rural areas of the county:
 - Ottertail and Snake Creek substations
 - Washburn Municipal Airport
 - White Shield School
 - Response capabilities of the Three Affiliated Tribes could be inhibited by a winter storm

McLean County

Multi-Hazard Mitigation Plan

- Benedict:
 - Ottertail Substation
- Butte:
 - Butte Fire
- Coleharbor:
 - Ottertail substation
- Garrison:
 - St. Alexius Home Health Care and Hospice
 - Benedictine Living Center Nursing Home
 - Garrison Elementary School
 - Garrison Public High School
 - Ottertail substations
 - Garrison Ambulance
 - Garrison City Water Plant
 - City Hall/Fire/Police
- Max:
 - Max Public School
 - Ottertail substation
 - Max Fire/Ambulance
- Mercer:
 - No identified facilities with increased vulnerability
- Riverdale:
 - Fire/Ambulance
- Ruso:
 - No identified facilities with increased vulnerability
- Turtle Lake:
 - Turtle Lake-Mercer School
 - St. Alexius Home Health Care
 - Community Memorial Hospital
 - Ottertail substation
 - Turtle Lake Ambulance Service
- Underwood:
 - Prairieview Nursing Home
 - Underwood Public School
 - Ottertail substation
 - Underwood Fire/Rescue/Ambulance
- Washburn:
 - Washburn Public School
 - Asbury Camp
 - Ottertail substations
 - City Hall/Washburn Fire and Rescue
 - Washburn Ambulance
- Wilton:
 - Ottertail substation
 - Basic Care Facility
 - Ambulance Hall
 - City Hall/Law Enforcement
 - Fire Hall

Property

- It is difficult to estimate the impact of winter storms on property in the County. **The most likely damages involve roof collapse due to heavy snow loads and vehicle accidents.** Roof collapse is most likely for older structures. According to the most recent American Community Survey estimates, there are approximately 900 housing units in the county that were built before 1939. Age information is not available for other types of structures in the county.
- A winter storm can also result in an **increased risk of structure fire due to use of portable heaters and fireplaces** during events that involve extremely cold temperatures.
- A severe winter storm can cause significant livestock fatalities. According to the 2012 Census of Agriculture, the **market value of livestock in McLean County was \$22.7 million.** Losses vary based on storm severity and duration, but losses to unprotected livestock can be significant following a major storm event. Winter storms in the spring season have the potential to affect calving operations.

Future Development

- The potential vulnerability to winter weather in the county is not expected to change in the foreseeable future.

McLean County

Multi-Hazard Mitigation Plan

Existing Capabilities

- Facilities with backup generators include the Garrison and Turtle Lake Hospitals, and the County Courthouse.
- Snow removal on rural and city roads is generally timely and effective.

Key Issues and Potential Action Items

- *Key Issue:* McLean County averages approximately six days per year with a winter storm event. Severe winter weather events in the county include winter storm, high wind, heavy snow, blizzard, extreme cold/wind chill and ice storm.
 - *Potential Action Item:* Coordinate with landowners to identify strategic locations for constructing snow fences.
 - *Potential Action Item:* Continue educating residents about winter storm safety.
- *Key Issue:* A winter storm event that causes a power outage may make it difficult for residents to heat their homes. Elderly residents and residents in mobile homes are the most vulnerable to extreme cold temperatures. Approximately 3,500 residents in the county are elderly or live in a mobile home.
 - *Potential Action Item:* Identify emergency warming shelter(s) and acquire back-up generator(s) to heat shelters and provide electricity during a winter storm event. Promote shelters so residents are aware of their availability.
 - *Potential Action Item:* Encourage utility provider to bury electric power lines when undergoing upgrades or repair.

Draft

McLean County

Multi-Hazard Mitigation Plan

Wildland Fire

Rural County *Overall Risk:* Moderate
Probability: Moderate (18 reported fires greater than 100 acres from 1992-2012)
Magnitude: Moderate (a large wildfire could potentially cause damages totaling millions of dollars and put human lives at risk; however, the largest wildfire reported from 1992-2012 was 1,764 acres)

Benedict *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 75 percent of city could be directly impacted)

Butte *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 40 percent of city could be directly impacted)

Coleharbor *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 40 percent of city could be directly impacted)

Garrison *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 15 percent of city could be directly impacted)

Max *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 40 percent of city could be directly impacted)

Mercer *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 40 percent of city could be directly impacted)

Riverdale *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 40 percent of city could be directly impacted)

Ruso *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 100 percent of city could be directly impacted)

Turtle Lake *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 25 percent of city could be directly impacted)

Underwood *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 25 percent of city could be directly impacted)

Washburn *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 15 percent of city could be directly impacted)

Wilton *Overall Risk:* Moderate
Probability: Low (no history of impacts on city)
Magnitude: High (estimated 25 percent of city could be directly impacted)

Seasonal Pattern March - November

Primary Impacts
 Agricultural loss (crops, livestock)
 Blocked roads
 Economic loss
 Explosion
 Hazardous materials release
 Human loss and injuries
 Increased stress on medical services
 Localized evacuation
 Property damage or loss
 Reduced air quality

McLean County

Multi-Hazard Mitigation Plan

Hazard Profile

A wildfire is an unplanned fire, a term which includes grass fires, forest fires and scrub fires either human-caused or natural in origin. Many of the fires occurred in or near urban/suburban areas.

Wildfires pose increasing threats to people and their property as communities develop in the wildland-urban interface. The wildland-urban interface refers to areas where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The threat exists anywhere that structures are located close to natural vegetation and where fire can spread from vegetation to structures, or from structures to vegetation.

The three major factors that affect the occurrence and severity of wildfires are the fuels supporting the fire, the weather conditions during a fire event and the topography in which the fire is burning. These factors affect and increase the likelihood of a fire starting, the speed and direction in which a fire will travel, the intensity at which it burns, and the ability to control and extinguish it. At the landscape level, both topography and weather are beyond our control. Fuel is the only factor influencing fire behavior that humans have the ability to manage.

Local Risk

- Figure 3.9 shows fuel types in the McLean County. Predominate fuel types are classified using the 13 standard fuel models for fire behavior by Anderson. **Much of the county is agricultural land, which the Anderson models do not consider to be a significant fuel;** however, in times of drought or during harvest season agricultural fields may present a wildfire risk. **The most prevalent fuels on the county are of the grass and brush groups.** These fuels generally burn with a low intensity, but can spread quickly. Grass and shrub fuels are most heavily concentrated in the southern portion of the county. Timber fuels are scattered along Lake Sakakawea and the Missouri River.
- Figure 3.9 also shows incidence of wildfires over 100 acres. The information is from the Interagency Fire Program Analysis fire-

occurrence database, compiled by Karen C. Short of the USDA Forest Service, Rocky Mountain Research Station. The database is sourced from multiple reporting agencies; however, due to reporting limitations, it should not be considered an all-inclusive list. According to the database, **McLean County had 18 wildfires over 100 acres between 1992 and 2012 with an average fire size of 520 acres. The largest wildfire reported during the time period was 1,764 acres.**

- There were **three wildfires greater than 1,000 acres** in McLean County reported to the National Interagency Fire Center between 1980 and 2012.
- In 2009 the North Dakota Forest Service developed a wildfire risk assessment for every county in the state based on wildfire occurrence, fire department response capabilities and weather. The assessment ranked McLean County as having a high risk for wildfire.
- The wildland-urban interface identifies risk areas where fire can spread from vegetation to structures, or from structures to vegetation. **Any areas where structures are located within or adjacent to wildland environments can be included within the wildland-urban interface.** This includes all rural structures in McLean County and structures along the edges of each city.

Vulnerability

Population

- Residents of non-urbanized areas (in the wildland-urban interface) are generally at a higher risk of wildfire. According to 2013 Census Bureau estimates, there are approximately 9,517 residents in the county; of these, 3,640 live outside of an incorporated city and are at increased vulnerability to wildfire. Assuming approximately 10 percent of residents in incorporated cities live along or near the wildland-urban interface, 588 additional residents are vulnerable to wildfire. Using these estimates **approximately 4,230 residents (45 percent of total population) in the county are vulnerable to wildfire.**

McLean County

Multi-Hazard Mitigation Plan

Critical Facilities

- Although nearly all of the county's key facilities are within urbanized areas, which are considered defensible space for wildfire, **several critical facilities are located along the edges of cities near the wildland-urban interface or in rural areas.** Facilities within 100 yards of the edge of town, or within non-urbanized rural areas are listed below.
- Rural areas of the county:
 - Ottertail and Snake Creek substations
 - Washburn Municipal Airport
 - McLean-Sheridan Rural Water
 - Fort Stevenson State Park
 - Coal Creek Station
 - Falkirk Mining Co
- Benedict:
 - Ottertail Substation
 - Concordia Lutheran Church
 - Sewage Lift Station
- Butte:
 - Wastewater Treatment Lagoons
 - St. Paul Lutheran Church
- Coleharbor:
 - Ottertail substation
- Garrison:
 - Airport
 - Cenex Bulk Fuel
 - Wastewater Treatment Lagoons
 - McLean County Highway Department
 - USDA Farm Service Agency
 - ND Department of Transportation
 - McLean Electric
 - WPA Department of Energy
 - Garrison Ambulance Barn
 - Peace Lutheran Church
- Max:
 - Max Public School
- MDU Border Station
- Wastewater Treatment Lagoons
- Ottertail Substation
- Mercer:
 - Wastewater Treatment Lagoons
- Riverdale:
 - Wastewater Treatment Lagoons
- Ruso:
 - US Post Office
- Turtle Lake:
 - City Shop
 - Farmers Union Oil Company
 - Ottertail Substation
 - Turtle Lake-Mercer School
 - Equity Elevator and Trading Company
- Underwood:
 - City Hall
 - Prairieview Nursing Home
 - Wastewater Treatment Lagoons
 - ND Department of Transportation
- Washburn:
 - Wastewater Treatment Lagoons
 - Ottertail substation
 - ND Lewis and Clark Interpretive Center
 - Washburn Clinic/Chiropractic
- Wilton:
 - Elevator
 - Wastewater Treatment Lagoons
 - Cenex Bulk Plant
 - Church

McLean County

Multi-Hazard Mitigation Plan



McLean County, ND

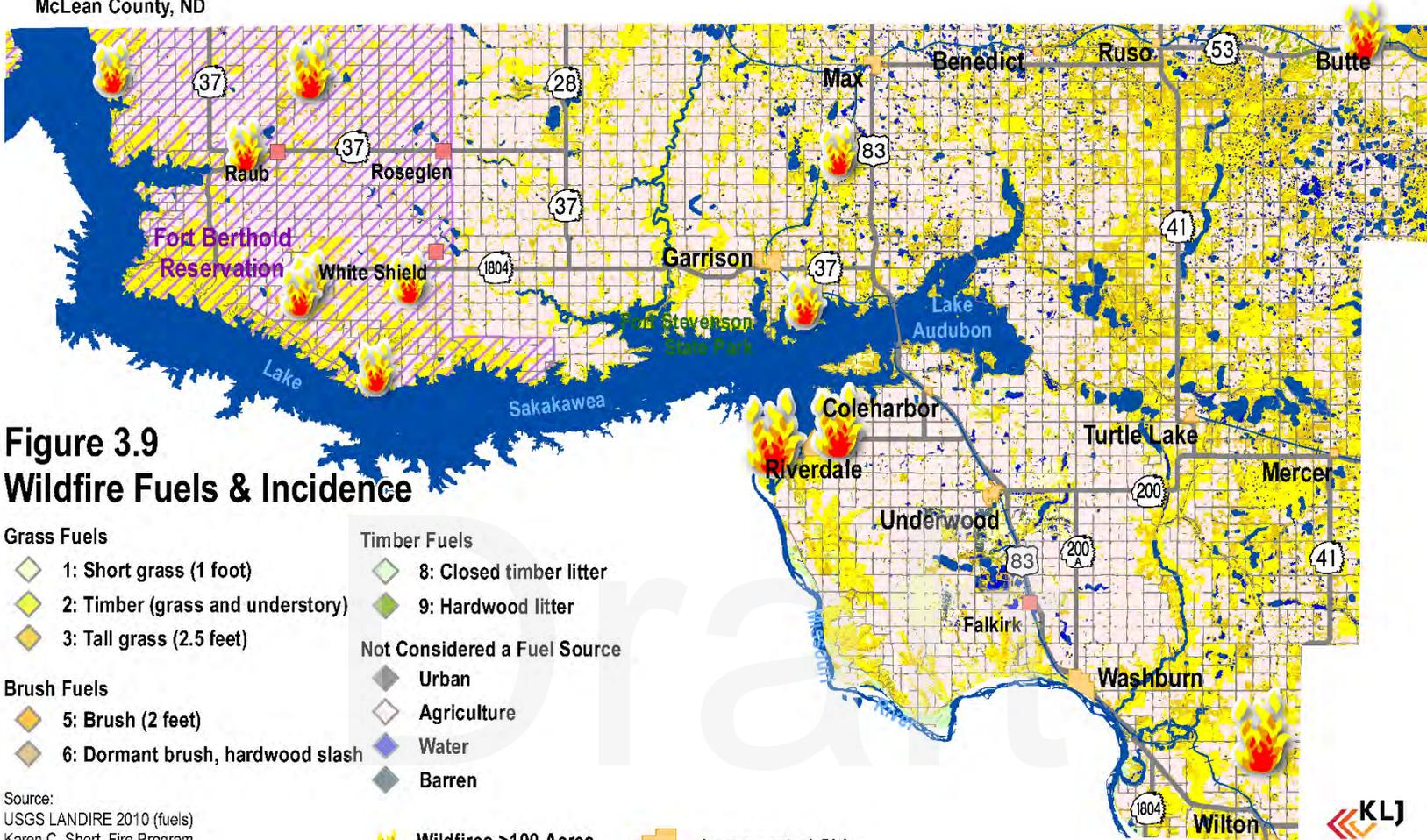
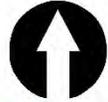


Figure 3.9
Wildfire Fuels & Incidence

Grass Fuels

- 1: Short grass (1 foot)
- 2: Timber (grass and understory)
- 3: Tall grass (2.5 feet)

Brush Fuels

- 5: Brush (2 feet)
- 6: Dormant brush, hardwood slash

Timber Fuels

- 8: Closed timber litter
- 9: Hardwood litter

Not Considered a Fuel Source

- Urban
- Agriculture
- Water
- Barren

Wildfires >100 Acres (1992-2012)

Incorporated Cities

Unincorporated Communities

Source:
USGS LANDIRE 2010 (fuels)
Karen C. Short, Fire Program
Analysis fire-occurrence database
(incidence)
ND GIS Hub

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Property

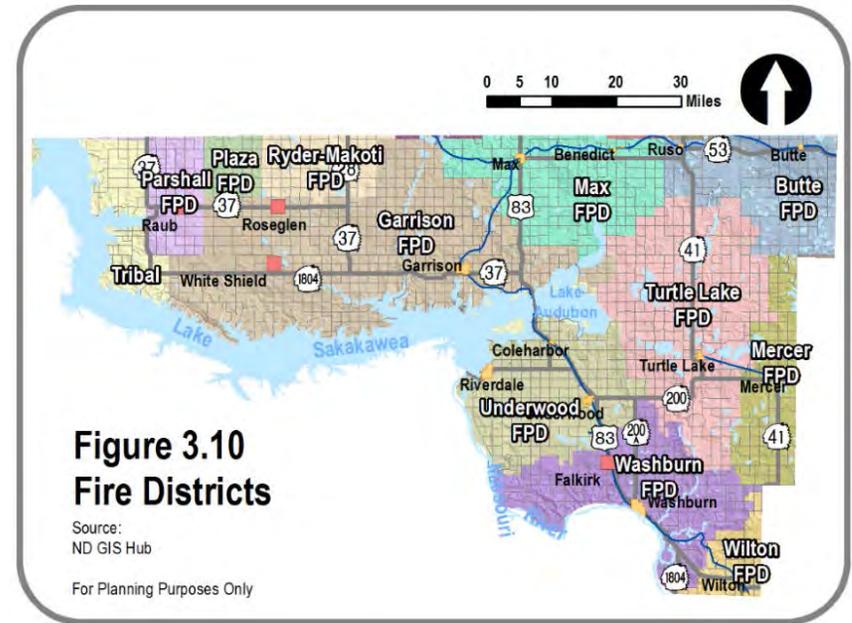
- The statewide Multi-Hazard Mitigation Plan includes information about crop indemnity payments from the USDA Risk Management Agency. There were **\$4,814 of wildfire-related crop indemnity payments** in McLean County between 2003 and 2012.
- There is no history of widespread property loss in McLean County due to wildfire. Table 3.8 shows scenarios for a wildfire near each city and a rural area of the county. Affected areas for each city include an estimated wildland-urban interface area along the edges of the city's urbanized area. Smaller communities have a larger proportion of their properties along the wildland-urban interface because they have a smaller centralized urban area. Note that this analysis does not include infrastructure damage or the cost of suppression.

Future Development

- Proposed rural subdivision plats must be reviewed by the fire protection district.

Existing Capabilities

- The county website includes wildfire safety notices.
- The Canadian Pacific railroad sprays for weeds in track right-of-way.
- Wildfire response in the county is coordinated by several fire districts. District boundaries are shown in Figure 3.10.
 - Butte Fire Protection District
 - Garrison Fire Protection District
 - Max Fire Protection District
 - Mercer Fire Protection District
 - Parshall Fire Protection District
 - Plaza Fire Protection District
 - Ryder-Makoti Fire Protection District
 - Turtle Lake Fire Protection District
 - Underwood Fire Protection District
 - Washburn Fire Protection District
 - Wilton Fire Protection District



Key Issues and Potential Action Items

- **Key Issue:** McLean County experiences a wildfire greater than 100 acres approximately once per year. Most wildfires in the county cause minimal property damage.
 - *Potential Action Item:* Perform fuel reduction activities in high-risk rural areas.
 - *Potential Action Item:* Educate residents about defensible space best practices.
 - *Potential Action Item:* Encourage the use of non-combustible materials (stone, brick, stucco, etc.) for new construction in wildfire hazard areas.
 - *Potential Action Item:* Incorporate wildland-urban interface guidelines into the county's subdivision regulations.

McLean County

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Table 3.7 - McLean County Wildfire Scenarios

	Land Use	Structure Value	Area Affected	Damage Extent	Total Damages
Rural County	Residential	\$191,896,130	5%	80%	\$7,675,845
	Commercial	\$48,841,400	5%	80%	\$1,953,656
	Total	\$240,737,530	5%	80%	\$9,629,501
Benedict	Residential	\$1,667,400	75%	80%	\$1,000,440
	Commercial	\$891,600	75%	80%	\$534,960
	Total	\$2,559,000	75%	80%	\$1,535,400
Butte	Residential	\$1,377,800	40%	80%	\$440,896
	Commercial	\$295,600	40%	80%	\$94,592
	Total	\$1,673,400	40%	80%	\$535,488
Coleharbor	Residential	\$2,441,800	40%	80%	\$781,376
	Commercial	\$283,700	40%	80%	\$90,784
	Total	\$2,725,500	40%	80%	\$872,160
Garrison	Residential	\$60,511,000	15%	80%	\$7,261,320
	Commercial	\$15,511,600	15%	80%	\$1,861,392
	Total	\$76,022,600	15%	80%	\$9,122,712
Max	Residential	\$8,334,800	40%	80%	\$2,667,136
	Commercial	\$3,303,610	40%	80%	\$1,057,155
	Total	\$11,638,410	40%	80%	\$3,724,291
Mercer	Residential	\$2,004,000	40%	80%	\$641,280
	Commercial	\$320,800	40%	80%	\$102,656
	Total	\$2,324,800	40%	80%	\$743,936
Riverdale	Residential	\$19,654,100	40%	80%	\$6,289,312
	Commercial	\$3,676,700	40%	80%	\$1,176,544
	Total	\$23,330,800	40%	80%	\$7,465,856

	Land Use	Structure Value	Area Affected	Damage Extent	Total Damages
Ruso	Residential	\$89,700	100%	80%	\$71,760
	Commercial	\$0	100%	80%	\$0
	Total	\$89,700	100%	80%	\$71,760
Turtle Lake	Residential	\$18,392,800	25%	80%	\$3,678,560
	Commercial	\$3,428,500	25%	80%	\$685,700
	Total	\$21,821,300	25%	80%	\$4,364,260
Underwood	Residential	\$27,268,500	25%	80%	\$5,453,700
	Commercial	\$5,140,000	25%	80%	\$1,028,000
	Total	\$32,408,500	25%	80%	\$6,481,700
Washburn	Residential	\$58,974,500	15%	80%	\$7,076,940
	Commercial	\$13,122,200	15%	80%	\$1,574,664
	Total	\$72,096,700	15%	80%	\$8,651,604
Wilton	Residential	\$24,424,900	25%	80%	\$4,884,980
	Commercial	\$4,181,900	25%	80%	\$836,380
	Total	\$28,606,800	25%	80%	\$5,721,360

Source: McLean County Tax Equalization Director

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Communicable Disease

All Jurisdictions	<i>Overall Risk:</i> Low <i>Probability:</i> Low (No incidence of major disease outbreak in recent decades) <i>Magnitude:</i> Moderate (Approximately 25 percent of population is under 18 or over 65 years of age, fatality rates for most modern diseases in North Dakota are significantly lower than one percent, agricultural losses could total millions of dollars)
Seasonal Pattern	None
Primary Impacts	Agricultural loss (crops, livestock) Economic loss Human loss and injuries Increased stress on medical services Localized evacuation School closure

Hazard Profile

Communicable disease is an illness caused by an infectious agent such as bacteria, virus, fungi, parasites or toxin. Communicable diseases of particular concern are those that can lead to the loss of human life or widespread loss of crops and livestock. A severe communicable disease incident has potential for catastrophic effects on human populations and the economy.

There are numerous ways for communicable disease to spread among humans: physical contact with an infected person, contact with contaminated object, bites from animals or insects carrying the disease, or air travel. A widespread occurrence of infection in a community is called an epidemic. Epidemics may lead to quarantines, school and business closures, and stress on medical facilities. A widespread epidemic (often countrywide or worldwide in scope) is referred to as a pandemic. Perhaps the most notable pandemic in the modern era was the Spanish Influenza in 1918. The disease killed an estimated 20 to 40 million people worldwide, including 675,000 Americans. In North Dakota, about 2,700 people died and 6,000 were infected.

Animal and plant diseases can harm the economy through the loss of livestock and crops. Widespread plant and animal diseases can lead to food shortages. Some animal diseases may cause sickness in humans if proper precautions are not taken with infected animals. Diseases that are a threat to cattle include tuberculosis and anthrax. According to the North Dakota Department of Health, there has been one report of tuberculosis in cattle in recent years. Anthrax is much more common, with 185 cases between 1989 and 2010; a majority of those cases occurred in 2005 when there were 109 reports. Plant diseases in North Dakota include karnal bunt disease, black stem rust race Ug99, and emerald ash borer.

Local Risk

- Populations throughout the world are susceptible to epidemics and national pandemics, and McLean County residents are no exception, although the generally low population density of the area makes rapid transmission of communicable disease less likely.
- There is no recent history of major crop, animal or human epidemic disease or contamination in the county.

Vulnerability

Population

- Elderly and young persons are most at risk for communicable disease. The estimated number of residents age 65 or older are summarized below for each jurisdiction.
 - Overall County: 2,020 residents (21 percent)
 - Benedict: 22 (34 percent)
 - Butte: 34 (27 percent)
 - Coleharbor: 8 (10 percent)
 - Garrison: 383 (28 percent)
 - Max: 45 (13 percent)
 - Mercer: 19 (32 percent)
 - Riverdale: 37 (20 percent)
 - Ruso: no estimate available
 - Turtle Lake: 142 (33 percent)

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- Underwood: 158 (22 percent)
- Washburn: 223 (18 percent)
- Wilton: 145 (19 percent)
- The estimated number of residents under age five are summarized below for each jurisdiction.
 - Overall County: 550 residents (6 percent)
 - Benedict: 11 (17 percent)
 - Butte: 33 (26 percent)
 - Coleharbor: 0 (0 percent)
 - Garrison: 42 (3 percent)
 - Max: 18 (5 percent)
 - Mercer: 2 (3 percent)
 - Riverdale: 10 (5 percent)
 - Ruso: no estimate available
 - Turtle Lake: 2 (5 percent)
 - Underwood: 54 (8 percent)
 - Washburn: 67 (5 percent)
 - Wilton: 39 (5 percent)
- According to the North Dakota Department of Health, the death rate for foodborne illnesses in the state was 31.7 per 100,000 population in 2011. Since 2005, the lowest death rate was 55 and the highest was 78. **The death rate of 78 per 100,000 equates to approximately seven foodborne illness deaths in McLean County over a one-year period.**
- According to the North Dakota Department of Health, the death rate for influenza in the state was 55 per 100,000 population in 2011. Since 2005 the lowest death rate was 27.1 and the highest was 61.7. **The death rate of 61.7 per 100,000 equates to approximately six influenza deaths in McLean County over a one-year period.**
- The Centers for Disease Control and Prevention (CDC) estimates that a medium level influenza pandemic would result in 30 percent ill, 0.8 percent of ill requiring hospitalization and 0.2 percent of ill dying from the disease. In McLean County this would equate to 2,855 ill, 23 requiring hospitalization and 6 deaths from a medium level influenza pandemic.

Critical Facilities

- Assisted living facilities, hospitals and schools have an increased vulnerability to communicable disease due to the high density and demographics of occupants. Jurisdictions with these facilities are summarized below.
- Rural areas of the county:
 - White Shield School on the Fort Berthold Reservation
- Garrison:
 - St. Alexius Home Health Care and Hospice
 - Garrison Family Clinic
 - Garrison Elementary School
 - Garrison Public High School
 - Benedictine Living Center
- Max:
 - Max Public School
- Turtle Lake:
 - Turtle Lake-Mercer School
 - St. Alexius Home Health Care
 - Community Memorial Hospital
- Underwood:
 - Prairieview Nursing Home
 - Underwood Public School
- Washburn:
 - Washburn Public School
 - Q & R Clinic
- Wilton:
 - Wilton School
 - Basic Care Facility

Property

- The statewide Multi-Hazard Mitigation Plan estimated that communicable disease could impact 20 percent of crop and livestock values. According to the 2012 Census of Agriculture the market value of crops in McLean County was \$271 million and the

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market value of livestock was \$23 million. Estimating 20 percent loss for each sector results in \$54 million in communicable disease-related crop loss and \$5 million livestock loss.

Future Development

- Any minor future development that may occur is not expected to affect the county's physical vulnerability to communicable disease. Potential future development is expected to primarily be low density single-family housing.

Existing Capabilities

- The USDA Farm Service Agency has field offices located in Garrison and Turtle Lake, and North Dakota State University Extension has a field office located in Washburn. Both agencies offer technical assistance to farmers and ranchers for the prevention and treatment of agricultural diseases.

Key Issues and Potential Action Items

- *Key Issue:* Human and agricultural disease have the potential to greatly impact the health and economy of the county.
 - *Potential Action Item:* Continue supporting the efforts of the USDA Farm Service Agency and NDSU Extension.
- *Key Issue:* Some areas of the county have large amounts of standing water during the spring and summer months, which can attract potentially disease-carrying insects.
 - *Potential Action Item:* Develop insect control system during periods of standing water.

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Dam Failure

Rural County	<i>Overall Risk: Low</i> <i>Probability: Low (no history of significant failure)</i> <i>Magnitude: Moderate</i>
Benedict	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Butte	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Coleharbor	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Garrison	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Max	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Mercer	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Riverdale	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Ruso	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Turtle Lake	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>

Underwood	<i>Overall Risk: Low</i> <i>Probability: Low (not within inundation area)</i> <i>Magnitude: Low (not within inundation area)</i>
Washburn	<i>Overall Risk: Moderate</i> <i>Probability: Low (no history of significant failure)</i> <i>Magnitude: High</i>
Wilton	<i>Overall Risk: Moderate</i> <i>Probability: Low (no history of significant failure)</i> <i>Magnitude: High</i>
Seasonal Pattern	None
Primary Impacts	Agricultural loss (crops, livestock) Blocked roads Economic loss Human loss and injuries Increased stress on medical services Localized evacuation Loss of power Release of hazardous materials Shortage of critical materials

Hazard Profile

A dam is defined as an artificial barrier across a watercourse or natural drainage area that may impound or divert water. Dams have many potential uses, including hydro-electric power generation, irrigation, flood control, water supply and recreation. Dam structures can be earthen or from manmade materials. Dam failure is a sudden, uncontrolled release of impounded water, and can have a devastating effect on people and property downstream.

The Association of State Dam Officials identifies five primary causes of dam failure, which are often interrelated:

- Overtopping of a dam occurs when water from the reservoir spills over the top of the dam, creating instability in the structure. This can occur during a major flood event if the spillways are not adequately designed or if there is blockage in the spillway.

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Approximately 34 percent of all dam failures in the United States are due to overtopping.

- Foundation defects, including settlement and slope instability, cause about 30 percent of all dam failures.
- Piping is a term used to describe the process that occurs as seepage pathways create eroded pipes through a structure. Seepage often occurs around hydraulic structures and earthen features, and if left unchecked can gradually reduce the dam structure's stability. About 20 percent of all dam failures in the United States are caused by piping.
- Structural failure of materials used to construct the dam.
- Inadequate maintenance.

The Association of State Dam Officials and the US Army Corps of Engineers utilize a rating system to determine potential hazard to property or life if a dam were to suddenly fail.

- *Low:* 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.
- *Significant:* Dams located in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, railroads or cause interruption of minor public utilities. Potential for the loss of life may be expected if the dam fails.
- *High:* Dams located upstream of developed and urban areas where failure may cause serious damage to homes, industrial and commercial buildings and major public utilities. Potential for loss of life if the dam fails. High hazard dam reservoirs must be at least 50 acre-feet.

According to the statewide Multi-Hazard Mitigation Plan, no North Dakota dams rated as a high or significant hazard failed between 2009 and 2013; however, some dams did sustain significant damage from major flood events during the time period.

The North Dakota Century Code requires that all dams with greater than 1,000 acre-feet of storage have emergency procedures and safety plans. Safety plans must include a map of the evacuation area, notification directory, name of the dam owner or responsible entity, availability of materials for emergency repairs, and a list of contractors that could provide emergency assistance.

Local Risk

- The North Dakota State Water Commission maintains a database of all dams in the county. There are 129 dams in McLean County; one is classified as high hazard (Garrison Dam) and one is classified as significant hazard (Yanktonai Dam). High hazard dams present the greatest risk for people and property in the event of failure. Garrison Dam and Yanktonai Dam are summarized in Table 3.9. Dams in the county are shown in Figure 3.11.

Table 3.8 - McLean County High and Significant Hazard Dams

Dam Name	Action Plan	Owner	Type	Year Built	Max Storage (acre-feet)
Garrison Dam	Yes	US Army Corps of Engineers	Rolled Earth	1953	24,200,000
Yanktonai Dam	Not Required	McLean County WRD	Rolled Earth	1935	600

Source: ND State Water Commission



Garrison Dam spillway located along the Missouri River in McLean County.

Source: David Valdez/FEMA

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McLean County, ND

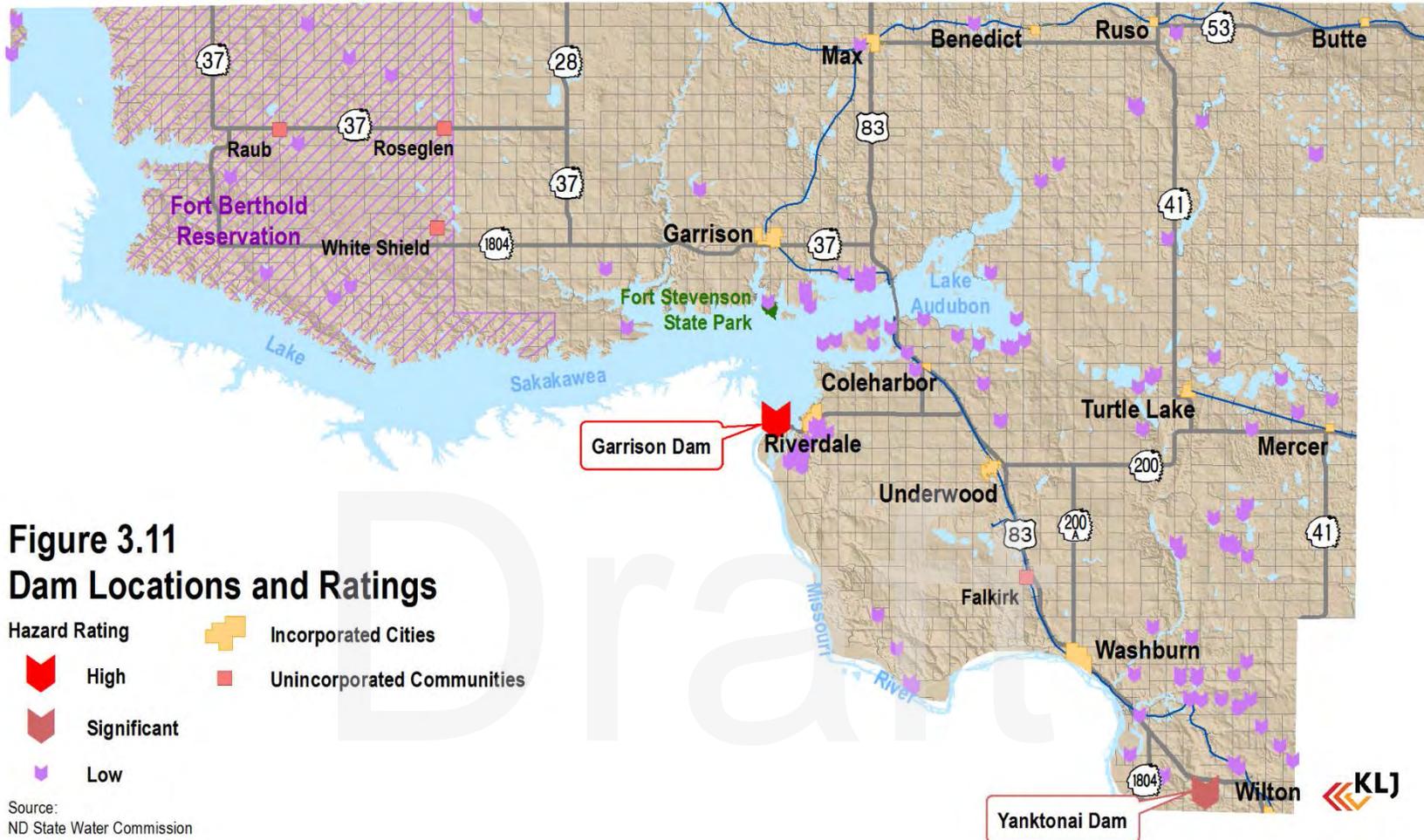


Figure 3.11
Dam Locations and Ratings

- | | |
|---|--|
| Hazard Rating |  Incorporated Cities |
|  High |  Unincorporated Communities |
|  Significant | |
|  Low | |

Source:
ND State Water Commission
ND GIS Hub

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Vulnerability

Population

- No residences in the county are located within the identified dam failure inundation area for Garrison Dam.
- Yanktonai Dam does not have an emergency action plan, which limits vulnerability analysis. Based on analysis of aerial imagery, there is one residential property located approximately 4,000 feet downstream of the dam and may be vulnerable in the event of failure

Critical Facilities

- No critical facilities are located within a dam failure inundation area.

Property

- No structures in the county are located within the identified dam failure inundation area for Garrison Dam.
- Yanktonai Dam does not have an emergency action plan, which limits vulnerability analysis. Based on analysis of aerial imagery, there is one residential property located approximately 4,000 feet downstream of the dam and may be vulnerable in the event of failure. Highway 83 is located approximately 6,000 feet downstream of the dam and may be inundated in the event of dam failure.

Future Development

- Floodplain regulations limit development within the 100-year floodplain in Washburn, Wilton and rural areas of the county.

Existing Capabilities

- An emergency action plan is available for Garrison Dam.

Key Issues and Potential Action Items

- *Key Issue:* Garrison Dam would have a large regional impact in the event of failure, but there are few properties in McLean County located within the dam failure inundation area.
 - *Potential Action Item:* Restrict future development in the flood-stage dam failure inundation area identified in the Garrison Dam emergency action plan.

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Hazardous Materials Release

Rural County	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (approximately 50 percent of county within potential hazard area, a large event could have a significant impact)</p>
Benedict	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Butte	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Coleharbor	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Garrison	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Max	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Mercer	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Riverdale	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>

Ruso	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Turtle Lake	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Underwood	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Washburn	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Wilton	<p><i>Overall Risk:</i> Moderate <i>Probability:</i> Low (approximately one reported incident per year countywide) <i>Magnitude:</i> High (entire city within hazard area)</p>
Seasonal Pattern	None
Primary Impacts	<p>Agricultural loss (crops, livestock) Blocked roads Economic loss Human loss and injuries Increased stress on medical services Localized evacuation Loss of power Permanent loss of business Shortage of critical materials</p>

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Hazard Profile

A hazardous material is any substance that has the potential to cause harm to humans, animals or the environment, either by itself or through interaction with other factors.

Hazardous materials incidents can occur at a fixed facility or while a material is transported. Common hazardous materials incidents at fixed sites include the improper storage, treatment and disposal of hazardous waste at manufacturing and processing facilities.

Transportation-related hazardous materials incidents generally occur along major transportation routes such as highways, interstates, pipelines and railroads.

Common hazardous materials found in North Dakota include natural gas, anhydrous ammonia and crude oil.

Natural gas is commonly used in North Dakota, often in its refined form of propane or butane. Propane and butane are generally transported as a liquid, but will vaporize in the event of an unintended release (butane only vaporizes at temperatures above 32 degrees Fahrenheit). In their gaseous form they are both heavier than air, and generally remain close to the ground. Propane and butane are both highly flammable and present the risk of explosion. Exposure to propane and butane can also be a health hazard. Acute exposure can cause asphyxiation, respiratory irritation and physiological damage; however, these effects are most likely to occur in enclosed spaces or areas with poor ventilation.

Anhydrous ammonia is used in manufacturing, refrigeration and fertilizer. It is often stored and transported as a pressurized liquid, but it will vaporize under normal pressure. Anhydrous ammonia has explosive potential, but it requires extremely high temperatures to ignite. It generally only produces a significant health hazard when released in poorly ventilated areas, but when exposed to moisture it can cause a low-lying ammonia fog. Effects of acute anhydrous ammonia exposure include severe irritation to the eyes, respiratory tract, gastrointestinal tract and skin; severe repetitive exposure can cause permanent damage to these tissues. Anhydrous ammonia is not known to be carcinogenic.

Crude oil poses a significant risk due to its high flammability. It may release flammable vapors that increase the risk of explosion. Crude oil

also poses several health risks. Exposure to crude oil can come from direct contact, inhalation or ingestion. Acute exposure to crude oil can cause direct effects such as skin irritation, breathing difficulty, headaches and nausea. Acute exposure may also lead to long-term complications such as lung, liver or kidney damage, and increased cancer risk.

Local Risk

- **Transportation routes present a risk for a hazardous materials release in Ransom County.** Highways and railroads are the primary transportation routes through the county. US Highway 83 is a major north-south route that experiences large traffic volumes, including trucks carrying hazardous materials. Other highways in the county also experience truck traffic. Materials transported on truck through the county include fuel and anhydrous ammonia. Railroads in the county include the Dakota Missouri Valley Western, Canadian Pacific and Red River Valley and Western. The Canadian Pacific is a Class I railroad and is the most likely location of oil transport through the county. Other railroads in the county primarily transport grain and anhydrous. All cities have railroad service.
- The Emergency Planning and Community Right-to-Know Act (EPCRA) requires that operators of facilities containing hazardous materials and chemicals must identify themselves to appropriate state and local agencies. North Dakota requires that all hazardous materials operators submit Tier II Chemical Inventory Reports to the county's Local Emergency Planning Committee (LEPC) on an annual basis. Typical Tier II facilities include bulk fuel plants, anhydrous ammonia plants, propane plants, agricultural processing plants and energy producing sites.
- **There are approximately 29 active Minuteman III missile launch facilities located throughout the county.** The facilities are operated by the 91st Missile Wing assigned to Minot Air Force Base, but assistance from local fire crews and law enforcement could be required during an incident. The most common incident is fuel leaking from missiles. The incident activates an emergency 2,800-foot safety zone around the missile silo, which often necessitates the closure of nearby roads and potential evacuation of residents. County fire crews and law enforcement are utilized to establish the safety zone.

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- The National Response Center is an interagency effort managed by the US Coast Guard that catalogs all reported hazardous materials incidents in the United States. The Pipeline and Hazardous Materials Safety Administration (PHMSA) is part of the US Department of Transportation and monitors all transportation-related hazardous materials incidents in the United States. Table 3.10 summarizes reported hazardous materials incidents in McLean County reported to the National Response Center and PHMSA between 2000 and 2014. There were 20 reported incidents during the time period. Ten (50 percent) of the incidents occurred at fixed facilities, nine (45 percent) along railways and two (10 percent) along roadways. A majority of the releases were minor and resulted in minimal impacts.

Material	# of Incidents
Nitrogen Oxide	5
Oil, Fuel	3
Oil Diesel	3
Ethanol Alcohol	3
Oil, Crude	2
Gamoxone Max (Pesticide)	1
Hydraulic Oil	1
Oil, Motor	1
Unknown Flammable Liquid	1
<i>Total</i>	<i>20</i>

Source: National Response Center, PHMSA Incident Reports Database

- Two incidents in the county were classified as “serious” by the PHMSA. In July of 2009 a train derailment resulted in the release of 174 gallons of ethanol, and in April of 2014 a truck accident resulted in the release of 300 gallons of gasoline. A “serious” incident occurs when the release of a hazardous material results in one or more of the following: death, major injury resulting in a hospitalization, an evacuation of 25 or more persons, closure of a major transportation artery, alteration of an aircraft flight plan or operation, failure of a Type B radioactive packaging, release of over 11.9 gallons or 88.2 pounds of a severe marine pollutant, or release of a bulk quantity (over 119 gallons or 882 pounds) of a hazardous material. Both incidents in McLean County resulted in the closure of a major transportation artery.

- There is one transmission pipeline in the county according to the PHMSA - a natural gas pipeline located in the eastern half of the county. There were no pipeline incidents in the county reported to the PHMSA between 2000 and 2014.
- Figure 3.12 shows major transportation corridors in the county, with evacuation areas of 1/2 mile and 1 mile. Tier II facilities and pipelines are not shown on the map due to security concerns, although their hazard areas are utilized to calculate risks and vulnerabilities. Hazard areas are from the 2012 Emergency Response Guidebook. Recommendations for initial evacuation in the case of fire for common hazardous materials are shown below:
 - Crude oil, petroleum and diesel fuel: 1/2 mile evacuation
 - Propane, natural gas: 1 mile evacuation
 - Anhydrous ammonia: 1 mile evacuation
 - Chlorine: 1/2 mile evacuation
 - Ammonium nitrate fertilizers: 1/2 mile evacuation

Vulnerability

Population

- Vulnerable population can be estimated by identifying the intersection of 2010 US Census Blocks and the identified hazard areas in Figure 3.12. Census blocks in rural areas are generally large, which makes detailed estimates difficult. For purposes of this analysis, only census blocks that have their centroid within the hazard area are included; however, it is important to note that this analysis does not consider the exact location of residential structures within each census block.
 - The entirety of all incorporated cities is within 1/2 mile of a major highway or railroad.
 - Approximately 660 rural residents (18 percent of all rural residents) are within 1/2 mile of a major highway or railroad
 - Approximately 1,370 rural residents (38 percent of all rural residents) are within 1/2 mile of a major highway or railroad

Critical Facilities

- Nearly all critical facilities in the county are within the 1/2 mile and 1 mile hazard areas.

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Property

- The entirety of each incorporated city is within the 1/2 mile hazard area.
- The greatest reported property damages for a hazardous materials incident in the county since 2000 was a train derailment that resulted in \$621,451 in damages; nearly all of those damages were to the railcar and track, and the cost was borne by the railroad operator.

- *Potential Action Item:* Explore the possibility of bypasses around populated areas when possible.

Future Development

- The county's vulnerability to hazardous materials is not expected to change in the foreseeable future.

Existing Capabilities

- The Canadian Pacific (CP) is a Class I railroad that travels along the northern border of the county through Benedict, Butte, Max and Ruso. The CP has a hazardous materials response team, with equipment stored in Mandan. Much of the equipment can be deployed by air to facilitate a rapid response.
- Hazardous materials operators are responsible for clean-up and reclamation of incident sites.

Key Issues and Potential Action Items

- *Key Issue:* Many residents in the county, including all city residents, live in a potential hazard area for a hazardous materials incident. There were 20 reported hazardous materials incidents in the county between 2000 and 2014.
 - *Potential Action Item:* Survey the number and types of hazardous materials passing through the county.
 - *Potential Action Item:* Educate first responders and residents about hazardous materials safety.
 - *Potential Action Item:* Designate evacuation shelter facility for each city located a safe distance from potential sources of a hazardous materials incident.

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McLean County, ND



Figure 3.12
Hazardous Materials
Transportation Hazard Areas

- 0.5 Mile Hazard Area
- 1 Mile Hazard Area
- Incorporated Cities
- Unincorporated Communities

Source:
 ND GIS Hub

For Planning Purposes Only



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Homeland Security Incident

All Jurisdictions	<i>Overall Risk:</i> Low <i>Probability:</i> Low (no history of major incidents) <i>Magnitude:</i> Moderate (magnitude could vary widely)
Seasonal Pattern	None
Primary Impacts	Agricultural loss (crops, livestock) Economic loss Human loss and injuries Increased stress on medical services Localized evacuation Property damage or loss Release of hazardous materials Structure collapse

Hazard Profile

A homeland security incident is any intentional adversarial human-caused incident, domestic or intentional, that causes mass casualties, large economic losses or widespread panic in the county. Terrorism is an example of an intentional adversarial human-caused incident. Terrorism is defined by the Code of Federal Regulations as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” Terrorist attacks are generally premeditated and motivated by a political and social methodology.

Local Threat

- The North Dakota Critical Infrastructure Program (CIP) collects data on critical infrastructure and key resources (CIKR) that exist in the state. CIKR facilities are divided into seven sectors. Each sector and their presence in McLean County is summarized in Table 3.12.
- Potential terrorist targets identified for the county are shown in Appendix C. High profile facilities include Garrison Dam, Coal

Creek Station, Blue Flint Ethanol and the 29 active Minuteman III missile launch facilities located throughout the county.

Table 3.10 - Critical Infrastructure and Key Resources in McLean County

CIKR Resource	Description	# in McLean County
Food/Agriculture	Major food distribution centers	0
Energy	Power generation and chemical facilities	2
Public Health	Hospitals and public health offices	3
Transportation	Bridges and major highways	2
Emergency Services	Police, fire and dispatch centers	2
Communications	Major communications towers	2
Water	Treatment facilities	1

Source: North Dakota Critical Infrastructure Program, 2014 North Dakota Multi-Hazard Mitigation Plan

Vulnerability

Population

- The number of residents vulnerable to a terrorist attack is highly variable based on time of day and extent of the attack. A large-scale incident, such as an attack on a municipal water supply, would have the potential for hundreds of injuries or fatalities.
- High density populations are generally more vulnerable to large-scale terrorism events. Figure 2.4 shows population density throughout the county. The largest concentration of high density populations can be found in Washburn and Garrison.

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Critical Facilities

- Facilities identified as potential terrorist targets are listed in Appendix C. Sixteen of these facilities are also identified as critical facilities in the county.

- *Potential Action Item:* Enhance security measures at critical facilities.

Property

- The North Dakota Tornado and Fire Fund compensates for losses related to vandalism and theft at various essential facilities. Between 1989 and 2013, McLean County received \$5,462 for local government facility losses and \$17,571 for school facility losses.

Future Development

- The county's overall vulnerability to homeland security incidents is not expected to change in the foreseeable future.

Existing Capabilities

- The county courthouse has cameras, scanners, panic buttons and secure doors.
- All major energy producers and transporters have strict security procedures. Many have their own security crews.
- Security of the Minuteman III missile launch facilities is the responsibility of the 91st Missile Wing assigned to Minot Air Force Base.

Key Issues and Potential Action Items

- *Key Issue:* Terrorism and violence are an ongoing concern, but it is very unlikely a large-scale event will occur in the county.
 - *Potential Action Item:* Continue general surveillance of suspicious persons or activities within the county.
 - *Potential Action Item:* Review evacuation plans that could be utilized in the event of a terrorist attack.
 - *Potential Action Item:* Continue education and review of school response procedures for all schools in the county.

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Urban Fire

All Jurisdictions	<i>Overall Risk:</i> Low <i>Probability:</i> Low (no history of major incidents) <i>Magnitude:</i> Moderate (magnitude could vary widely)
Seasonal Pattern	None
Primary Impacts	Agricultural loss (crops, livestock) Economic loss Human loss and injuries Increased stress on medical services Localized evacuation Property damage or loss Release of hazardous materials Structure collapse

Hazard Profile

Urban fire is a threat to all communities. A small flame can begin inside a structure and rapidly turn into a major fire, creating a costly and deadly situation. The National Fire Protection Association (NFPA) reports that fires in the United States caused 3,005 civilian deaths and 17,500 civilian injuries in 2011. Eighty-four percent of civilian fire deaths were due to home structure fires. According to the National Fire Incident Reporting System (NFIRS) there are about 2,500 urban fire events each year in North Dakota.

Fires may begin intentionally (arson) or by accident. Common motives for arson are insurance fraud, vandalism and murder. Common causes of accidental fires are cooking equipment, heating equipment, electrical distribution and lighting equipment, cigarettes, clothes dryer or washer, candles, and spontaneous combustion. According to the NFPA, unattended cooking is the leading cause of structure fires, with frying as the leading type of cooking activity. Heating equipment is the second leading cause of structure fire.

Local Risk

- Most structure fires are individual disasters and not community-wide, but the potential exists for widespread urban fires that

displace several businesses or residences. The greatest risk of a multiple-structure urban fire is in historic downtowns. There is no history of multi-structure fire in McLean County. Agricultural facilities, such as grain elevators and dryers, and energy production and transport facilities are also at risk for significant fire.

Vulnerability

Population

- All residents in urban areas of the county are vulnerable to an urban fire event. The county's 12 cities contain approximately 5,880 residents (62 percent of total population in the county).

Critical Facilities

- Critical facilities in historic downtowns generally have a greater vulnerability to fire. Other large facilities, such as grain elevators, electric substations and energy production facilities, may also be vulnerable to fire.
- Rural areas of the county:
 - Ottertail and Snake Creek substations
 - Coal Creek Station
 - Falkirk Mining Co
- Benedict:
 - City Hall
 - US Post Office
- Butte:
 - Dakota Agronomy
 - SRT Communications Switching Station
 - County Roads/United Community/Post Office
- Coleharbor:
 - Ottertail substation
 - City Hall
 - US Post Office
- Garrison:

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- Ottertail Power Co
- Garrison State Bank
- BNC National Bank
- Dakota Plains Chiropractic
- Schindler and Deis, OD
- Farmers Union Elevator
- Cenex Bulk Fuel
- Max:
 - Farmers Elevator
 - Max Fire/Ambulance
 - US Post Office
 - City Hall
 - Max Farm Services
- Mercer:
 - West River Telecom Switching Station
 - US Post Office
 - First National Bank
- Riverdale:
 - City Hall
 - First Security Bank
 - Fire/Ambulance
 - Federal Credit Union
- Turtle Lake:
 - Bank of Turtle Lake
 - US Post Office
 - Soil Conservation Service
 - Ken's Jack and Jill
 - Turtle Lake Community Credit Union
 - Ottertail Substation
- Underwood:
 - Benson Quinn Co Elevator
 - Q & R Clinic
 - Grocery Store
 - Bank
 - West River Telecom Switching Station
- Washburn:
 - McLean County Sheriff's Department

- McLean County Courthouse
- First Lutheran Church
- Wilton Farmers Union Elevator

- Wilton:
 - City Hall/Law Enforcement
 - Ambulance Hall
 - Government Building
 - Post Office
 - Bank
 - Fire Department
 - Cenex Bulk Plant
 - Elevator

Property

- Property value data for individual structures is not available, but is assumed that a large multi-structure fire could cause damages over \$1 million.

Future Development

- Coleharbor, Garrison, Underwood and Washburn have adopted the North Dakota state building code.

Existing Capabilities

- All areas of the county are within the service area of a volunteer fire department.

Key Issues and Potential Action Items

- *Key Issue:* There is no history of large-scale urban fire in the county, but it is an ongoing concern.
 - *Potential Action Item:* Provide education about fire prevention best practices for local business owners and residents.
 - *Potential Action Item:* Continue response preparation with local fire districts.
 - *Potential Action Item:* Remove abandoned properties that could be a target for arson.
 - *Potential Action Item:* Adopt the North Dakota state building code throughout the county.

McLean County

Multi-Hazard Mitigation Plan

Summary

There are 11 priority hazards identified for McLean County. The key issues for each hazard are summarized below. Hazards are summarized for the county overall and listed alphabetically within priority class. Hazard risk for each jurisdiction is summarized in Table 3.13.

	Rural County	Benedict	Butte	Coleharbor	Garrison	Max	Mercer	Riverdale	Ruso	Turtle Lake	Underwood	Washburn	Wilton
Drought	M	M	M	M	M	M	M	M	M	M	M	M	M
Flood	M	L	L	L	M	L	L	L	L	L	L	L	L
Geologic Hazards	L	L	L	L	L	L	L	L	L	L	L	L	L
Severe Summer Weather	H	H	H	H	H	H	H	H	H	H	H	H	H
Severe Winter Weather	H	H	H	H	H	H	H	H	H	H	H	H	H
Wildland Fire	M	M	M	M	M	M	M	M	M	M	M	M	M
Communicable Disease	L	L	L	L	L	L	L	L	L	L	L	L	L
Dam Failure	L	L	L	L	L	L	L	L	L	L	L	L	L
Hazardous Materials Release	M	M	M	M	M	M	M	M	M	M	M	M	M
Homeland Security Incident	L	L	L	L	L	L	L	L	L	L	L	L	L
Urban Fire	L	L	L	L	L	L	L	L	L	L	L	L	L

Note: H = High, M = Moderate, L = Low

Drought

- Agriculture is a key component of the county's economy. A significant drought has the potential to greatly affect the industry and the county as a whole.
- Recent population growth has resulted in an increased demand for potable water. Maintaining an adequate water supply may become

difficult if this growth continues, particularly during times of drought.

Flood

- McLean County experiences approximately one flood event every two years. Flood events in the county are primarily related to heavy rainfall and snowmelt runoff.
- Many roads and bridges in the county are commonly washed-out or inundated during flooding events.

Geologic Hazards

- The county is in an area of minimal hazard for earthquakes.
- Much of county is within a moderate susceptibility/low incidence landslide hazard area as defined by USGS.

Severe Summer Weather

- McLean County averages approximately nine days per year with a summer storm event. Severe wind and hail are the most common summer storm events in the county, and tornadoes are also a possibility in the region.

Severe Winter Weather

- McLean County averages approximately six days per year with a winter storm event. Severe winter weather events in the county include winter storm, high wind, heavy snow, blizzard, extreme cold/wind chill and ice storm.
- A winter storm event that causes a power outage may make it difficult for residents to heat their homes. Elderly residents and residents in mobile homes are the most vulnerable to extreme cold temperatures. Approximately 3,500 residents in the county are elderly or live in a mobile home.

Wildland and Rangeland Fire

- McLean County experiences a wildfire greater than 100 acres approximately once per year. Most wildfires in the county cause minimal property damage.

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Communicable Disease

- Human and agricultural disease have the potential to greatly impact the health and economy of the county.
- Some areas of the county have large amounts of standing water during the spring and summer months, which can attract potentially disease-carrying insects.

Dam Failure

- Garrison Dam would have a large regional impact in the event of failure, but there are few properties in McLean County located within the dam failure inundation area.

Hazardous Materials Incident

- Many residents in the county, including all city residents, live in a potential hazard area for a hazardous materials incident. There were 20 reported hazardous materials incidents in the county between 2000 and 2014.

Homeland Security Incident

- Terrorism and violence are an ongoing concern, but it is very unlikely a large-scale event will occur in the county.

Urban Fire

- There is no history of large-scale urban fire in the county, but it is an ongoing concern.

Draft

McLean County

Multi-Hazard Mitigation Plan

Chapter 4: Mitigation Strategy

The mitigation strategy includes specific action items to reduce the impact of the priority hazards identified in Chapter 3. The process for identifying action items included a Planning Team meeting, city council/commission meetings and a community survey. Goals were identified to guide the development of action items.

Capability Assessment

Before identifying goals and action items, it is important to know the capabilities of each jurisdiction to undertake different types of hazard mitigation projects. Specific capabilities are listed as part of each hazard profile in Chapter 3. Additional capabilities are summarized below.

Legal and Regulatory Capabilities

- *Zoning Ordinance.* Garrison, Turtle Lake, Underwood, Washburn and the County have zoning ordinances.
- *Comprehensive Plan.* Garrison has a comprehensive plan.
- *Floodplain Ordinance.* Coleharbor, Garrison, Max, Underwood, Washburn, Wilton and the County have floodplain ordinances that are actively enforced.
- *Building Code.* Coleharbor, Garrison, Underwood and Washburn have adopted the North Dakota State Building Code.

Administrative and Technical Capabilities

- McLean County has an Emergency Management Department that oversees mitigation, response and recovery activities county-wide.
- Coleharbor, Garrison, Max, Underwood, Washburn, Wilton and the County have a floodplain administrator.

Fiscal Capabilities

- McLean County and each incorporated jurisdiction are eligible for a variety of federal grants, including Community Development Block Grants.

- McLean County and each incorporated jurisdiction have the ability to issue bonds and levy taxes.

The County and each incorporated jurisdiction have limited resources and would have difficulty implementing a wide range of comprehensive mitigation actions. The action items contained in this plan are generally small in scope and specific to each community's biggest issues. Funding/financing mechanisms for large projects is the greatest element that limits the capability of each jurisdiction. The County has a small tax base, and any financing mechanism that increases the public tax burden is not desired by residents. As a result, a majority of projects identified in this plan have a minimal cost and can be completed by local staff. Outside funding sources and technical assistance would need to be acquired to help fund and complete the few large projects identified in this plan.

The greatest opportunity for the County to upgrade its governance capabilities would be to create a multi-jurisdictional comprehensive plan. A comprehensive plan could create a vision for the county and help to guide development in an efficient and hazard-resilient manner. A comprehensive plan could also provide guidance for future updates to zoning regulations.

Goals

The goals defined below provide the general guiding principles that were used when developing mitigation activities. The goals may be used to guide the development of additional action items as the plan is evaluated in future years. The 2014 state-wide Multi-Hazard Mitigation Plan was used to guide goal creation. The goals below are all priorities and presented in no particular order.

- Reduce the impacts of flooding to people and property.
- Enhance the public's awareness of hazards.
- Reduce impacts of severe summer and winter weather to people and property.
- Reduce impacts of drought and wildland fires to people and property.

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- Reduce impacts of human-caused threats to people and property.

Previous Mitigation Actions

Mitigation actions from the 2009 McLean County Multi-Hazard Mitigation Plan are shown in Appendix F. The plan included 22 actions. Thirteen actions were completed (or partially completed), and nine actions are included in this plan.

The greatest challenge to completing mitigation activities has been the limited resources (time and money) of the County and each jurisdiction. Local government is run by a small number of people, some part-time. A majority of mitigation actions included in this plan can be implemented through existing County and City programs, and many require only a minimal cost. Those that require substantial costs are linked to grant programs that can provide much of the necessary funding.

Funding

McLean County will need to utilize local, state and federal funding to implement the action items identified in this plan. The County and each jurisdiction have access to multiple state and federal funding opportunities. US Department of Housing and Urban Development (HUD) Community Development Block Grants (CDBG) and US Department of Agriculture (USDA) Community Facility Grants are available for a wide variety of uses. There are also other viable funding streams tailored specifically for hazard mitigation and disaster response. FEMA's Hazard Mitigation Grant Program (HMGP) could provide funding for a wide variety of mitigation projects, and is only available following a North Dakota disaster declaration. Additional FEMA grant programs that provide funds for mitigation include the Pre-Disaster Mitigation (PDM) program and Flood Mitigation Assistance (FMA) program.

FEMA's Hazard Mitigation Assistance Unified Guidance, which includes eligible activities for each of FEMA's mitigation grant programs, can be found at:

<https://www.fema.gov/media-library/assets/documents/103279>

Action Items

The action items identified in Tables 4.1 - 4.12 are recommendations developed through discussion with local officials, stakeholders and other interested members of the public. A broad range of potential mitigation activities were considered; each of these potential activities is listed in Chapter 3 with the applicable hazard. The Planning Team discussed each activity in order to develop a list of priority projects that will have the greatest benefit. Further explanation of the mitigation activity selection process can be found in Appendix F. Several preparedness and response actions discussed during the planning process are also included in the plan.

The activities list found in this section provides a roadmap for targeting and implementing mitigation projects over the next five years. Projects are prioritized based on a generalized benefit-cost analysis that factors in potential cost and project benefit. It is important to note that many project costs are eligible for grant or other outside funding. Funding options and project costs may vary year-to-year, so before moving forward with implementation the jurisdiction should perform a detailed benefit-cost analysis. The implementation timeline for each project may be highly variable based on the availability of funds.

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Table 4.1 - McLean County Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
A	Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
B	Moderate	Coordinate with landowners to identify water sources for fire suppression	Wildfire	Staff Time	2016
C	High	Install generators for McLean-Sheridan water plant and well field	Multiple Hazards	\$25,000 - \$50,000	2017
D	Moderate	Improve inter-department radio communication	Multiple Hazards	Varies	2017
E	Low	Acquire and remove repetitive loss properties from the floodplain	Flooding	Varies	2018
F	High	Drainage improvements and/or elevation for rural roads throughout the county	Flooding	Varies	Ongoing
G	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing

Table 4.2 - Benedict Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Table 4.3 - Butte Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
C	High	Install generator at emergency shelter	Multiple Hazards	\$25,000 - \$50,000	2016
J	Moderate	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
K	High	Replace warning siren	Severe Summer Weather	\$8,000 - \$15,000	2017
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Table 4.4 - Coleharbor Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
A	High	Participate in NFIP workshop	Flooding	Staff Time	2016
H	Moderate	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing
G	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing

Table 4.5 - Garrison Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
C	High	Install generator at City Hall/emergency shelter and school auditorium/emergency shelter	Multiple Hazards	\$25,000 - \$50,000 per generator	2016
A	Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
J	Moderate	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
L	Moderate	Expand municipal storm water system into southern area of town	Flooding	\$250,000+	2017
K	High	Install additional warning siren	Severe Summer Weather	\$8,000 - \$15,000	2017
M	Moderate	Develop insect control system during periods of standing water	Communicable Disease	Varies	Ongoing
G	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Table 4.6 - Max Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
A	Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
J	Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
C	High	Install generator at city hall/civic center/shelter	Multiple Hazards	\$25,000 - \$50,000	2017
N	Moderate	Install railroad crossing arms on 3rd Avenue SE	Multiple Hazards	\$250,000	2018
G	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Table 4.7 - Riverdale Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
J	Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
C	High	Install generator at water treatment plant	Multiple Hazards	\$25,000 - \$50,000	2017
H	Moderate	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing

Table 4.8 - Ruso Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
O	Moderate	Distribute weather radios to homeowners	Multiple Hazards	\$30 per radio	2017
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	High	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Table 4.9 - Turtle Lake Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
P	High	Remove culvert beneath old railroad tracks	Flooding	\$5,000	2016
J	Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
Q	Moderate	Upgrade warning siren control system	Severe Summer Weather	\$5,000 - \$10,000	2017
R	High	Elevate County Road 27 near Turtle Lake	Flooding	\$50,000+	2018
S	High	Upgrade municipal storm water system	Flooding	\$250,000+	2019
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Table 4.10 - Underwood Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
T	High	Require hazardous materials facilities to provide status reports to the fire department	Hazardous Materials Release	Staff Time	2016
A	Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
J	Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
C	High	Install generator at city hall/shelter	Multiple Hazards	\$25,000 - \$50,000	2017
U	Moderate	Address overflow flooding issues from pond north of the city	Flooding	Varies	2017
V	High	Conduct engineering study to identify solutions for flooding issues on the city's west side	Flooding	\$75,000	2018
F	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Table 4.11 - Washburn Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
C	High	Install generators at Memorial Building/shelter and water treatment plant	Multiple Hazards	\$25,000 - \$50,000 per generator	2016
A	Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
J	Low	Install signage to identify emergency shelters	Multiple Hazards	\$50 - \$250 per sign	2016
W	High	Replace culverts that pass through coulee on east side of town	Flooding	\$20,000 - \$50,000	2017
X	Moderate	Replace drinking water intake along Missouri River	Flooding	\$500,000+	2018
Y	Moderate	Upgrade storm water system along Custer Drive	Flooding	\$100,000 - \$400,000	2019
G	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

Table 4.12 - Wilton Action Items

ID	Priority	Action	Hazard	Cost	Time Frame
K	High	Repair warning siren on north side of town	Severe Summer Weather	\$3,000 - \$15,000	2016
A	Moderate	Participate in NFIP workshop	Flooding	Staff Time	2016
J	Low	Install signage to identify emergency shelters	Multiple Hazards	\$250 per sign	2016
C	High	Generator for Memorial Hall/emergency shelter	Multiple Hazards	\$25,000 - \$50,000	2017
G	Low	NFIP training for staff	Flooding	Staff Time	Ongoing
I	Low	Public education	Multiple Hazards	Staff Time	Ongoing
H	Low	Participate in Firewise education program for homeowners and implement best practices during wildfire season	Wildfire	Staff Time	Ongoing

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Notes for Action Items

The McLean County Emergency Manager is the local champion for the plan, and responsible for maintaining energy and enthusiasm for each jurisdiction's overall mitigation program. Responsibility for implementing mitigation projects ultimately rests with each jurisdiction. The individual responsible for overseeing implementation of mitigation projects for each jurisdiction is listed as part of each project summary. This individual was identified during the planning process. The actual person performing the project may be different than the responsible party.

A: Participate in NFIP workshop

Workshops would be targeted at educating residents not required to buy flood insurance but still at risk for flooding. Technical assistance for a workshop is available from the North Dakota State Water Commission. A workshop could be conducted by the County in a central location, or rotating workshops could be held in each participating NFIP community.

Funds are available for public awareness or education campaigns under the HMGP Five Percent Initiative.

Responsible party: McLean County Emergency Manager

B: Coordinate with landowners to identify water sources for fire suppression

Many rural landowners have personal wells and/or water storage tanks that could be used to assist with wildfire suppression. A map/list should be developed to identify landowners who are willing to share their water supplies with local fire departments.

Responsible party: McLean County Emergency Manager (coordinating with local fire districts)

C: Emergency generators at critical facilities

Funding for generators is available through FEMA's HMGP and PDM grant programs.

Responsible party: McLean County Emergency Manager, Butte Mayor, Garrison Mayor, Max Mayor, Riverdale Mayor, Underwood Mayor, Washburn Mayor, Wilton Mayor

D: Improve inter-department radio communication

Coordination of inter-department radio protocols and procedures is needed to aid response. Once completed, updated procedures should be included in the county's Emergency Operations Plan.

Responsible party: McLean County Emergency Manager

E: Acquire and remove repetitive loss properties from the floodplain

Funding for property acquisition is available through the FEMA HMGP, PDM and FMA programs. Any repetitive loss properties acquired using FEMA funds must be deed-restricted in perpetuity to open space uses following structure removal

Responsible party: McLean County Emergency Manager

F: Road flood mitigation

A mix of projects are identified to mitigate flooding throughout the county.

Funds for road mitigation are available through the FEMA HMGP, PDM and FMA grant programs.

Responsible party: McLean County Highway Superintendent

G: NFIP training for staff

Training would be targeted at floodplain administrators in NFIP-participating jurisdictions. Local on-site training can be requested from the North Dakota State Water Commission, and online education opportunities are available from FEMA.

Responsible party: McLean County Emergency Manager

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H. Administer Firewise program and implement best practices during wildfire season

Firewise is a nationwide program produced by the National Fire Protection Association. Within North Dakota the program is operated by the state Forest Service. Firewise focuses on education for individual homeowners to help prepare homes for wildfire resistance. Each jurisdiction's role within this program is to educate residents about wildfire risks and mitigation activities they can do to reduce their individual risk.

In addition to public education, the county and each city should evaluate opportunities for fuel reduction activities during wildfire season.

More information about Firewise can be found at:

<http://www.firewise.org/>

<http://www.ag.ndsu.edu/ndfs/documents/firewise-standard.pdf/view>

<http://www.firewise.org/usa-recognition-program/state-liason-list.aspx?sso=0>

Additional resources may be required to implement fuel reduction activities. Wildfire fuels reduction is eligible for funding through the FEMA HMGP and PDM grant programs.

Responsible party: McLean County Emergency Manager (coordinating between local fire districts)

I: Public Education

Hazard-related public education campaigns should include a wide variety of topics. Potential topics include:

- Hazardous materials awareness/shelter-in-place for residents
- Community shelter promotion
- Summer and winter weather safety
- Flood safety and NFIP promotion
- Fire weather notifications and fire prevention

Funds are available for public awareness or education campaigns under the HMGP Five Percent Initiative.

Responsible party: McLean County Emergency Manager

J: Install signage to identify emergency shelters

Signage in public spaces can help to quickly direct residents to the nearest emergency shelter. This can reduce the risk of having a person or persons knocking on doors while a tornado is bearing down on the community. This is especially important for out-of-town visitors who may not be familiar with the community's facilities. Large public areas are the most likely to have out-of-town visitors.

Generic aluminum metal signage is available from multiple sources with rates ranging from \$50 to \$100. A customized sign that includes facility name or even a simple map may be more effective. The cost of a custom sign generally ranges from \$300 to \$500. Any sign should be at least two feet by two feet and have text of at least three inches.

Outdoor signage on shelter facilities is also recommended so that residents may be aware of their presence. Generic signage is available from multiple vendors for \$50 to \$100 per sign.

Responsible party: Butte Mayor, Garrison Mayor, Max Mayor, Riverdale Mayor, Turtle Lake Mayor, Underwood Mayor, Washburn Mayor, Wilton Mayor

K: New warning siren

There are many different types of sirens, each with a different price point. Items to consider include fixed or rotating, duty rating, decibel ratings, sound circle and source of power. Warning sirens are not eligible for FEMA mitigation funding, but funding is periodically made available from North Dakota DES.

Responsible party: Butte Mayor, Garrison Mayor, Wilton Mayor

L: Expand municipal storm water system into southern area of Garrison

The southern area of Garrison does not have an underground storm water system, resulting in localized ponding during heavy rain events. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Garrison Mayor

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M: Develop insect control system during periods of standing water

The generally increased water levels in the region have created many areas of stagnant water, which increases the number of insects.

Responsible party: Garrison Mayor

N: Install railroad crossing arms on 3rd Avenue SE

The project would be a collaboration between the city, state and railroad. FEMA mitigation funds are not available for this project, but some funding may be available from North Dakota DOT.

Responsible party: Max Mayor

O: Distribute weather radios to homeowners

Funding is periodically available from the state for distribution programs. Weather radios may be eligible under the FEMA HMGP 5 Percent Initiative.

Responsible party: Ruso Mayor

P: Remove culvert beneath old railroad tracks in Turtle Lake

An old culvert across the former railroad right-of-way is impeding drainage in town and causing local ponding. Culvert mitigation is eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Turtle Lake Mayor

Q: Upgrade warning siren control system

A remote control system is needed to enhance timeliness of siren warnings. Warning sirens are not eligible for FEMA mitigation funding, but funding is periodically made available from North Dakota DES.

Responsible party: Turtle Lake Mayor

R: Elevate County Road 27 near Turtle Lake

Rising water levels have caused County Road 27 to be routinely flooded near town. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Turtle Lake Mayor

S: Upgrade municipal storm water system in Turtle Lake

Ponding is common on city streets during rain events due to inadequate street drainage. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Turtle Lake Mayor

T: Require hazardous materials facilities to provide status reports to Underwood fire department

The fire department is not currently aware of all hazardous materials activities happening in the city. Some producers do not file Tier II reports, and the reports are not always available in a timely manner. A system should be developed to require that producers report their activities to the fire department on a regular basis.

Responsible party: Underwood Mayor

U: Address overflow issues from pond north of the city

Mitigation activities include removing the man-made pond or re-routing pond drainage around town. Any project would need to be coordinated with the county. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Underwood Mayor

V: Conduct engineering study to identify solutions for flooding issues on the city's west side

Drainage from the west side of town is causing localized flooding. An engineering study needs to be completed to determine potential

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mitigation options. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Underwood Mayor

W: Replace culverts that pass through coulee on east side of town

Existing culverts in the area are no longer functional. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Washburn Mayor

X: Replace the Washburn drinking water intake along Missouri River

The city's drinking water intake along the Missouri River was damaged in the 2011 flood event. Infrastructure mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Washburn Mayor

Y: Upgrade storm water system along Custer Drive

Ponding is common along Custer Drive during rain events due to inadequate street drainage. Localized flood mitigation projects are eligible for FEMA funds through the HMGP, PDM and FMA grant programs.

Responsible party: Washburn Mayor

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Chapter 5: Plan Maintenance

This chapter details the plan maintenance process to make sure the McLean County Multi-Hazard Mitigation Plan will remain an active and relevant document. The plan maintenance process includes monitoring the implementation of mitigation projects, evaluating the effectiveness of the plan at achieving its goals and updating the plan. This chapter also includes information regarding how the plan will be integrated into existing planning mechanisms.

Plan Monitoring and Evaluation

The Local Emergency Planning Committee (LEPC) will monitor and evaluate the plan once per year. A basic agenda for each meeting should include:

- Discussion of project progress for the current period (and uncompleted projects from previous periods)
- Local champion reports on project status
- Discussion of upcoming projects and grant/funding opportunities
- Develop action list for upcoming reporting period

The responsible party should provide the following basic information about projects in the reporting period:

- What was accomplished for the project since the last meeting
- What obstacles, problems or delays the project encountered
- If the project needs to be changed or revised

Project progress should be recorded on the Mitigation Action Progress Report Form found in Appendix G. A form should be completed for each project during the reporting period (and projects from previous reporting periods that have not been completed). If time constraints are an issue, the LEPC may decide to only complete the form for high priority projects; lower-priority projects may be generally discussed without completing the form.

The McLean County Emergency Manager should maintain a folder with all Mitigation Action Progress Report Forms and meeting notes.

The risk and vulnerability assessment should be evaluated during a LEPC meeting approximately two years after plan adoption. Any changes to risks since plan adoption, such as a major flood event that damaged areas thought to be safe from flooding, should be noted. The critical facilities list should also be reviewed to see if any additions or deletions need to be made. A report detailing these changes should be made. If significant changes are required, the Emergency Manager should schedule a meeting to discuss amending the current plan. If no significant changes are required, the Emergency Manager should save the report of changes for reference during the next five-year plan update.

LEPC meetings that are reserved for discussion of the plan should be open to the public and advertised.

Integration into Existing Planning Mechanisms

The County's 2009 Multi-Hazard Mitigation Plan includes no specific details about integrating the plan into existing mechanisms. It notes that each jurisdiction is encouraged to adopt the hazard mitigation plan and incorporate it into any existing mechanisms the jurisdiction may have. Each participating jurisdiction adopted the plan; however, it was not incorporated into any other planning mechanisms.

Due to the limited resources of each jurisdiction, few planning mechanisms exist within the county. Despite recent population gains, the county's population is projected to remain generally unchanged through 2025. This suggests that resources will continue to remain scarce in the near future. For the next five years, specific effort needs to be directed at maintaining interest in mitigation. The limited resources of each jurisdiction do not allow for many activities beyond the standard course of business, and mitigation can get overlooked. It is the role of each responsible party identified in Chapter 4 to be present at annual budget meetings and advocate for consideration of mitigation projects.

As noted in Chapter 4, a new comprehensive plan is something that the County should consider during the current planning period. A comprehensive plan could create a vision for the county and help to guide development in an efficient and hazard-resilient manner. A

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comprehensive plan could also provide guidance for future updates to zoning regulations.

Items from the risk/vulnerability assessment and action items that involve response activities should also be integrated into the county's Local Emergency Operations Plan (LEOP).

Updating the Plan

The McLean County Emergency Manager is responsible for overseeing the five-year update process. Nine months should be allowed for completion of the plan - six months to develop a draft and three months to collect DES and FEMA comments/revisions and formally adopt the plan. The Emergency Manager should begin the plan update process approximately one year prior to the expiration of the current plan. The first step is to develop the project scope by utilizing the Plan Update Evaluation Worksheet in Appendix G. Funding opportunities from DES/FEMA may also be evaluated when determining project scope. The Emergency Manager should also evaluate the possibility of contacting neighboring jurisdictions to join in the plan to achieve cost savings.

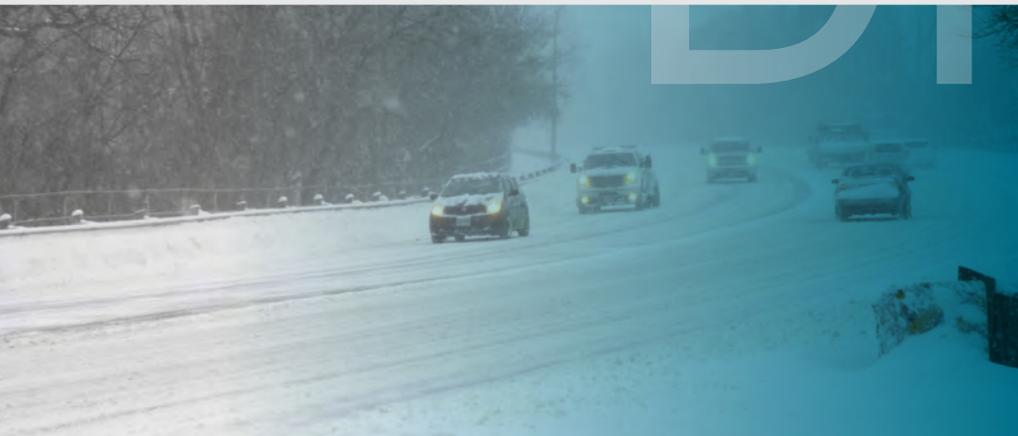
The Emergency Manager should maintain any documentation gathered during the five-year period that will be useful when developing the update. This will help to greatly reduce the research collection phase of the plan update, which will reduce the time and cost of the plan update. It will also ensure that any priority items identified during LEPC monitoring meetings will be included in the plan.

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APPENDIX A



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Appendix A: Approval and Adoption Documentation

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APPENDIX B



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Appendix B: Planning Process

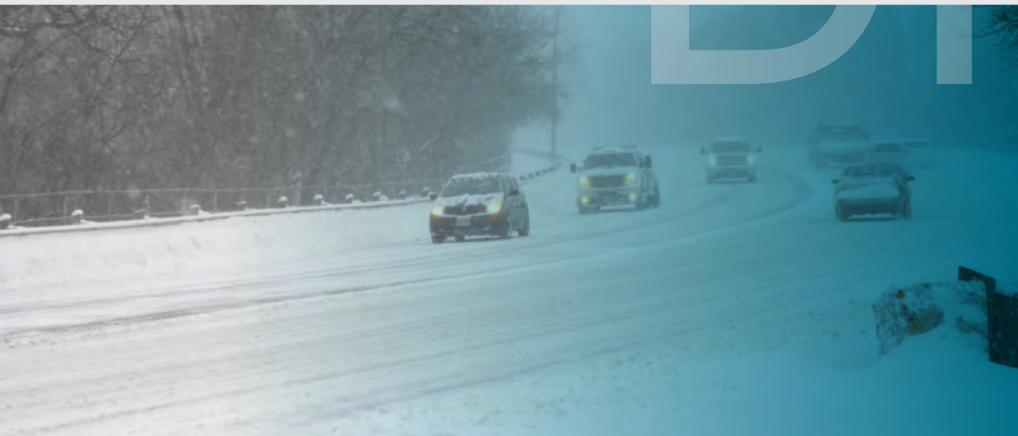
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APPENDIX C



FEMA



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Appendix C: Additional Hazard Information

Storm Events Database

This section contains storm events from the NOAA National Climatic Data Center Storm Events Database. The criteria for each event type to qualify for inclusion to the database are:

- *Blizzard*: Sustained winds of 35 MPH or greater, snow reducing visibility to less than ¼ mile and lasting at least three hours.
- *Cold/Wind Chill*: Wind chill reaching -35 degrees F or lower.
- *Flash Flood*: Rapid and extreme flow of high water above pre-determined flood levels, beginning within six hours of the causative event.
- *Drought*: Deficiency of moisture resulting in a D2 classification or higher as indicated in the multi-agency Drought Monitor.
- *Flood*: Any high flow, overflow or inundation by water that causes or threatens damage, generally occurring more than six hours after the causative event.
- *Funnel Cloud*: A rotating, visible, extension of a cloud pendant from a convective cloud with circulation not reaching the ground.
- *Hail*: Hail of at least ¾ inch diameter, or hail less than ¾ inch diameter that causes injuries or fatalities.
- *Heavy Rain*: Unusually large amount of rain which does not cause a flash flood or flood, but causes damage, e.g., roof collapse or other human/economic impact. Urban ponding events would generally be classified as heavy rain.
- *Heat*: A period of heat resulting from high temperatures and relative humidity as determined by locally-established thresholds.
- *Heavy Snow*: Snow accumulation exceeding locally defined 12 and/or 24-hour criteria. Could include snow events of 6, 8 or 10 inches in 24 hours or less depending on typical regional snowfall.
- *High/Strong/Thunderstorm Wind*: Sustained winds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph for any duration.
- *Ice Storm*: Ice accretion of ¼ or ½ inch or more (varies depending on local jurisdiction defining criteria).
- *Lightning*: Sudden electrical discharge from a storm resulting in a fatality, injury or property damage.
- *Tornado*: A funnel cloud that makes contact with the ground and creates ground-based visual effects such as dust/dirt or other disturbance.
- *Wildfire*: Wildfire that causes one or more fatalities or injuries, and/or property damage.
- *Winter Storm*: A winter weather event that has more than one significant hazard (i.e. heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice). A winter storm would normally pose a threat to life and property.
- *Winter Weather*: Winter precipitation event that causes a death, injury or significant economic impact.

Note that in most instances property and crop damage was not included with storm reports in the county. No storm events resulted in reported injury or death.

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McLean County Hazard Events, 1996-2014

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
McLean (zone)	1/17/1996	Blizzard		0	0	0.00K	0.00K
McLean (zone)	2/1/1996	Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/10/1996	High Wind	50 kts.	0	0	0.00K	0.00K
McLean (zone)	2/26/1996	Blizzard		0	0	0.00K	0.00K
McLean (zone)	3/23/1996	Winter Storm		0	0	0.00K	0.00K
Garrison	6/11/1996	Thunderstorm Wind	60 kts.	0	0	20.00K	0.00K
Garrison	6/11/1996	Thunderstorm Wind	75 kts.	0	0	0.00K	0.00K
Roseglen	7/10/1996	Hail	2.00 in.	0	0	0.00K	0.00K
Mercer	7/17/1996	Tornado	F0	0	0	0.00K	0.00K
Mercer	7/28/1996	Tornado	F1	0	0	75.00K	0.00K
4 ne Garrison	8/3/1996	Lightning		0	0	70.00K	0.00K
McLean (zone)	10/20/1996	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	11/19/1996	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	11/23/1996	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	12/16/1996	Blizzard		0	0	0.00K	0.00K
McLean (zone)	12/25/1996	Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	1/4/1997	Blizzard		0	2	250.00K	0.00K
McLean (zone)	1/4/1997	Blizzard		0	0	0.00K	0.00K
McLean (zone)	1/9/1997	Blizzard		0	1	1.530M	0.00K
McLean (zone)	3/12/1997	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	3/21/1997	Flood		0	0	0.00K	0.00K
McLean (zone)	4/4/1997	Blizzard		0	1	1.500M	0.00K
Roseglen	6/14/1997	Hail	1.00 in.	0	0	0.00K	0.00K
Turtle Lake	6/22/1997	Thunderstorm Wind	70 kts.	0	0	15.00K	0.00K
Falkirk	7/10/1997	Thunderstorm Wind	60 kts.	0	0	0.00K	0.00K
Turtle Lake	7/10/1997	Thunderstorm Wind	70 kts.	0	0	30.00K	0.00K
Riverdale	7/13/1997	Hail	0.75 in.	0	0	0.00K	0.00K
Garrison	7/24/1997	Hail	1.75 in.	0	0	0.00K	0.00K

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Turtle Lake	8/5/1997	Funnel Cloud		0	0	0.00K	0.00K
Mercer	8/5/1997	Tornado	F0	0	0	0.00K	0.00K
McLean (zone)	2/25/1998	Blizzard		0	2	0.00K	0.00K
Max	5/13/1998	Hail	1.00 in.	0	0	3.00K	5.00K
Wilton	5/27/1998	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	6/18/1998	Funnel Cloud		0	0	0.00K	0.00K
Ruso	7/6/1998	Hail	0.75 in.	0	0	0.00K	0.00K
Turtle Lake	7/6/1998	Hail	0.75 in.	0	0	0.00K	0.00K
Raub	7/6/1998	Hail	1.75 in.	0	0	0.00K	0.00K
Emmet	8/27/1998	Hail	0.75 in.	0	0	0.00K	0.00K
McLean (zone)	11/9/1998	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	11/18/1998	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	1/1/1999	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	1/26/1999	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	4/1/1999	Blizzard		0	0	0.00K	0.00K
McLean (zone)	4/3/1999	Winter Storm		0	0	0.00K	0.00K
Turtle Lake	6/3/1999	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
Underwood	6/3/1999	Tornado	F0	0	0	0.00K	0.00K
Turtle Lake	6/3/1999	Tornado	F0	0	0	0.00K	0.00K
Garrison	6/6/1999	Flash Flood		0	0	300.00K	0.00K
Ruso	7/14/1999	Hail	1.75 in.	0	0	0.00K	0.00K
Garrison	7/24/1999	Hail	1.75 in.	0	0	0.00K	0.00K
Turtle Lake	8/9/1999	Hail	1.00 in.	0	0	0.00K	0.00K
Benedict	8/15/1999	Tornado	F0	0	0	0.00K	0.00K
McLean (zone)	10/31/1999	High Wind	60 kts.	0	0	0.00K	0.00K
McLean (zone)	12/19/1999	Blizzard		0	0	0.00K	0.00K
McLean (zone)	2/25/2000	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	2/26/2000	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	4/5/2000	High Wind	61 kts. M	0	0	0.00K	0.00K
McLean (zone)	4/13/2000	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	4/14/2000	Winter Storm		0	0	0.00K	0.00K

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Max	6/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Ruso	6/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Max	6/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Washburn	6/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Max	6/11/2000	Hail	0.88 in.	0	0	0.00K	0.00K
Riverdale	6/11/2000	Hail	1.00 in.	0	0	0.00K	0.00K
Coleharbor	6/11/2000	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	6/11/2000	Tornado	F0	0	0	0.00K	0.00K
Garrison muni arpt	6/24/2000	Thunderstorm Wind	59 kts. M	0	0	0.00K	0.00K
Turtle Lake	7/6/2000	Hail	0.88 in.	0	0	0.00K	0.00K
Garrison	7/7/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Turtle Lake	7/24/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Washburn	8/5/2000	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
Underwood	8/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Benedict	8/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Underwood	8/11/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Turtle Lake	8/11/2000	Thunderstorm Wind	51 kts. M	0	0	0.00K	0.00K
Roseglen	8/13/2000	Hail	1.00 in.	0	0	0.00K	0.00K
Falkirk	8/20/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Max	8/28/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Benedict	8/28/2000	Hail	1.25 in.	0	0	0.00K	0.00K
Underwood	9/5/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Underwood	9/5/2000	Hail	1.25 in.	0	0	0.00K	0.00K
Wilton	11/1/2000	Hail	0.75 in.	0	0	0.00K	0.00K
Washburn	11/1/2000	Tornado	F0	0	0	0.00K	0.00K
Mercer	11/1/2000	Tornado	F0	0	0	0.00K	0.00K
McLean (zone)	11/2/2000	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	11/7/2000	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	12/16/2000	Blizzard		0	0	0.00K	0.00K
McLean (zone)	5/7/2001	High Wind	44 kts. M	0	0	0.00K	0.00K
McLean (zone)	5/20/2001	High Wind	44 kts. M	0	0	0.00K	0.00K

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McLean (zone)	5/22/2001	High Wind	51 kts. M	0	0	0.00K	0.00K
Washburn	6/11/2001	Hail	0.75 in.	0	0	0.00K	0.00K
Max	7/19/2001	Hail	0.75 in.	0	0	0.00K	0.00K
Washburn	7/20/2001	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
Raub	7/22/2001	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
Roseglen	7/22/2001	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
Wilton	7/22/2001	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
Underwood	8/14/2001	Hail	0.75 in.	0	0	0.00K	0.00K
Max	8/21/2001	Hail	1.00 in.	0	0	0.00K	0.00K
Turtle Lake	8/21/2001	Hail	1.00 in.	0	0	0.00K	0.00K
McLean (zone)	11/1/2001	High Wind	39 kts. M	0	0	0.00K	0.00K
McLean (zone)	2/11/2002	High Wind	48 kts. M	0	0	0.00K	0.00K
McLean (zone)	4/18/2002	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	5/7/2002	Winter Storm		0	0	0.00K	0.00K
Turtle Lake	6/8/2002	Hail	0.75 in.	0	0	0.00K	0.00K
Turtle Lake	6/8/2002	Hail	0.88 in.	0	0	0.00K	0.00K
Garrison muni arpt	6/9/2002	Thunderstorm Wind	50 kts. M	0	0	0.00K	0.00K
Max	6/10/2002	Hail	0.75 in.	0	0	0.00K	0.00K
Roseglen	6/10/2002	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
Garrison	6/10/2002	Thunderstorm Wind	66 kts. E	0	0	0.00K	0.00K
Garrison muni arpt	6/10/2002	Thunderstorm Wind	66 kts. M	0	0	0.00K	0.00K
Raub	6/22/2002	Lightning		0	0	0.00K	0.00K
Wilton	6/23/2002	Funnel Cloud		0	0	0.00K	0.00K
Coleharbor	7/24/2002	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
Garrison	7/31/2002	Hail	0.75 in.	0	0	0.00K	0.00K
Garrison	8/8/2002	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
Garrison	8/8/2002	Thunderstorm Wind	70 kts. M	0	0	0.00K	0.00K
Benedict	8/16/2002	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	8/30/2002	Hail	0.75 in.	0	0	0.00K	0.00K
McLean (zone)	11/29/2002	High Wind	46 kts. M	0	0	0.00K	0.00K
McLean (zone)	12/17/2002	Winter Storm		0	0	0.00K	0.00K

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McLean (zone)	4/1/2003	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	4/2/2003	Winter Storm		0	0	0.00K	0.00K
Underwood	5/7/2003	Hail	0.75 in.	0	0	0.00K	0.00K
Butte	5/7/2003	Hail	0.75 in.	0	0	0.00K	0.00K
Underwood	5/7/2003	Hail	0.88 in.	0	0	0.00K	0.00K
Roseglen	5/7/2003	Hail	0.88 in.	0	0	0.00K	0.00K
Coleharbor	6/15/2003	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	6/21/2003	Tornado	F0	0	0	0.00K	0.00K
Riverdale	7/3/2003	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Garrison	7/3/2003	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K
Garrison	7/13/2003	Hail	0.75 in.	0	0	0.00K	0.00K
Max	7/13/2003	Hail	0.88 in.	0	0	0.00K	0.00K
Butte	7/13/2003	Hail	1.00 in.	0	0	0.00K	0.00K
Coleharbor	7/13/2003	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	7/13/2003	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	7/13/2003	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Turtle Lake	7/13/2003	Tornado	F1	0	0	0.00K	0.00K
McLean (zone)	1/4/2004	Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	1/24/2004	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	1/27/2004	Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/10/2004	Blizzard		0	0	0.00K	0.00K
McLean (zone)	2/10/2004	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	2/29/2004	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	3/10/2004	Blizzard		0	0	0.00K	0.00K
McLean (zone)	3/13/2004	High Wind	50 kts. ES	0	0	0.00K	0.00K
McLean (zone)	3/13/2004	High Wind	50 kts. ES	0	0	0.00K	0.00K
Raub	6/6/2004	Hail	0.75 in.	0	0	0.00K	0.00K
Max	6/6/2004	Hail	0.88 in.	0	0	0.00K	0.00K
Max	6/6/2004	Hail	1.00 in.	0	0	0.00K	0.00K
Emmet	6/6/2004	Tornado	F0	0	0	0.00K	0.00K
Roseglen	6/6/2004	Tornado	F1	0	0	0.00K	0.00K

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Washburn	6/11/2004	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	6/11/2004	Hail	1.00 in.	0	0	0.00K	0.00K
Benedict	7/11/2004	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
Max	7/11/2004	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
Riverdale	8/23/2004	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
Wilton	8/25/2004	Hail	0.75 in.	0	0	0.00K	0.00K
McLean (zone)	12/11/2004	High Wind	43 kts. ES	0	0	0.00K	0.00K
McLean (zone)	12/20/2004	High Wind	45 kts. MS	0	0	0.00K	0.00K
McLean (zone)	1/1/2005	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	1/13/2005	Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	3/9/2005	High Wind	49 kts. ES	0	0	0.00K	0.00K
Washburn	5/7/2005	Flash Flood		0	0	0.00K	0.00K
Riverdale	5/19/2005	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
Max	6/1/2005	Flash Flood		0	0	60.00K	0.00K
Washburn	6/19/2005	Hail	0.88 in.	0	0	0.00K	0.00K
Garrison	6/26/2005	Flash Flood		0	0	10.00K	0.00K
Roseglen	7/7/2005	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	7/21/2005	Hail	0.75 in.	0	0	0.00K	0.00K
McLean (zone)	8/31/2005	High Wind	52 kts. EG	0	0	0.00K	0.00K
Garrison	9/16/2005	Hail	0.75 in.	0	0	0.00K	0.00K
Coleharbor	9/16/2005	Hail	0.75 in.	0	0	0.00K	0.00K
McLean (zone)	10/5/2005	Blizzard		0	0	100.00K	0.00K
McLean (zone)	2/16/2006	Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/24/2006	Winter Storm		0	0	0.00K	0.00K
Mercer	5/27/2006	Hail	0.88 in.	0	0	0.00K	0.00K
Washburn	5/27/2006	Hail	0.88 in.	0	0	0.00K	0.00K
Coleharbor	5/27/2006	Hail	1.25 in.	0	0	0.00K	0.00K
Turtle Lake	5/27/2006	Hail	1.25 in.	0	0	0.00K	0.00K
Wilton	5/27/2006	Thunderstorm Wind	70 kts. EG	0	0	50.00K	0.00K
Turtle Lake	5/31/2006	Funnel Cloud		0	0	0.00K	0.00K
Coleharbor	6/3/2006	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K

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Turtle Lake	6/30/2006	Hail	1.75 in.	0	0	4.00K	0.00K
Mercer	6/30/2006	Hail	1.75 in.	0	0	3.00K	0.00K
Garrison	6/30/2006	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Riverdale	7/12/2006	Funnel Cloud		0	0	0.00K	0.00K
Ruso	7/12/2006	Funnel Cloud		0	0	0.00K	0.00K
Coleharbor	7/12/2006	Thunderstorm Wind	109 kts. EG	0	2	3.000M	0.00K
Coleharbor	7/12/2006	Thunderstorm Wind	65 kts. EG	0	0	10.00K	0.00K
Coleharbor	7/12/2006	Thunderstorm Wind	80 kts. MG	0	0	8.00K	0.00K
Coleharbor	7/24/2006	Lightning		0	0	15.00K	0.00K
Max	8/12/2006	Hail	0.75 in.	0	0	0.00K	0.00K
Max	8/12/2006	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison	8/24/2006	Funnel Cloud		0	0	0.00K	0.00K
Underwood	8/24/2006	Hail	0.75 in.	0	0	0.00K	0.00K
Washburn	8/24/2006	Hail	1.00 in.	0	0	0.00K	0.00K
Underwood	8/24/2006	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	8/24/2006	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Garrison	8/24/2006	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Coleharbor	8/24/2006	Thunderstorm Wind	56 kts. MG	0	0	0.00K	0.00K
Riverdale	8/24/2006	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
Underwood	8/24/2006	Thunderstorm Wind	70 kts. EG	0	0	15.00K	0.00K
Washburn	8/24/2006	Thunderstorm Wind	78 kts. EG	0	0	675.00K	0.00K
Turtle Lake	8/24/2006	Thunderstorm Wind	78 kts. EG	0	0	80.00K	0.00K
Underwood	8/24/2006	Tornado	F2	0	0	200.00K	0.00K
McLean (zone)	12/30/2006	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	2/2/2007	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/28/2007	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	3/2/2007	Blizzard		0	0	0.00K	0.00K
Max	3/28/2007	Hail	1.00 in.	0	0	0.00K	0.00K
Wilton	5/14/2007	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Washburn	5/21/2007	Hail	1.00 in.	0	0	0.00K	0.00K
Wilton	6/12/2007	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K

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Garrison	6/12/2007	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Max	6/12/2007	Tornado	EF0	0	0	0.00K	0.00K
McLean (zone)	6/26/2007	High Wind	52 kts. MG	0	0	0.00K	0.00K
Raub	7/3/2007	Thunderstorm Wind	61 kts. EG	0	0	35.00K	0.00K
Raub	7/9/2007	Hail	1.50 in.	0	0	0.00K	250.00K
Garrison	7/9/2007	Thunderstorm Wind	62 kts. MG	0	0	0.00K	0.00K
Roseglen	7/9/2007	Tornado	EF1	0	4	80.00K	150.00K
Garrison	8/7/2007	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
Butte	8/10/2007	Hail	1.00 in.	0	0	0.00K	0.00K
Butte	8/10/2007	Hail	1.00 in.	0	0	0.00K	50.00K
Butte	8/10/2007	Hail	1.00 in.	0	0	0.00K	0.00K
Riverdale	8/10/2007	Hail	1.25 in.	0	0	0.00K	0.00K
Riverdale	8/10/2007	Hail	1.50 in.	0	0	0.00K	0.00K
Riverdale	8/10/2007	Hail	1.75 in.	0	0	0.00K	0.00K
McLean (zone)	11/13/2007	High Wind	57 kts. MG	0	0	0.00K	0.00K
McLean (zone)	1/28/2008	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/9/2008	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	3/24/2008	High Wind	58 kts. MG	0	0	0.00K	0.00K
McLean (zone)	5/19/2008	High Wind	41 kts. MS	0	0	0.00K	0.00K
Washburn	6/11/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Turtle Lake	6/14/2008	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
Riverdale	6/18/2008	Hail	0.75 in.	0	0	0.00K	0.00K
Riverdale	6/18/2008	Hail	0.75 in.	0	0	0.00K	0.00K
Wilton	6/18/2008	Hail	0.75 in.	0	0	0.00K	0.00K
Riverdale	6/18/2008	Hail	0.88 in.	0	0	0.00K	0.00K
Turtle Lake	6/18/2008	Hail	0.88 in.	0	0	0.00K	0.00K
Garrison	6/18/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Riverdale	6/18/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Riverdale	6/18/2008	Hail	1.50 in.	0	0	0.00K	0.00K
Garrison	6/18/2008	Hail	1.75 in.	0	0	0.00K	0.00K
Turtle Lake	6/19/2008	Thunderstorm Wind	61 kts. MG	0	0	0.00K	0.00K

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Emmet	6/24/2008	Hail	0.75 in.	0	0	0.00K	0.00K
Turtle Lake	6/24/2008	Hail	0.75 in.	0	0	0.00K	0.00K
Garrison	6/24/2008	Hail	1.75 in.	0	0	0.00K	0.00K
Coleharbor	6/24/2008	Hail	1.75 in.	0	0	0.00K	0.00K
Washburn	6/26/2008	Hail	0.88 in.	0	0	0.00K	0.00K
Underwood	7/10/2008	Hail	0.75 in.	0	0	0.00K	0.00K
Washburn	7/10/2008	Hail	1.00 in.	0	0	0.00K	0.00K
McLean (zone)	7/12/2008	High Wind	35 kts. MS	0	0	0.00K	0.00K
Riverdale	7/28/2008	Hail	0.88 in.	0	0	0.00K	0.00K
Emmet	7/28/2008	Hail	1.75 in.	0	0	0.00K	0.00K
Coleharbor	7/28/2008	Hail	1.75 in.	0	0	0.00K	0.00K
Garrison	7/30/2008	Flash Flood		0	0	25.00K	0.00K
Blackwater	7/30/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison	7/30/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison	7/30/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison	7/30/2008	Hail	1.25 in.	0	0	0.00K	0.00K
Roseglen	7/30/2008	Hail	1.50 in.	0	0	0.00K	0.00K
Emmet	7/30/2008	Hail	2.50 in.	0	0	35.00K	0.00K
Coleharbor	7/30/2008	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Benedict	7/30/2008	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
Max	8/2/2008	Hail	0.88 in.	0	0	0.00K	0.00K
Roseglen	8/2/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison	8/2/2008	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	8/3/2008	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
Washburn arpt	8/21/2008	Hail	0.88 in.	0	0	0.00K	0.00K
Washburn	8/22/2008	Thunderstorm Wind	65 kts. EG	0	0	6.00K	0.00K
McLean (zone)	10/26/2008	High Wind	37 kts. MS	0	0	10.00K	0.00K
McLean (zone)	11/6/2008	Blizzard		0	0	0.00K	0.00K
McLean (zone)	12/13/2008	Blizzard		0	0	0.00K	0.00K
McLean (zone)	12/14/2008	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	12/20/2008	Extreme Cold/wind Chill		0	0	0.00K	0.00K

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McLean (zone)	12/21/2008	Cold/wind Chill		1	0	0.00K	0.00K
McLean (zone)	12/26/2008	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	12/29/2008	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	1/8/2009	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	1/11/2009	Blizzard		0	0	0.00K	0.00K
McLean (zone)	1/16/2009	Winter Weather		0	0	0.00K	0.00K
McLean (zone)	1/31/2009	High Wind	35 kts. MS	0	0	0.00K	0.00K
McLean (zone)	2/9/2009	Heavy Snow		0	0	0.00K	0.00K
Raub	3/6/2009	Flood		0	0	205.00K	0.00K
McLean (zone)	3/23/2009	Blizzard		0	0	0.00K	0.00K
Raub	4/1/2009	Flood		0	0	350.00K	0.00K
McLean (zone)	6/6/2009	Winter Weather		0	0	0.00K	0.00K
Raub	6/22/2009	Hail	0.88 in.	0	0	0.00K	0.00K
Raub	6/22/2009	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
Riverdale	6/26/2009	Hail	0.88 in.	0	0	0.00K	0.00K
Riverdale	6/26/2009	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	6/26/2009	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	6/26/2009	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	6/26/2009	Hail	1.00 in.	0	0	0.00K	0.00K
Mercer	6/26/2009	Hail	1.00 in.	0	0	0.00K	0.00K
Underwood	6/26/2009	Hail	1.75 in.	0	0	0.00K	0.00K
Turtle Lake	6/26/2009	Hail	2.75 in.	0	0	45.00K	0.00K
Garrison muni arpt	6/26/2009	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Garrison	6/26/2009	Thunderstorm Wind	55 kts. MG	0	0	0.00K	0.00K
Garrison	6/26/2009	Thunderstorm Wind	61 kts. EG	0	0	4.00K	0.00K
Underwood	6/26/2009	Tornado	EF0	0	0	0.00K	0.00K
Mercer	6/26/2009	Tornado	EF0	0	0	0.00K	0.00K
Turtle Lake	7/8/2009	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Coleharbor	7/8/2009	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
Garrison muni arpt	7/11/2009	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
Roseglen	7/19/2009	Hail	0.88 in.	0	0	0.00K	0.00K

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Ruso	9/10/2009	Hail	1.00 in.	0	0	0.00K	75.00K
McLean (zone)	12/14/2009	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	12/23/2009	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	12/25/2009	Blizzard		0	0	0.00K	0.00K
McLean (zone)	1/5/2010	Winter Weather		0	0	0.00K	0.00K
McLean (zone)	1/6/2010	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	1/22/2010	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	1/25/2010	Blizzard		0	0	0.00K	0.00K
McLean (zone)	3/9/2010	Winter Weather		0	0	0.00K	0.00K
McLean (zone)	4/2/2010	Winter Storm		0	0	350.00K	0.00K
McLean (zone)	5/6/2010	Winter Weather		0	0	0.00K	0.00K
McLean (zone)	5/25/2010	High Wind	52 kts. MG	0	0	30.00K	0.00K
Roseglen	5/27/2010	Hail	1.00 in.	0	0	0.00K	0.00K
Underwood	6/17/2010	Hail	0.88 in.	0	0	0.00K	0.00K
Max	6/17/2010	Hail	1.00 in.	0	0	0.00K	0.00K
McLean (zone)	6/18/2010	High Wind	35 kts. ES	0	0	0.00K	0.00K
Roseglen	6/25/2010	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison muni arpt	6/25/2010	Hail	1.00 in.	0	0	0.00K	0.00K
Garrison	7/1/2010	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
Coleharbor	7/1/2010	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
Underwood	7/10/2010	Hail	0.88 in.	0	0	0.00K	0.00K
Max	7/20/2010	Hail	0.75 in.	0	0	0.00K	0.00K
Garrison	7/26/2010	Hail	1.00 in.	0	0	0.00K	0.00K
Emmet	7/26/2010	Hail	1.75 in.	0	0	50.00K	0.00K
Emmet	7/26/2010	Hail	1.75 in.	0	1	45.00K	0.00K
Garrison	7/26/2010	Hail	1.75 in.	0	0	0.00K	0.00K
Mercer	7/26/2010	Thunderstorm Wind	61 kts. EG	0	0	20.00K	0.00K
Garrison	7/26/2010	Thunderstorm Wind	62 kts. MG	0	0	100.00K	150.00K
Roseglen	7/29/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Garrison	7/29/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Garrison	7/29/2010	Thunderstorm Wind	56 kts. MG	0	0	0.00K	0.00K

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Max	8/2/2010	Lightning		0	0	4.00K	0.00K
Garrison	8/2/2010	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Washburn	8/7/2010	Lightning		0	0	4.00K	0.00K
Ruso	8/10/2010	Hail	1.00 in.	0	0	0.00K	0.00K
Emmet	8/11/2010	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K
McLean (zone)	10/26/2010	Blizzard		0	0	0.00K	0.00K
McLean (zone)	10/26/2010	High Wind	52 kts. MG	0	0	0.00K	0.00K
McLean (zone)	12/10/2010	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	12/20/2010	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	12/29/2010	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	1/31/2011	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/1/2011	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/1/2011	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/8/2011	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/13/2011	High Wind	51 kts. MG	0	0	20.00K	0.00K
McLean (zone)	3/11/2011	Blizzard		0	0	0.00K	0.00K
McLean (zone)	3/22/2011	Blizzard		0	0	0.00K	0.00K
McLean (zone)	3/22/2011	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	4/14/2011	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	4/30/2011	Blizzard		0	0	0.00K	0.00K
McLean (zone)	5/1/2011	Blizzard		0	0	0.00K	0.00K
McLean (zone)	5/31/2011	High Wind	35 kts. ES	0	0	0.00K	0.00K
Raub	6/20/2011	Tornado	EFO	0	0	0.00K	0.00K
Riverdale	7/1/2011	Flood		0	0	0.00K	0.00K
Garrison	7/8/2011	Lightning		0	0	50.00K	0.00K
Underwood	7/8/2011	Tornado	EFO	0	0	0.00K	0.00K
Garrison	7/15/2011	Hail	0.88 in.	0	0	0.00K	0.00K
McLean (zone)	7/16/2011	Excessive Heat		0	0	0.00K	0.00K
Wilton	7/16/2011	Hail	0.88 in.	0	0	0.00K	0.00K
Wilton	7/16/2011	Hail	1.00 in.	0	0	0.00K	0.00K
Washburn	7/16/2011	Hail	1.00 in.	0	0	0.00K	0.00K

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Emmet	7/16/2011	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
Max	7/20/2011	Hail	1.00 in.	0	0	0.00K	0.00K
Roseglen	7/20/2011	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
Max	7/20/2011	Thunderstorm Wind	55 kts. EG	0	0	100.00K	0.00K
Coleharbor	7/31/2011	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
Riverdale	8/1/2011	Flood		0	0	0.00K	0.00K
Max	8/4/2011	Hail	1.75 in.	0	0	10.00K	0.00K
Coleharbor	8/31/2011	Thunderstorm Wind	56 kts. MG	0	0	0.00K	0.00K
Mercer	8/31/2011	Thunderstorm Wind	61 kts. EG	0	0	18.00K	0.00K
McLean (zone)	9/20/2011	High Wind	35 kts. ES	0	0	0.00K	0.00K
McLean (zone)	1/18/2012	Extreme Cold/wind Chill		0	0	0.00K	0.00K
Max	6/6/2012	Hail	0.88 in.	0	0	0.00K	0.00K
Garrison	6/7/2012	Hail	1.25 in.	0	0	0.00K	0.00K
Benedict	6/7/2012	Hail	1.25 in.	0	0	0.00K	0.00K
Garrison	7/19/2012	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
Garrison	7/19/2012	Thunderstorm Wind	61 kts. EG	0	0	15.00K	0.00K
Falkirk	8/2/2012	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
Washburn	8/24/2012	Hail	0.75 in.	0	0	0.00K	0.00K
Riverdale	8/24/2012	Hail	1.00 in.	0	0	0.00K	0.00K
Coleharbor	8/24/2012	Hail	1.25 in.	0	0	0.00K	0.00K
McLean (zone)	10/17/2012	High Wind	51 kts. MG	0	0	0.00K	0.00K
McLean (zone)	11/10/2012	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	1/11/2013	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	1/20/2013	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	1/30/2013	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/2/2013	Blizzard		0	0	0.00K	0.00K
McLean (zone)	4/14/2013	Winter Storm		0	0	0.00K	0.00K
McLean (zone)	5/14/2013	High Wind	55 kts. MG	0	0	0.00K	0.00K
Garrison	7/8/2013	Thunderstorm Wind	55 kts. MG	0	0	0.00K	0.00K
Garrison muni arpt	7/8/2013	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
Washburn	8/29/2013	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K

McLean County

Multi-Hazard Mitigation Plan

McLean (zone)	12/2/2013	Heavy Snow		0	0	0.00K	0.00K
McLean (zone)	12/6/2013	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	12/28/2013	Blizzard		0	0	0.00K	0.00K
McLean (zone)	1/4/2014	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	1/15/2014	High Wind	65 kts. MG	0	0	0.00K	0.00K
McLean (zone)	1/22/2014	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	1/26/2014	Blizzard		0	0	0.00K	0.00K
McLean (zone)	1/26/2014	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	2/28/2014	Extreme Cold/wind Chill		0	0	0.00K	0.00K
McLean (zone)	3/31/2014	Blizzard		0	0	0.00K	0.00K
Max	5/29/2014	Hail	1.25 in.	0	0	0.00K	0.00K
Max	5/29/2014	Hail	1.75 in.	0	0	0.00K	0.00K
Coleharbor	9/3/2014	Hail	1.00 in.	0	0	0.00K	0.00K
Haynes	9/3/2014	Hail	1.50 in.	0	0	0.00K	0.00K
Roseglen	9/3/2014	Hail	1.75 in.	0	0	0.00K	0.00K
Garrison	9/3/2014	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
Wilton	9/4/2014	Hail	1.00 in.	0	0	0.00K	0.00K
Wilton	9/4/2014	Hail	1.25 in.	0	0	0.00K	0.00K

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McLean County

Multi-Hazard Mitigation Plan

Potential Terrorism Targets in McLean County

Government Targets

County Courthouse - 712 5th Ave, Washburn
Law Enforcement Center (EOC) - 709 6th Ave, Washburn
County Highway Department - 515 8th Street, Washburn
County Highway Department - 501 Hwy 37 West, Garrison
Garrison Dam - 1 ½ miles west of Riverdale, Riverdale
US Government Farm Services Agency - 140 5th Ave SW, Garrison
Missile Sites - 31 throughout County

Commercial/Utility Targets

Great River Energy, Coal Creek Station - 2875 3rd Street SW, Underwood
Falkirk Mine - 2801 1st Street SW, Underwood
McLean/Sheridan Rural Water - 987 17th Ave NW, Turtle Lake
Otter Tail Power Main Office - 1777 41st Ave NW, Garrison
McLean Electric Cooperative Main Office - 4031 Hwy 37 Bypass NW, Garrison
Blue Flint Ethanol, 2841 3rd St SW, Underwood

Transportation Targets

Highway US 83
Railroad main line from Wilton to Max

Recreational Targets

Lake Sakakawea
Missouri River
Ft. Stevenson State Park - Garrison
Government Bay - Riverdale
Lake Audubon - E and S of Garrison
Ft. Mandan - West of Washburn
ND Lewis & Clark Interpretive Center - 2576 8th St SW, Washburn

Industrial Targets

Hawkins Water Treatment Group (Mon Dak Chemical) - 2576A Industrial Dr, Washburn
Industrial Lubricant - 2576B Industrial Dr, Washburn
Farm Coops - Anhydrous - Throughout County

Miscellaneous Targets

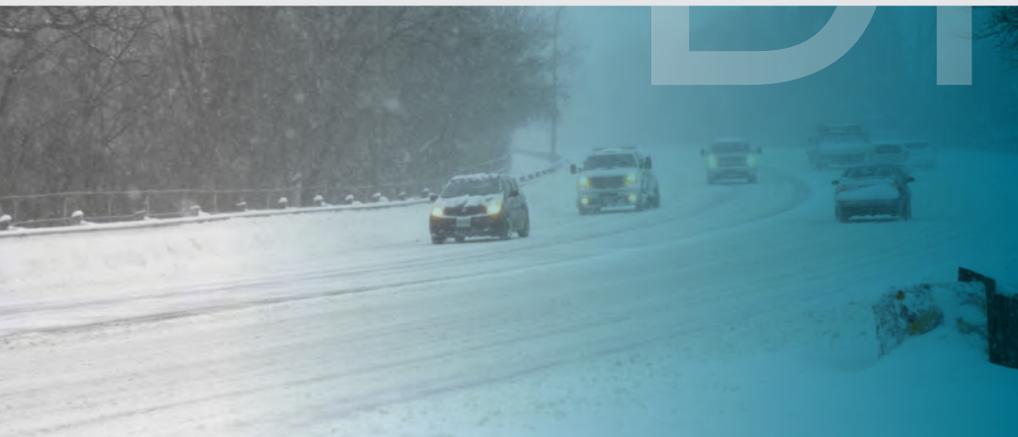
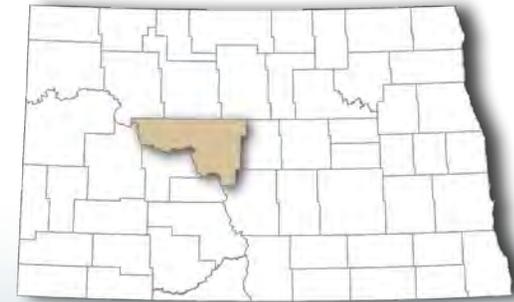
Garrison Memorial Hospital - 407 3rd Ave SE, Garrison
Turtle Lake Memorial Hospital - 220 5th Ave W, Turtle Lake

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APPENDIX D



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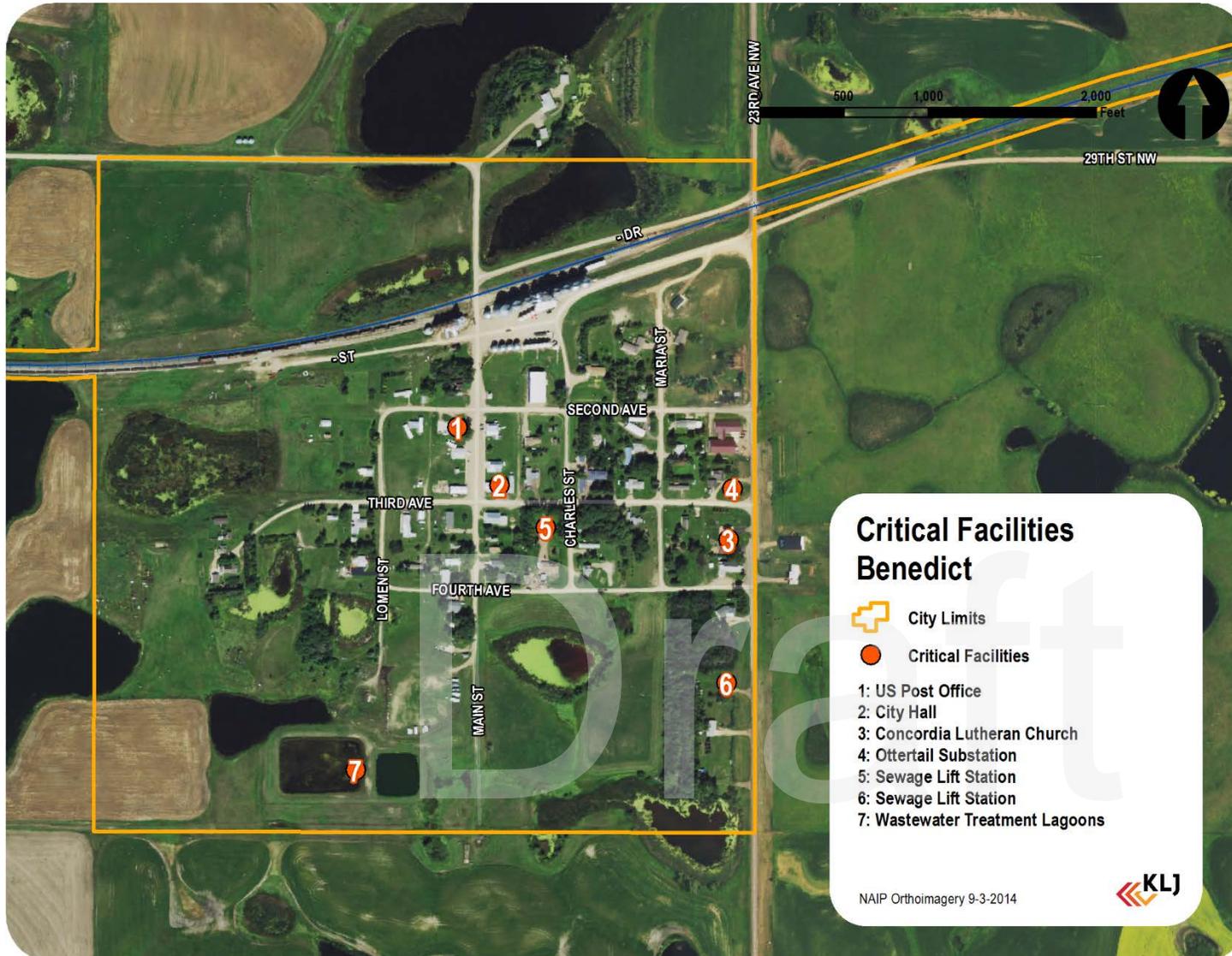
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McLean County

Multi-Hazard Mitigation Plan

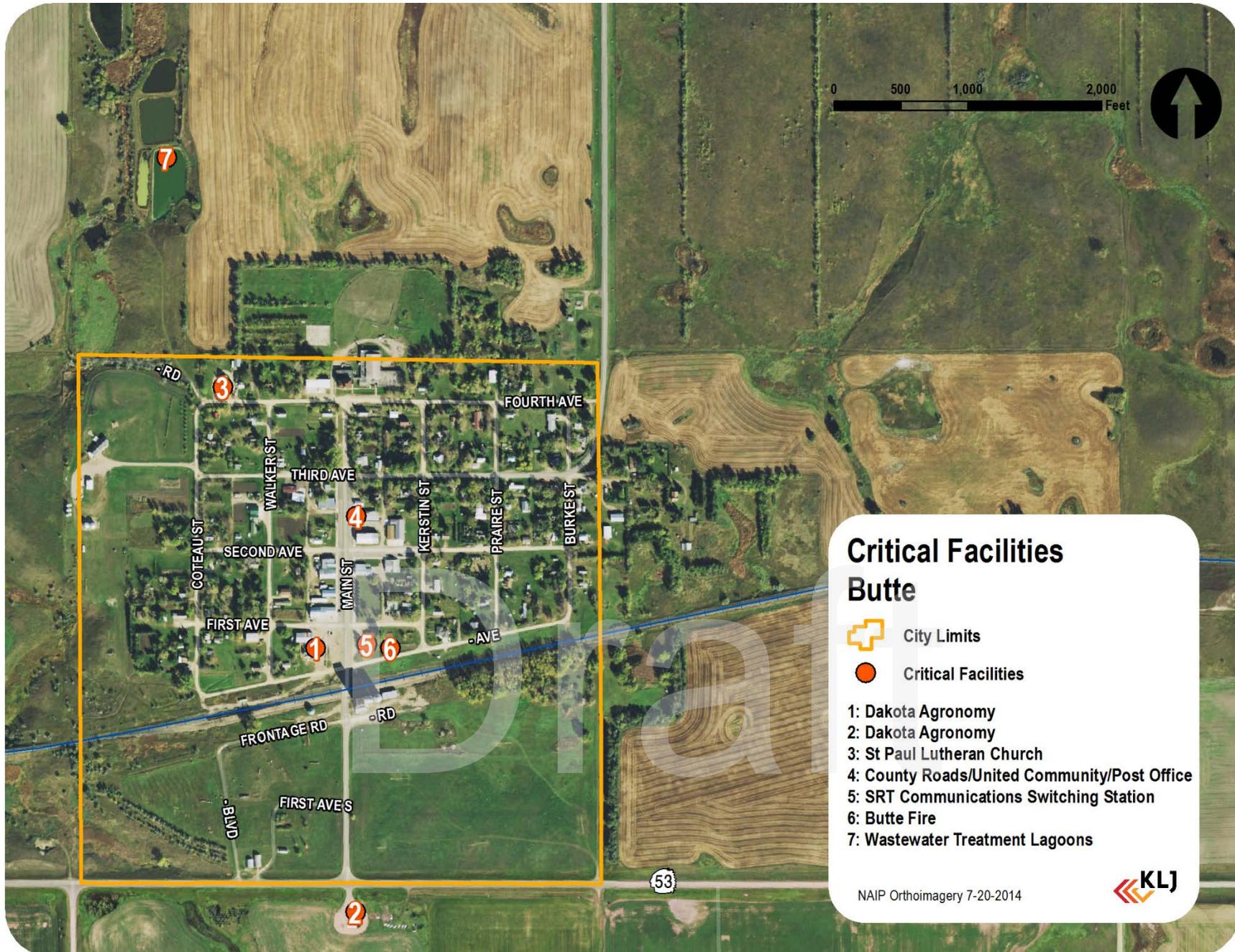
Appendix D: Critical Facilities

The critical facilities list presented below is based off the previous plan update.



McLean County

Multi-Hazard Mitigation Plan



McLean County

Multi-Hazard Mitigation Plan



McLean County

Multi-Hazard Mitigation Plan



McLean County, ND



Critical Facilities Rural County

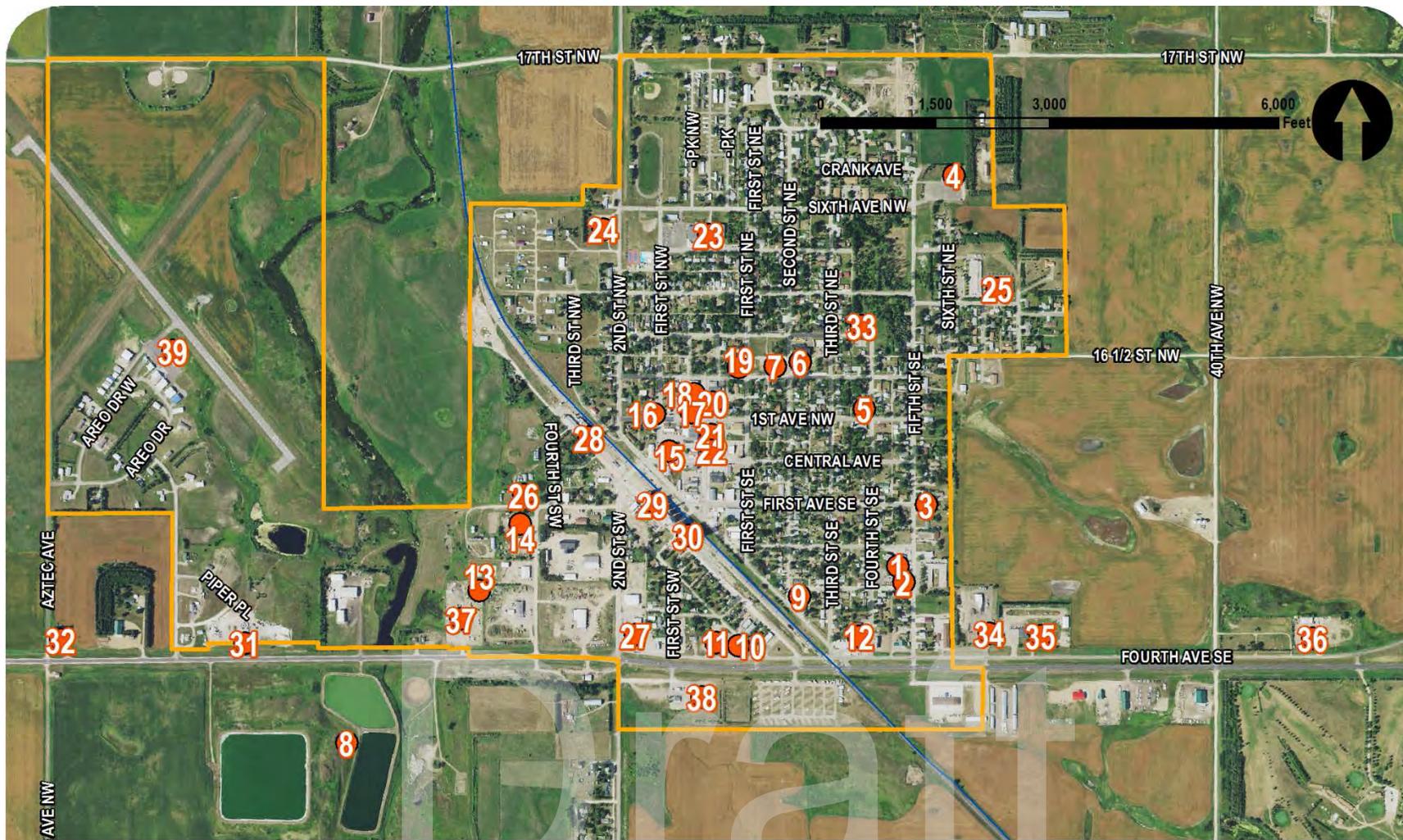
-  Incorporated Cities
-  Unincorporated Communities
-  Critical Facilities

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McLean County

Multi-Hazard Mitigation Plan



Critical Facilities Garrison



City Limits



Critical Facilities

NAIP Orthoimagery 8-12-2014

- | | | | |
|--|-------------------------------|--|-------------------------------|
| 1: St. Alexis Home Health Care & Hospice | 10: Spinal Care Center | 19: First Congregational Church | 31 - 32: Bulk Fuel - Cenex |
| 2: Garrison Family Clinic | 11: Ottertail Power Warehouse | 20: Garrison State Bank | 33: MDU Border Station |
| 3: Garrison Ambulance Barn | 12: Garrison Super Valu | 21: BNC National Bank | 34: ND Dept of Transportation |
| 4: St. Paul Lutheran Church | 13: Garrison City Water Plant | 22: Dakota Plains Chiropractic | 35: McLean Electric |
| 5: Church of God | 14: Garrison Veterinary | 23: Garrison Public High School | 36: WAPA Dept of Energy |
| 6: Garrison Elementary School | 15: City Hall/Fire/Police | 24: Peach Lutheran Church | 37: McLean Co Hwy Dept |
| 7: St. Nicholas Catholic Church | 16: US Post Office | 25: Benedictine Living Center Nursing Home | 38: USDA Farm Service Agency |
| 8: Wastewater Treatment Lagoons | 17: Schindler & Deis, OD | 26 - 27: Bulk Fuel - Cenex | |
| 9: Assembly of God Church | 18: Ottertail Power Co | 28 - 30: Farmers Union Elevator | |



McLean County

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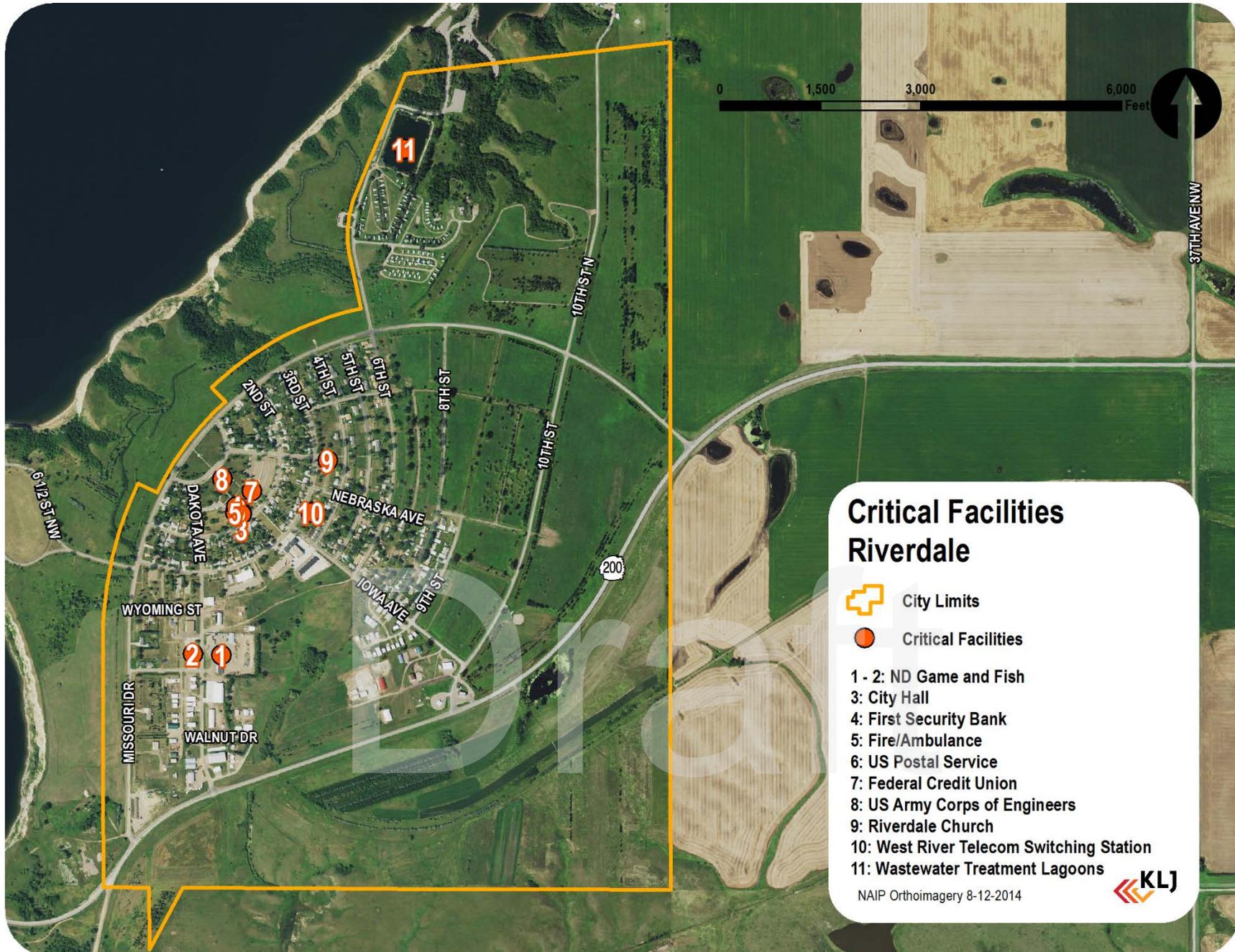
McLean County

Multi-Hazard Mitigation Plan



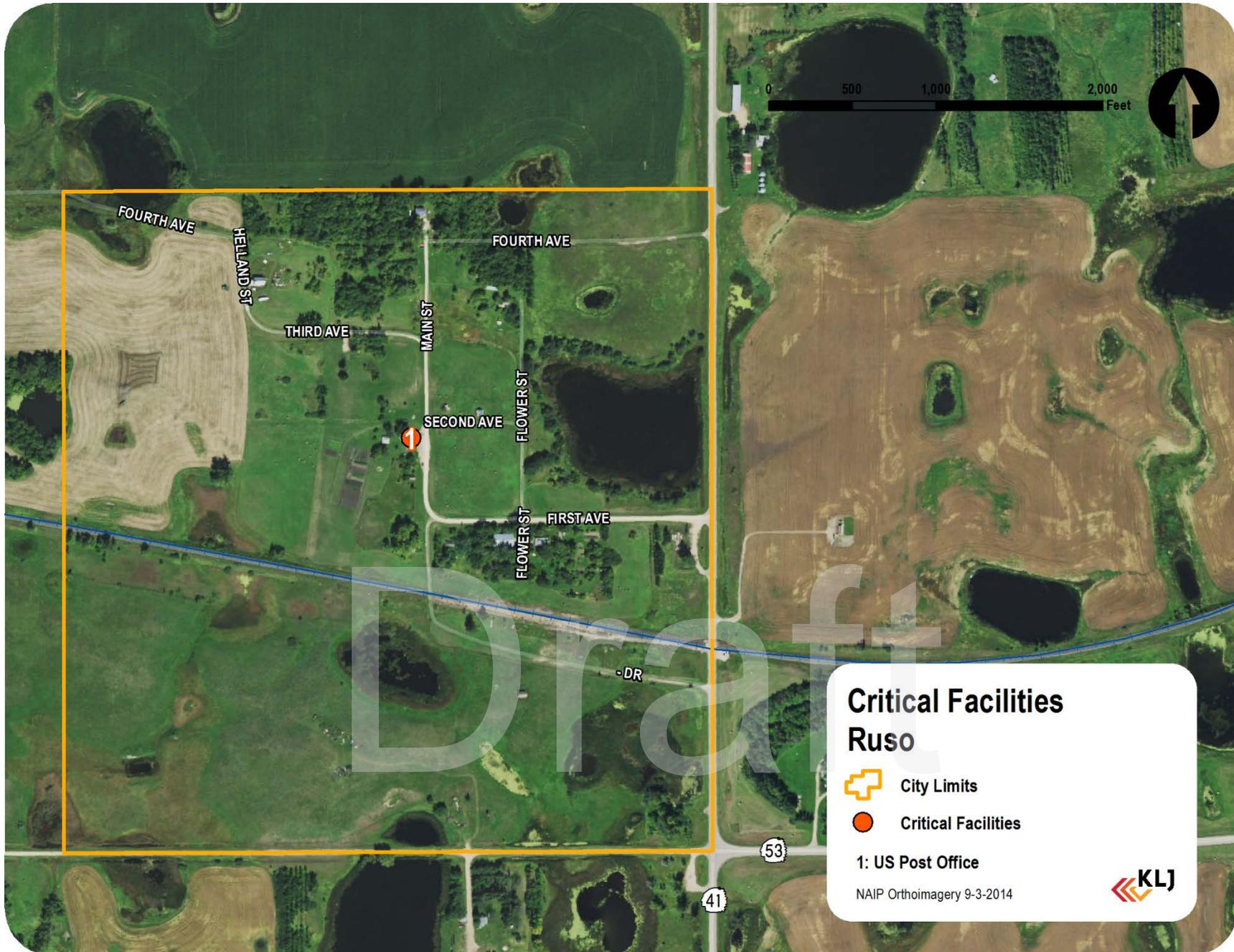
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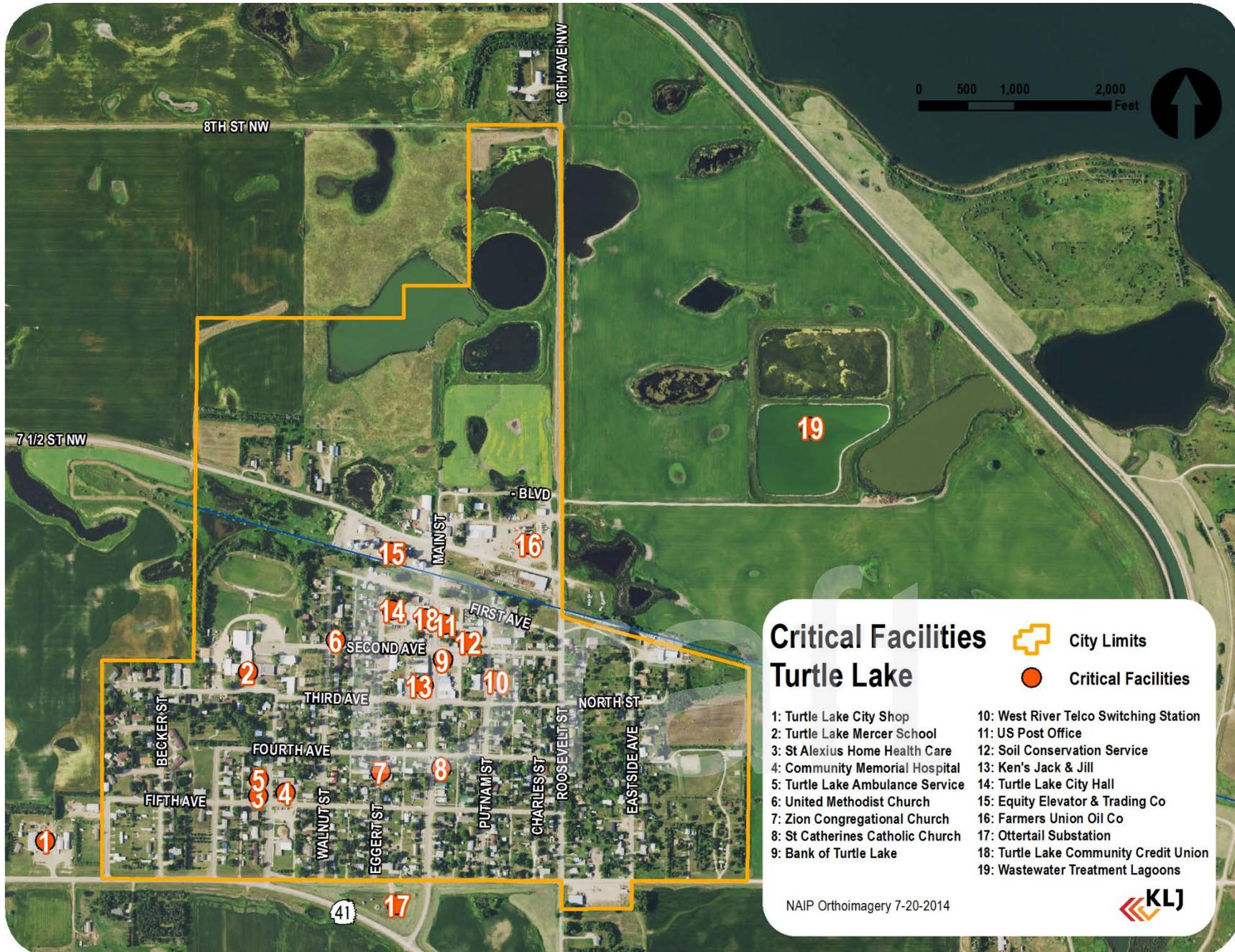
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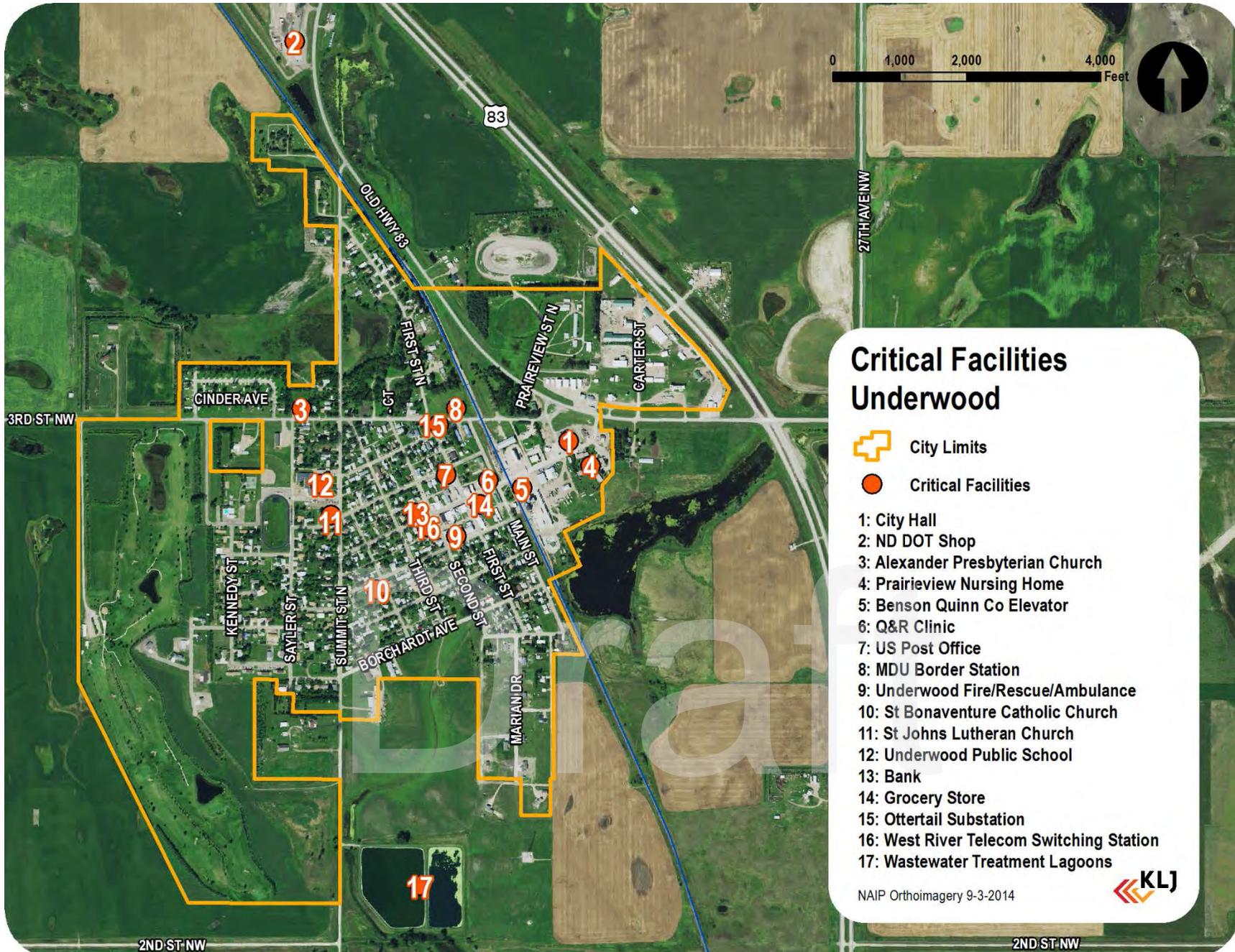
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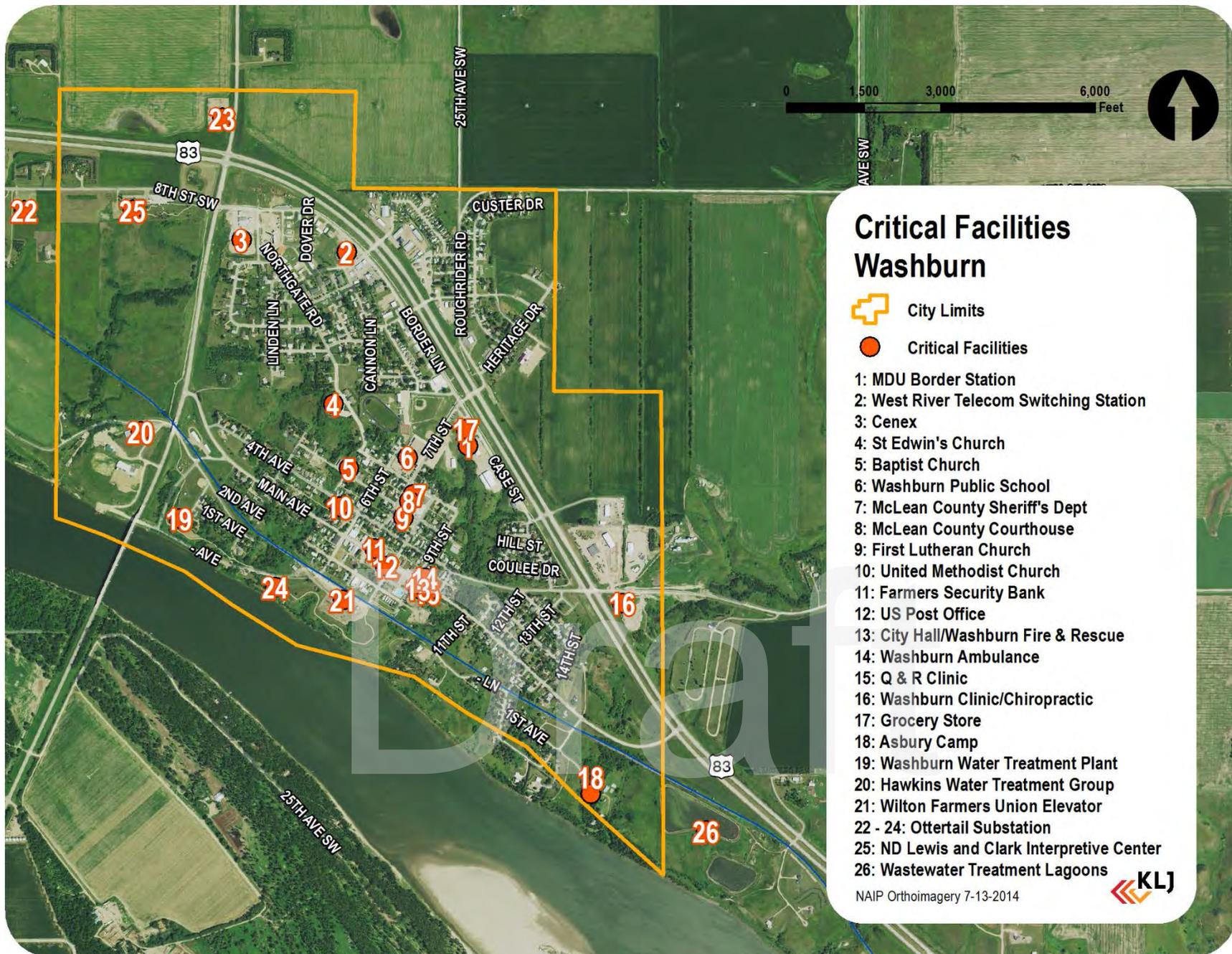
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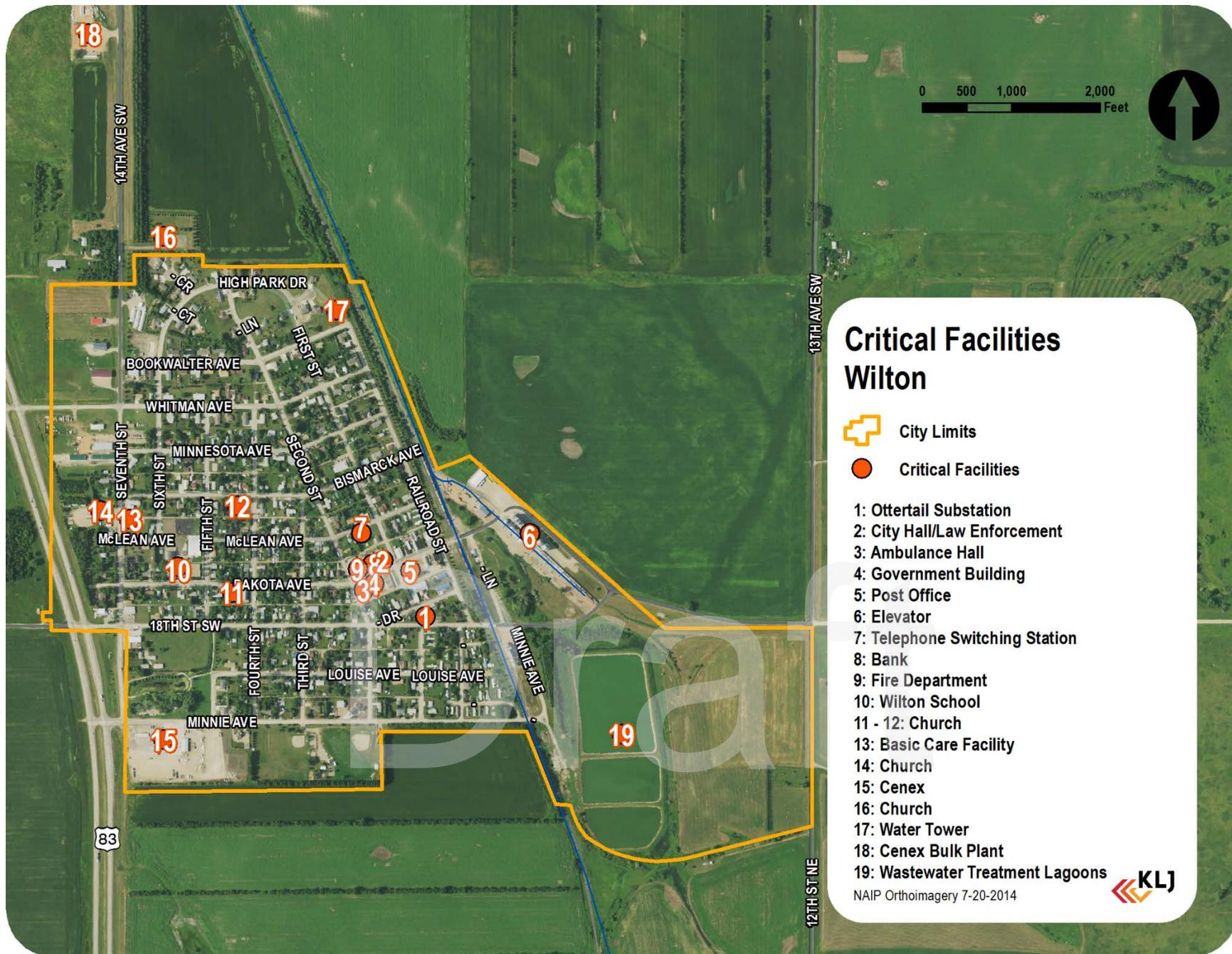
McLean County

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McLean County

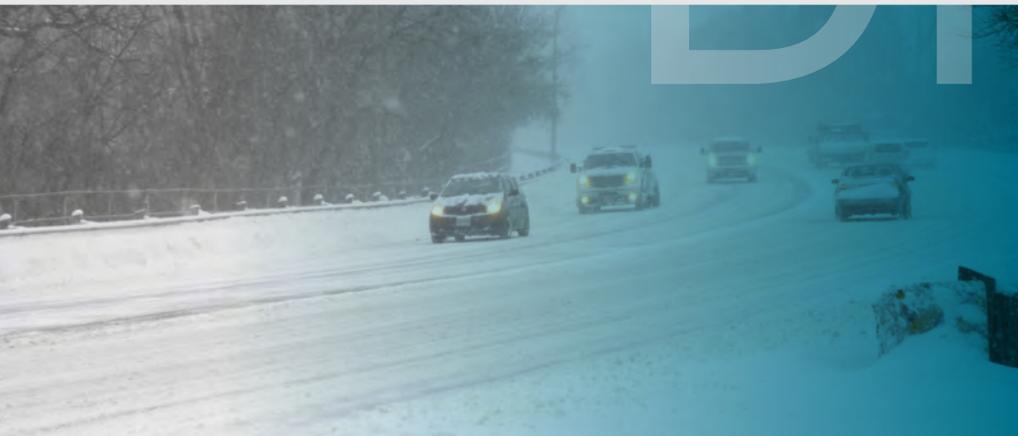
Multi-Hazard Mitigation Plan



APPENDIX E



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McLean County

Multi-Hazard Mitigation Plan

Appendix E: Mitigation Action Determination

Mitigation activities were discussed at a public meeting and Planning Team meeting. The public was also able to provide input on mitigation actions with the online survey. Activity selection included multiple steps. For the first step, goals were determined to help guide strategy selection. Following goal selection, the mitigation actions from the county's 2009 plan were reviewed. The result of the review is shown below.

In addition to the list of previously uncompleted actions, the consultant provided a list of recommendations for new action items. A refined list was developed using the preliminary list and other projects brought up during the meeting. The refined list was then developed into a priority action plan by discussing each item. The consultant provided assistance with ranking each project based on discussions at the Planning Team and public meetings. Items were scored based on 10 criteria that help to determine their future feasibility and effectiveness. The prioritization criteria are:

Life Safety - Does the item protect the life of residents?

Property Protection - Does the item protect public and personal property in the county?

Technical - Is the item technically feasible to implement?

Political - Is the item politically acceptable in the community?

Legal - Is the item legal to implement?

Environmental - Does the item have an impact on the environment?

Social - Is the item socially acceptable in the community?

Administrative - Does the jurisdiction have the administrative capacity to implement the item?

Local Champion - Does the item have a committed local champion?

Cost/Benefit - Does the benefit justify the cost?

A prioritization hierarchy was developed based on each item's total score. The action item prioritization scores are presented in the following table. Priorities were adjusted further based on comments received during the final public review period.

Note: Items in the following tables are ranked 0 to 3 (low to high)

Low: 20 or below
Moderate: 21 to 25
High: 26 or above

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McLean County

Multi-Hazard Mitigation Plan

Status of McLean County Mitigation Actions, 2009 Hazard Mitigation Plan

Mitigation Action	Status
Divert water away from lowland areas to reduce flooding on rural county roads	Partially completed, some mitigation still needed
Elevate roads, improve road drainage, install culverts, install riprap when applicable to help reduce flooding risk on rural roads	Partially completed, some mitigation still needed
Develop a GIS system that can be utilized to identify floodplain areas in the county	County is currently working on implementing a GIS system
Create resource list for equipment to be used during a flooding event	Completed for Garrison, no longer a countywide priority
Monitor saturated areas of the county and prohibit development in these areas	Completed, the County Water Board reviews development applications
Weather spotter training	Completed, held once or twice per year
Public education and awareness for summer storm	Completed, include in plan
Expand use of NOAA weather radios	County is implementing a phone alert system
Install living snow fences where needed	Not completed, no longer a priority
Winter storm public awareness and education	Completed, include in plan
Develop regulations that restrict burning, off-road travel and other activities that may contribute to wildfire during times of drought	Completed, county has burn ban regulations
Wildfire education and public awareness	Completed, include in plan
Promote Firewise Communities program	Completed, include in plan
Vegetation management/controlled burns	Completed
Public education about drought	Not completed, include in plan
Place an emphasis on water conservation	Not completed, no longer a priority
Implement drought monitoring efforts	Not completed, no longer a priority
Insect population control during times of drought	Not completed, no longer a priority
Remove homes from dam failure inundation areas	Not completed, no longer a priority
Prepare dam emergency action plans	Not completed, no longer a priority due to no county jurisdiction dams needing plans
Require emergency action plans for dams with more than 1,000 acre-feet of storage per the Century Code	Not completed, not a priority for the county, no dams with more than 1,000 acre-feet of storage and no dams are rated as high or moderate hazard
Develop a map of all Tier II sites in the county	Not completed, GIS information is available from EPA Region 8

McLean County

Multi-Hazard Mitigation Plan

Action Item Prioritization Scores												
	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Cost/Benefit	Total	Priority
Action												
Participate in NFIP workshop	0	1	3	3	2	3	3	3	1	3	22	Moderate
Coordinate with landowners to identify water sources for fire suppression	1	1	3	3	3	3	3	3	1	3	24	Moderate
Install generators at critical facilities	3	1	2	3	3	3	3	3	3	2	26	High
Improve inter-department radio communication	1	1	2	2	3	3	3	3	3	3	24	Moderate
Acquire and remove repetitive loss properties from the floodplain	0	1	2	1	2	3	1	2	1	1	14	Low
Drainage improvements and/or elevation for rural roads throughout the county	2	2	3	3	3	2	3	3	3	2	26	High
NFIP training for staff	0	1	1	2	2	3	2	2	1	1	15	Low
Participate in Firewise education program for homeowners and implement best practices during wildfire season	1	2	2	2	2	3	1	2	2	2	19	Low
Public education	1	1	2	2	2	3	1	2	2	1	17	Low
Install signage to identify emergency shelters	1	0	3	3	2	3	2	3	2	3	22	Moderate
Replace warning siren	2	0	3	3	3	3	3	3	3	3	26	High
Replace the Washburn drinking water intake along Missouri River	1	0	2	3	3	2	3	3	3	3	23	Moderate
Upgrade storm water system along Custer Drive	1	2	3	3	3	2	3	3	3	2	25	Moderate

McLean County

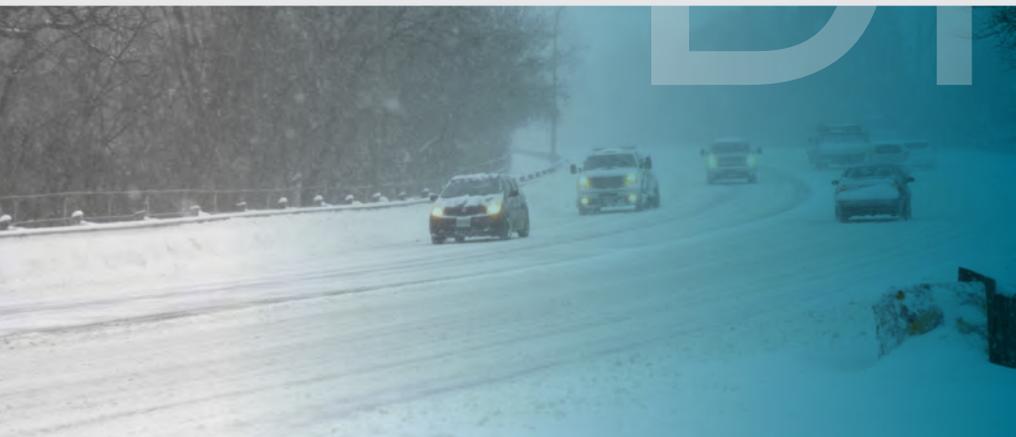
Multi-Hazard Mitigation Plan

	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Cost/Benefit	Total	Priority
Action												
Expand municipal storm water system into southern area of Garrison	1	2	3	3	3	2	3	3	3	2	25	Moderate
Develop insect control system during periods of standing water	2	0	2	3	3	2	3	3	3	2	23	Moderate
Install railroad crossing arms on 3rd Avenue SE	1	1	3	3	3	3	3	3	1	1	22	Moderate
Distribute weather radios to homeowners	2	0	2	3	3	3	3	3	3	3	25	Moderate
Remove culvert beneath old railroad tracks in Turtle Lake	1	2	3	3	3	2	3	3	3	2	25	High
Upgrade warning siren control system	2	0	3	3	3	3	3	3	3	2	25	Moderate
Elevate County Road 27 near Turtle Lake	2	2	3	3	3	2	3	3	3	2	26	High
Upgrade municipal storm water system in Turtle Lake	2	2	3	3	3	2	3	3	3	2	26	High
Require hazardous materials facilities to provide status reports to Underwood fire department	2	1	3	3	3	3	3	3	3	3	27	High
Address overflow issues from pond north of the city	1	2	3	3	3	2	3	3	3	2	25	Moderate
Conduct engineering study to identify solutions for flooding issues on the city's west side	2	2	3	3	3	2	3	3	3	2	26	High
Replace culverts that pass through coulee on east side of town	2	2	3	3	3	2	3	3	3	2	26	High

APPENDIX F



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McLean County

Multi-Hazard Mitigation Plan

Appendix F: Monitoring Forms

Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action/Project Title		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Project Status	<input type="checkbox"/> Project completed <input type="checkbox"/> Project canceled <input type="checkbox"/> Project on schedule <input type="checkbox"/> Anticipated completion date: _____ <input type="checkbox"/> Project delayed Explain _____	

Summary of Project Progress for this Report Period

1. What was accomplished for this project during this reporting period?

2. What obstacles, problems, or delays did the project encounter?

3. If uncompleted, is the project still relevant? Should the project be changed or revised?

4. Other comments

Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Planning Team undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision-maker priorities related to hazard mitigation?	
	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFP participation changed in the participating jurisdictions?	
Capability Assessment	Has a natural and/or technical or human-caused disaster occurred?	
	Should the list of hazards addressed in the plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
Risk Assessment	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	

McLean County

Multi-Hazard Mitigation Plan

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Worksheet 7.2 Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	
	Are there new funding sources to consider?	
Plan Maintenance Procedures	Have elements of the plan been incorporated into other planning mechanisms?	
	Was the plan monitored and evaluated as anticipated? What are needed improvements to the procedures?	

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