OLIVER COUNTY

Multi-Hazard Mitigation Plan

MARCH 2021




NDDES Homeland Security State Radio

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Chapter 1 : Introduction

Hazard Mitigation Planning

Natural and human-caused hazards have a direct impact on residents and property in Oliver 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.
- Communicating 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 Assistance Program (HMA). HMA offers three programs to help fund implementation of mitigation projects; the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Grant Program (PDM) and Flood Mitigation Assistance (FMA).

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

This plan is an update of Oliver County's 2014 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.

Table 1.1 - Adopting Jurisdictions

Jurisdiction	Adoption Date
Oliver County	2-26-2021
Center	3-1-2021

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.

The details of the planning process are described in the following steps:

1. A kickoff meeting with Planning Team was held to explain the process and purpose of multi-hazard mitigation planning, and to introduce the hazards that were going to be evaluated.
2. Hazard/Risk/Vulnerability meetings with Planning Team and with Center City Council were held to discuss the past and potential impacts of hazards.
3. Public involvement activities included a public meeting on the proposed plan and hosting a booth and soliciting citizen input via a questionnaire at the annual Kris Kringle Event. Notice of public meetings was advertised in the local newspaper.
4. Consultant prepared a partial draft plan for review and to identify needed additional information.
5. Planning Team meetings to discuss questions for the draft.

6. Edits were made to complete the draft plan.
7. A Public Meeting was held to review the draft plan.
8. The City Council and the Board of County Commissioners reviewed the draft plan and approved it pending NDDES/FEMA approval.

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 meetings or completed the survey.

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

Chapter 2 : Study Area Background

Jurisdictional Information

Oliver County is located in west central North Dakota, northwest of the Bismarck-Mandan metropolitan area. Its total area is 467,840 acres, making it smaller than the state's median county size of 739,000 acres. The county includes 1 incorporated city: Center. Center has a population of 584. The county has a few unincorporated communities including Hensler, Hannover, Ft Clark, Price, and Sanger. Their total population is estimated to be 50 and they are primarily included in this plan as reference points.

A general map of the county, including major features and neighboring jurisdictions, is shown in Figure 2.1. Major roadways include State Highways 25, 31, 48, and 200. The county is also served by one railroad line which roughly parallels the Missouri River from the southeastern corner to the north central part of the County.

Population and Demographics

Summarized demographic information for Oliver County and North Dakota is shown in Table 2.1. The county is generally older than the state overall, with a median age of 50.6 and 26.7 percent of residents at least 65 years of age. The county's population density of 2.4 persons per square mile is less than half the statewide rate. Nearly all residents identify themselves as White not Hispanic. The county's median income is less than the state's while the poverty level is lower than the state's.

Table 2.1 - Oliver County Demographics

	Oliver County	North Dakota
Population	1,952	755,393
Persons under 5 years	5.2%	7.2%
Persons under 18 years	18.9%	26.1%
Persons 65 years and over	26.7%	14.5%
Median Age	50.6	35.1
Persons per square mile	2.4	11.7
White not Hispanic	94.3%	86.7%
Hispanic or Latino	1.6%	3.7%
American Indian or Alaska Native	0.7%	5.5%
Black or African American	0.8%	3.1%
Asian	2.2%	1.6%
Two or More Races	1.8%	2.6%
Foreign born	1.9%	2.7%
Language other than English spoken at home	3.7%	5.6%
High school graduates, age 25+	96.0%	92.0%
Median household income	$53,295	$59,114
Persons below poverty level	10.5%	11.2%
Average household size (persons)	2.22	2.33

Source: US Census Bureau; 2017 Annual Estimate used for population, age and race/ethnicity; 20013-2017 American Community Survey used for other demographic information

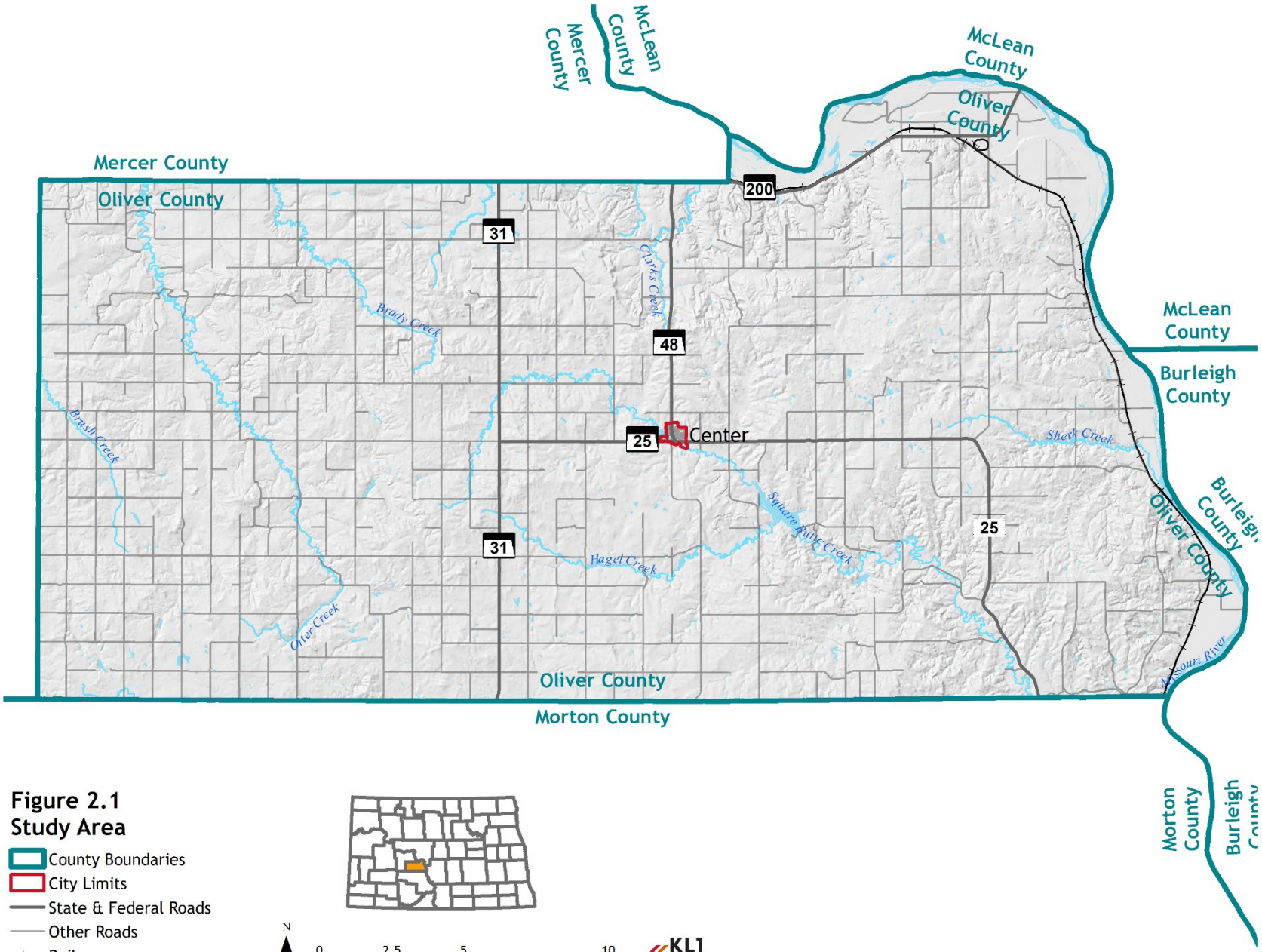
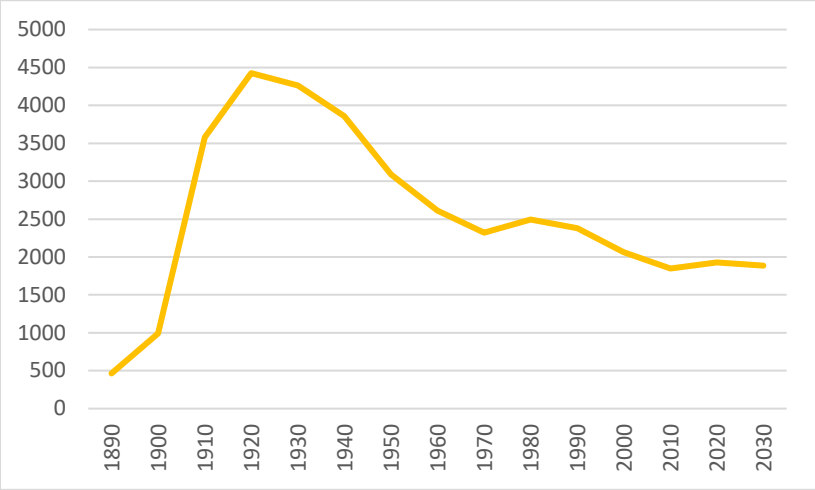


Figure 2.1
Study Area

- County Boundaries
- City Limits
- State & Federal Roads
- Other Roads
- Rail

Population trends for the county are shown in Figure 2.2. The county generally experienced declining population from 1920 to present day.

Figure 2.2 Historical and Projected Population



Sources: US Census Bureau; Woods and Poole

More detail about population trends in the county and in Center are summarized in Table 2.2. Overall, the County lost nearly 12% from 2000 to 2010, but has since gained back almost 5% from 2010 to 2017.

Table 2.2 - Population Trends					
City	**2000**	**2010**	**% Change 2000-2010**	**2017**	**% Change 2010-2017**
Center	678	571	-15.8%	584	2.3%
Rural County	1387	1275	-8.1%	1356	6.4%
County	2065	1846	-11.9%	1940	4.8%

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

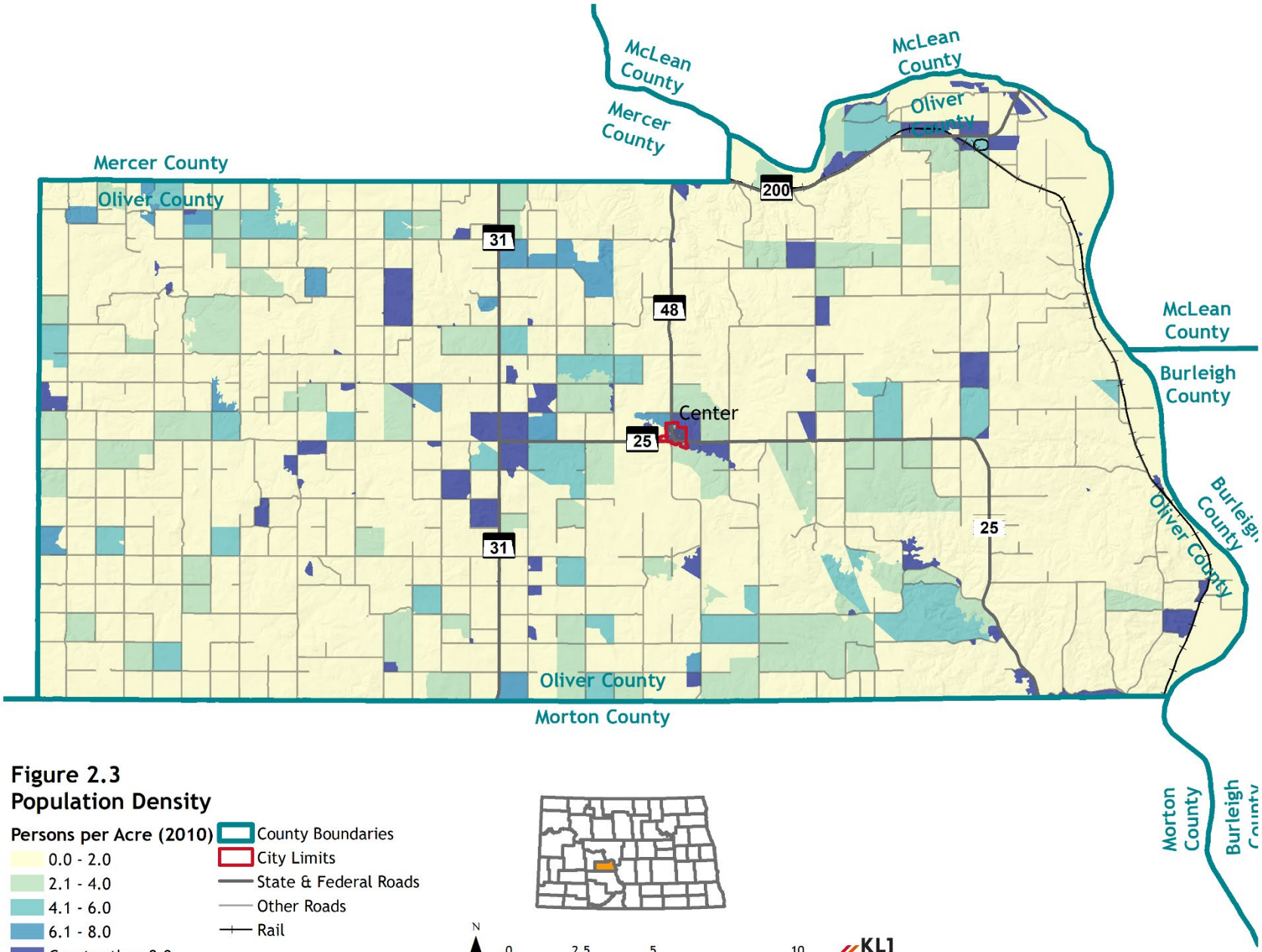


Figure 2.3
Population Density

Economy

The agriculture and energy production industries are the leading forces of the Oliver County economy. The agriculture industry is tracked by annual survey through the National Agricultural Statistics Service and Census of Agriculture data. Summarized survey information is shown in Table 2.3. Spring wheat is the most common crop, accounting for over 50 percent of the county's harvested acreage in 2017. Cattle and calves make up most of the county's livestock industry. The USDA Census of Agriculture indicates that in 2017 the total value of crops sold in the county was $21,911,000 and the total value of livestock was $25,415,000.

Table 2.3 - Oliver County Agriculture Summary

Crop (Most Recent Year)	Acres Harvested	Production
Spring Wheat (excl Durum) (2017)	31,389	934,131 bu
Durum Wheat (2017)	2,267	50,721 bu
Corn, Grain (2017)	15,620	1,612,480 bu
Sunflower (2017)	3,794	7,432,049 lb
Barley (2017)	2,353	91,800 bu
Livestock (2017)	**Inventory**	
Cattle and Calves	33,130	
Sheep and Lambs	405	

Countywide workforce data was unavailable from the Job Service North Dakota Labor Market Information Center. Based on LEPC estimates, the county's largest employers are shown in Table 2.4. A majority of the top employers were from energy, government, education and health care.

Table 2.4 - Oliver County Largest Employers, 2017

Rank	Employer	Industry
1	BNI Mining Company	Energy
2	MinnKota Power Company	Energy
3	Center-Stanton School District	Education
4	Oliver County	Government
5	City of Center	Government
6	Coal Country Community Health	Healthcare

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 Oliver County are on file at the Emergency Manager's office. Critical facilities are also discussed in general terms in each hazard profile found in Chapter 3.

Climate and Weather

Aggregated weather statistics for the county are shown in Table 2.5. Weather extremes in the county are shown in Table 2.6. The NWS Cooperative Network Weather Station near Center 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.

Table 2.5 - Oliver County Aggregated Weather Statistics

	Center			
	Temperature (°F)		**Precipitation (In.)**	**Snow Fall (In.)**
	Avg Daily Max	*Avg Daily Min*	*Avg Monthly*	*Avg Monthly*
Jan	21.7	-0.6	0.48	5.5
Feb	26.2	4.1	0.56	5.3
Mar	38.0	15.2	0.73	5.3
Apr	55.2	29.0	1.66	3.0
May	67.7	40.2	2.51	0.5
Jun	76.1	49.8	3.23	0.0
Jul	83.5	54.9	2.58	0.0
Aug	82.6	52.5	1.91	0.0
Sep	71.4	42.1	1.74	0.1
Oct	58.4	31.2	1.03	1.4
Nov	39.4	16.9	0.64	4.9
Dec	26.9	5.5	0.52	4.7
Ann	*53.2*	*28.1*	*17.81*	*33.0*

Table 2.6 - Oliver County Weather Extremes

Highest Max Temperature	110° F	8/5/1941
Lowest Min Temperature	-42° F	1/18/1950
Highest Daily Precipitation	5.82"	7/18/1969
Greatest Snowfall	16.0"	10/29/1991

Chapter 3 : Hazard Risks and Vulnerabilities

Hazards Overview

Oliver County is subject to numerous natural and human-caused or technological hazards. Many hazards are capable of creating significant damage and having a negative local economic effects.

Table 3.1 lists Disaster Declarations for Oliver County from 1953 to 2018. There were 59 Presidential Disaster Declarations for all of North Dakota during the period; 17 included Oliver County.

Table 3.1 – Oliver County Disaster Declarations, 1993-2018

Year	Declaration	Hazard(s)
2011	EM 3318	Flooding
2010	DR 1901	Severe Winter Storm
2010	DR 1879	Severe Winter Storm
2009	DR 1829	Severe Storms, Flooding
2005	DR 1616	Severe Winter Storm and Record Snowfall
2001	DR 1376	Flooding
2000	DR 1334	Severe Storm (Statewide)
1997	DR 1174	Severe Winter Storms, Severe Flooding
1997	DR 1157	Severe Winter Storms and Blizzards
1996	DR 1118	Severe Storms, Ice Jams, and Flooding
1994	DR 1032	Severe Storms and Flooding
1993	DR 1001	Severe Storms and Flooding
1979	DR 581	Storms, Snowmelt & Flooding
1978	DR 554	Storms, Ice Jams, Snowmelt & Flooding
1970	DR 287	Severe Storms and Flooding
1969	DR 256	Flooding
1966	DR 220	Severe Storms and Flooding

The 2018 State of North Dakota Enhanced Mission Area Operations Plan served as the basis for selecting the hazards profiled in this chapter. Space Weather, Civil Disturbance, Cyber Attack, and Criminal Terrorist National Attack are profiled as separate hazards in the statewide plan; however, in this plan these hazards are profiled in a limited manner due to the low perceived level of impact or the perceived low potential to mitigate impacts. Wildland Fire and Urban Fire (including structural collapse) were combined into a single Fire hazard in the 2018 draft Statewide Plan; but they are retained as separate hazards in this very rural county due to the very different impacts and responses needed for each.

Profiled natural hazards:

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

Profiled human-caused/technological hazards:

- Dam Failure
- Hazardous Materials Release
- Infectious Diseases and Pest Infestation
- Transportation 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 impact of each event to determine overall hazard risk. These terms are defined similarly to their use in the 2018 draft State of North Dakota Enhanced Mission Area Operations Plan. Probability is the likelihood that the hazard event will occur within the county in future years. Impact is the percentage of residents and property, and the extent to which critical facilities, could be significantly affected by the hazard event in a worst-case scenario. Criteria used to determine probability, impact and overall risk class are shown below and further detailed in Appendix C. When possible, historical data from previous events was utilized to determine probability. Impact was assessed based primarily on significant proximity to a hazard. Risk class is determined for the rural county (unincorporated areas) and each incorporated city.

Probability

- *Unlikely:* not likely to occur even once in 100 years
- *Possible:* likely to occur at least once every 100 years – comparable to 100 year flood event – having a 1% annual chance of occurring
- *Likely:* likely to occur at least once every 10 years
- *Highly Likely:* Nearly 100% likely to occur in any given year

Impact

- *Negligible:* less than 10% of jurisdiction affected with no critical facilities affected
- *Limited:* at least 10% but less than 25% of jurisdiction affected or one critical facility affected for one week or less
- *Critical:* 25-50% of jurisdiction affected or at least one critical facility affected for more than one week, but less than 30 days
- *Catastrophic:* more than 50% of jurisdiction affected or at least one critical facility affected for 30 days or more

Risk Class

- *Low:* impacts are negligible or limited at the same time the probability is less than 10% probability in next year
- *Moderate:* despite negligible or limited impacts, the higher probability of an event raises the risk class above low, or although very low probability, the level of impact raises the risk class above low
- *High:* high levels of impact raise the risk class to high when the event probability is 1% or more in 100 years

Table 3.2 - Risk Class Determination Criteria					
		Impact			
		Negligible	Limited	Critical	Catastrophic
Probability	Unlikely	Low	Low	Moderate	Moderate
	Possible	Low	Moderate	High	High
	Likely	Moderate	Moderate	High	High
	Highly Likely	Moderate	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 Oliver County, the database includes information about flooding, severe summer weather and severe winter weather. Where possible, statistics for other hazards are provided by a variety of sources, as noted in each corresponding profile.

Drought

All Jurisdictions	*Overall Risk:* High *Probability:* Likely (once per decade, approximately 10 percent annual probability) *Impact:* Critical (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

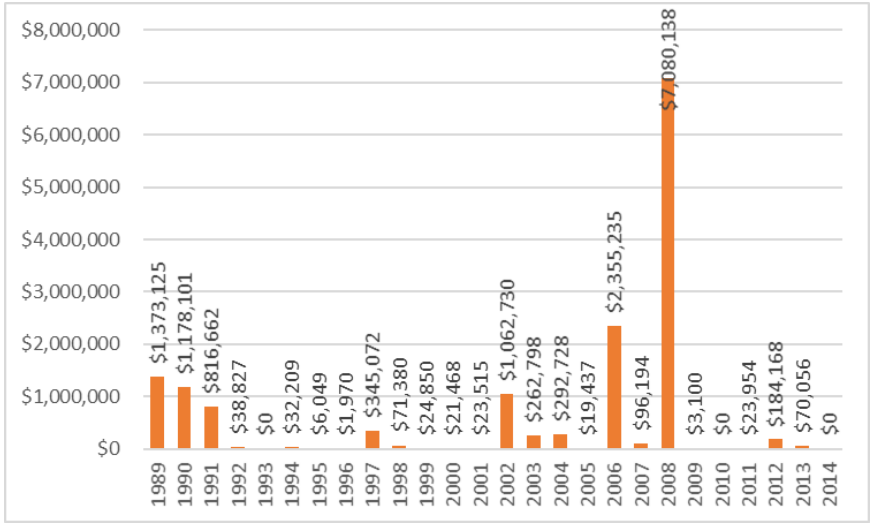
Drought is generally defined as a deficiency of precipitation over an extended period. If severe enough, this deficiency has potential to reduce soil moisture and water below the minimum necessary for sustaining plant, animal and human life systems. It is a normal, recurrent phenomenon that takes place 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, and 2002 through 2008. **All jurisdictions in the county are at equal risk of drought.**

Droughts are often measured by impacts, most notably agricultural damage and municipal water supply shortage. The impacts are highly variable based on water supply source, 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

Drought conditions are generally widespread and involve the entire county. Several drought events in Oliver County occurred between 1989 and 2014. The most recent was in 2008, and was by far the most significant drought in recent history.

Figure 3.1 on Federal Indemnity Payments for Drought Related Losses



Vulnerability

Population

- Drought has no direct impact on human life, but it **greatly increases the risk of wildland fire**, 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 Center monitoring station) is 110 degrees Fahrenheit recorded in August 1941**. Elderly persons are at increased risk of heat-related illness. According to the most recent American Community Survey estimates, approximately **500 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.
  - Center: 170 residents (29 percent)
  - Rural Oliver: 330 residents (24 percent)
- Prolonged drought could affect water supplies. Oliver County is part of the Southwest Pipeline Project, served by the Zap water treatment plant, with Lake Sakakawea as the water source. Most residents in the County are served by that rural water system. The risk of drought causing a loss of this water supply is considered very remote. Bottled water could be brought in as an emergency measure, but a lack of household water could create health and sanitation issues for residents.

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 3.1, are an indicator of drought-related agricultural losses. **Since 1989, the year with the greatest payments was 2008, with over $7 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 2014 statewide Multi-Hazard Mitigation Plan included information about crop insurance payments from the USDA Risk Management Agency. Drought-related **crop insurance payments in Oliver County from 2005 to 2014 totaled $9.8 million**. Based on a statewide rate of 89 percent of crops being insured, **total estimated damages for the county were $11.1 million**.
- It is difficult to measure direct economic loss for livestock producers. Cattle and calve 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 wildland fire and may create water shortages that inhibit adequate fire response. Structure vulnerability from wildland fire 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.

- Extension of rural water systems to non-participating locations is dependent on availability of funds, level of interest by unserved locations, and programming priorities.

Existing Capabilities

- The USDA Farm Service Agency has a field office located in Center, and North Dakota State University Extension has a field office located in Center. 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.
- Center has an abandoned water well not currently in use. If a water treatment system such as a chlorinator were brought in, it could possibly be brought back online.

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.

Flood

Rural County	*Overall Risk:* Moderate *Probability:* Likely *Magnitude:* Negligible
Center	*Overall Risk:* Moderate *Probability:* Likely *Magnitude:* Limited
Seasonal Pattern	March – October
Primary Impacts	Agricultural loss (crops, livestock) Blocked or washed out roads Economic loss Human loss and injuries Localized evacuation Power loss Property damage or loss Release of hazardous materials

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 the National Flood Insurance Program (NFIP) was created 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. Typically, 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

- Oliver County was included in **11 flood-related Presidential Disaster Declarations** between 1953 and 2018.
- The most significant flooding issues in the county are localized ponding and inundated roadways resulting from heavy precipitation, snowmelt and runoff.
- Recent flood events in Oliver County are summarized in Table 3.3. Recently, t**he county has averaged nearly one flood event every two years**. Flood event classification criteria and a detailed listing of events can be found in Appendix C.

Table 3.3 - Flood Events in Oliver County,1996-2018

Flood Events	Event Days*	Annual Probability	Event Days per Year
Total	*9*	*40.9%*	*0.4*
Flood	6	27.3%	0.3
Flash Flood	3	13.6%	0.1

**Number of days with a reported event (there are additional unreported events)*
Source: National Climatic Data Center Storm Events Database

- The National Climatic Data Center Storm Events Database includes brief summaries of significant weather events. A

selection of recent flood events within Oliver County are summarized below.

- *August 30, 2002.* Heavy rain of over 5 inches resulted in flooded county roads creating deep cuts.
- *May 7, 2005.* Flooding caused washed out roads and deep cuts at Cross Ranch State Park.
- *March 6, 2009.* Heavy snowfall in central North Dakota caused widespread spring flooding. In Oliver County, roads were flooded resulting in $88,000 of damages.
- *April, 2009.* Continued flooding caused an additional $99,000 in damages
- *June 2, 2011.* Severe widespread flooding in North Dakota caused $500,000 in damages in Oliver County.
- *June 12, 2011.* Continued flooding caused an additional $20,000 in damages

- The National Climatic Data Center Storm Events Database categorizes storm events by location**. Between 1996 and 2018 there were nine flood event days in the County.**
- **The most common impact on structures in the county is seepage into basements due to saturated soil and/or high water tables**.
- FEMA Flood Insurance Rate Maps (FIRMs) were established or updated for the county in 1987 and the City of Center in 1990. These maps show specified areas as Zone A which have a 1% annual chance of flooding. The FIRMs for the county are shown in Figures 3.2 and 3.3. The recently completed NDRAM mapping project illustrates additional areas potentially at risk of flooding. Areas identified as having a 1% annual chance of flooding are illustrated in Figures 3.4 and 3.5. New flood risk data is being updated by FEMA but has not been completed to date.
- In the past, Center experienced localized flooding issues during heavy rain due to inadequate drainage and development in areas of potential flooding. However, recent drainage improvements have eliminated this issue.

Figure 3.2 – Oliver County FIRM Panel 1 of 2

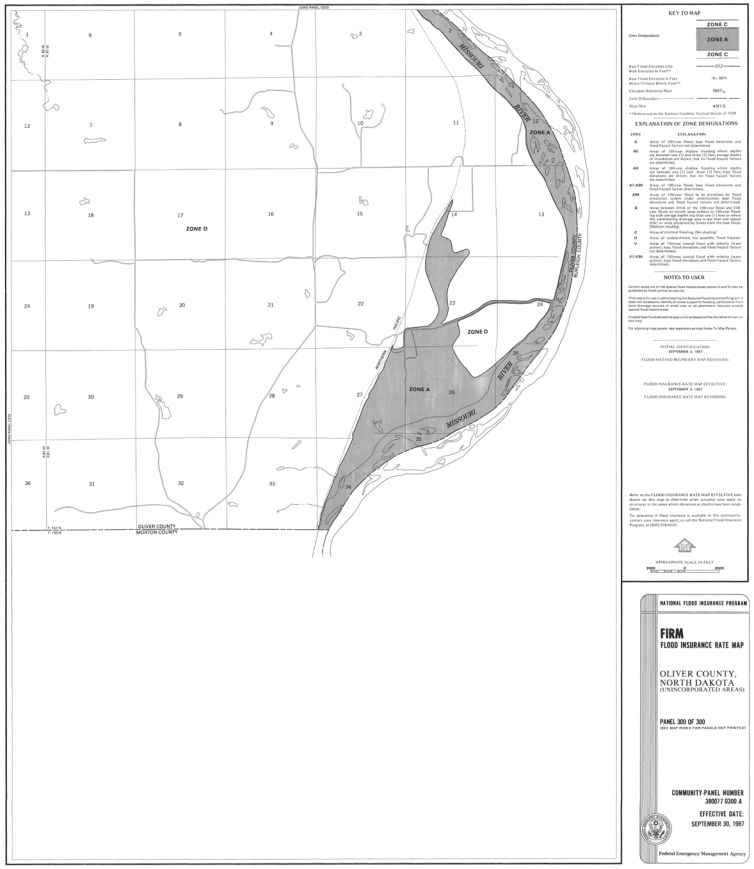


Figure 3.3 – Oliver County FIRM Panel 2 of 2

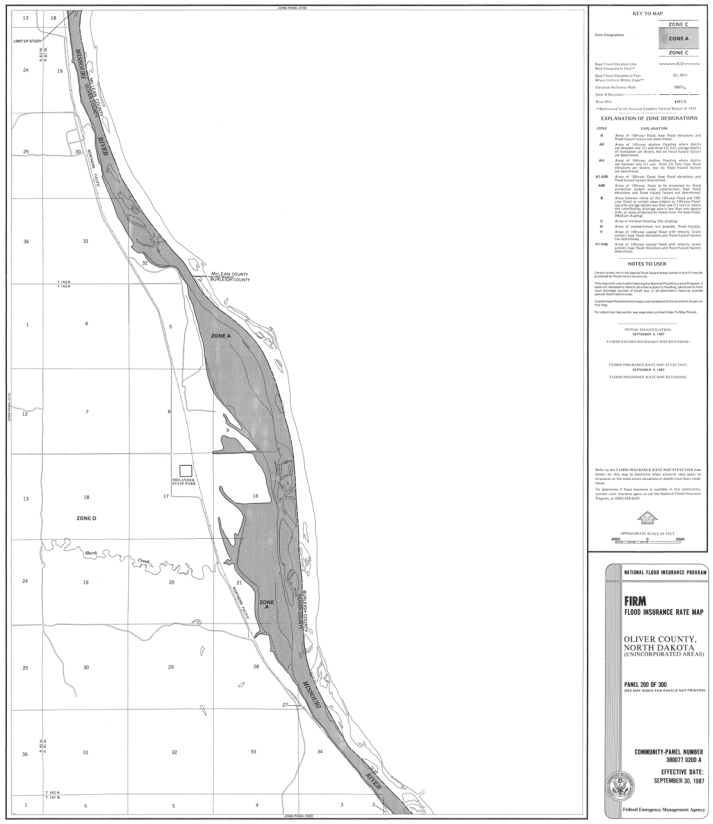


Figure 3.4 – Oliver County NDRAM Map – 1% Annual Chance

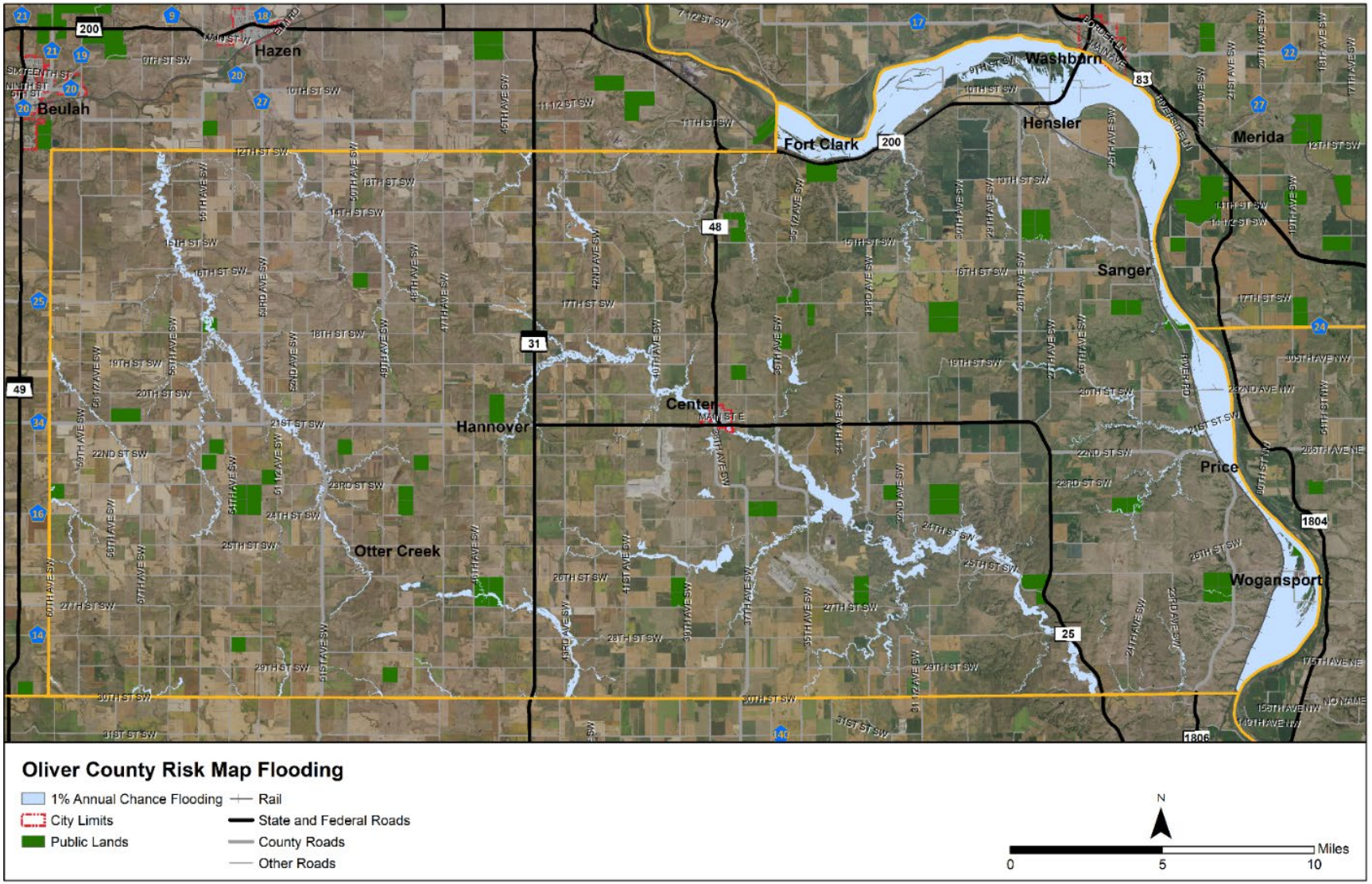
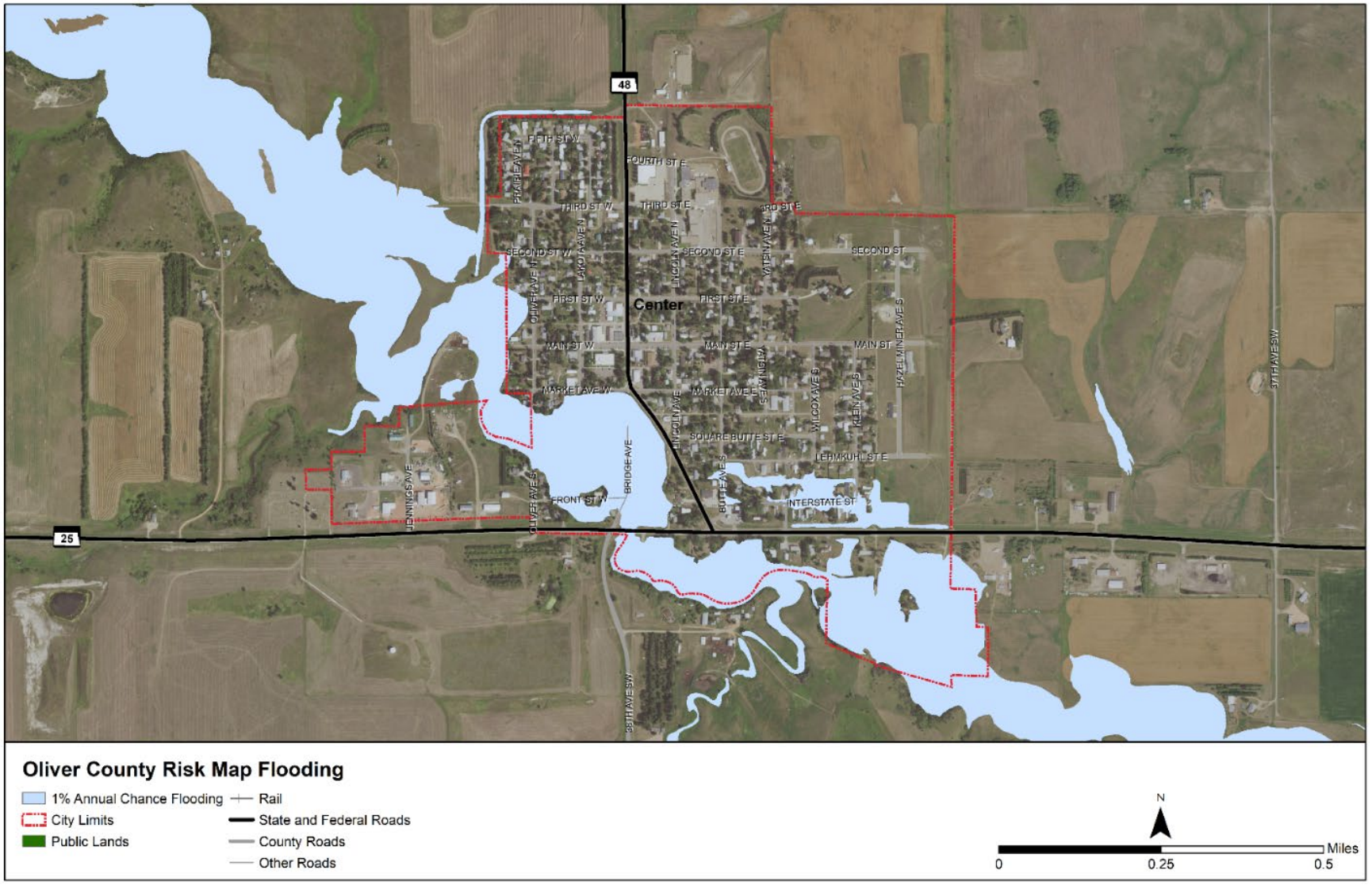


Figure 3.5 – Center NDRAM Map – 1% Annual Chance



Vulnerability

Population

- A detailed flood insurance study has been completed for Oliver County. The County FIRM mapped locations with a 1% annual chance of flooding contain 17 residences with a total of 24 residents. It is estimated that approximately 48 people residing in 24 residences in the City of Center with a 1% annual chance of flooding.
- The NDRAM project information may demonstrate that more residents are vulnerable to a 1% annual chance event, but no specific numbers are available.
- 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 Oliver County LEPC estimates that there are 3 critical facilities located within the designated 100 year floodplain for Center. No critical facilities outside the City are known to be in the designated 100 year floodplain.

Property

- The 2013 statewide Multi-Hazard Mitigation Plan includes information about crop insurance payments from the USDA Risk Management Agency. Flood-related crop insurance payments in Oliver County from 2003 to 2012 totaled $6.3 million. Based on a statewide rate of 89 percent of crops being insured, total estimated damages for the county were $7.1 million. Over a ten-year period this results in an annualized loss of $700,000.
- The most significant flooding event in terms of recorded damages since 1986 was heavy snow and snowmelt runoff in 2009. The corresponding DR-1829 FEMA expense report total over $912,000 in damages in Oliver County.
- Repetitive loss properties are tracked for communities that participate in the NFIP. There are no repetitive loss properties in Oliver County.

Future Development

- According to the FEMA Community Status Book, Center and Oliver County participate in the NFIP and have floodplain regulations that limit future growth in high risk areas.

Existing Capabilities

- Center and Oliver County have floodplain regulations and are participants in the National Flood Insurance Program. The County is currently waiting on FEMA to obtain updated flood risk maps.

Key Issues and Potential Action Items

- *Key Issue*: Oliver 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*: Investigate opportunities to remove residences and major structures at risk of flooding in Center.
  - *Potential Action Item*: Non-participating jurisdictions consider joining the NFIP.
  - *Potential Action Item*: Use NDRAM information to identify potential flooding risks to roads and property, and evaluate opportunities to mitigate potential impacts.
- *Key Issue*: Roads and bridges in the county are sometimes 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.
- *Potential Action Item:* Upsize culverts at road locations with higher risk of inundation or washing out.

Geologic Hazards

All Jurisdictions	*Overall Risk:* Low *Probability:* Unlikely (the county is in a low probability area for a significant earthquake and a moderate susceptibility landslide area; sinkhole risk is undefined) *Magnitude:* Negligible (no identified risk locations; 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 Power loss Property damage or loss Release of hazardous materials

Hazard Profile

Geologic hazards include landslides, earthquakes, sinkholes, and volcanic eruptions.

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 known for earthquake activity; however, many small earthquakes may occur throughout the state.

The USGS defines a sinkhole as a depression in the ground that has no natural external surface drainage. The primary cause of sinkholes is typically the dissolution of soluble rock by groundwater. This creates underground spaces. If there is not enough support for the land above the spaces, sudden collapse of the land surface can occur.

Local Risk

The risk of geologic hazards in Oliver County is low. The following details summarize probability of each hazard type occurring in the County.

- Figure 3.9 shows levels of potential earthquake hazard in the contiguous United States.

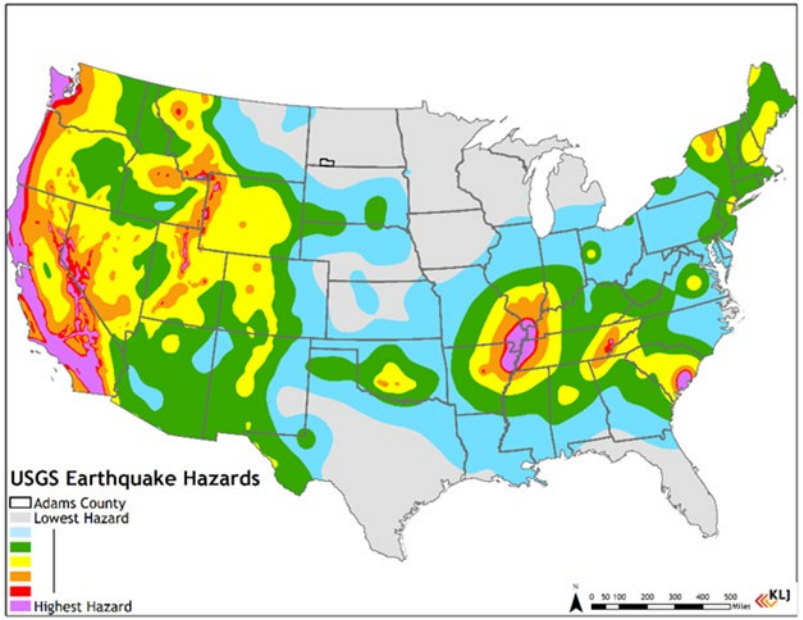


Figure 3.9 – Earthquake Hazards

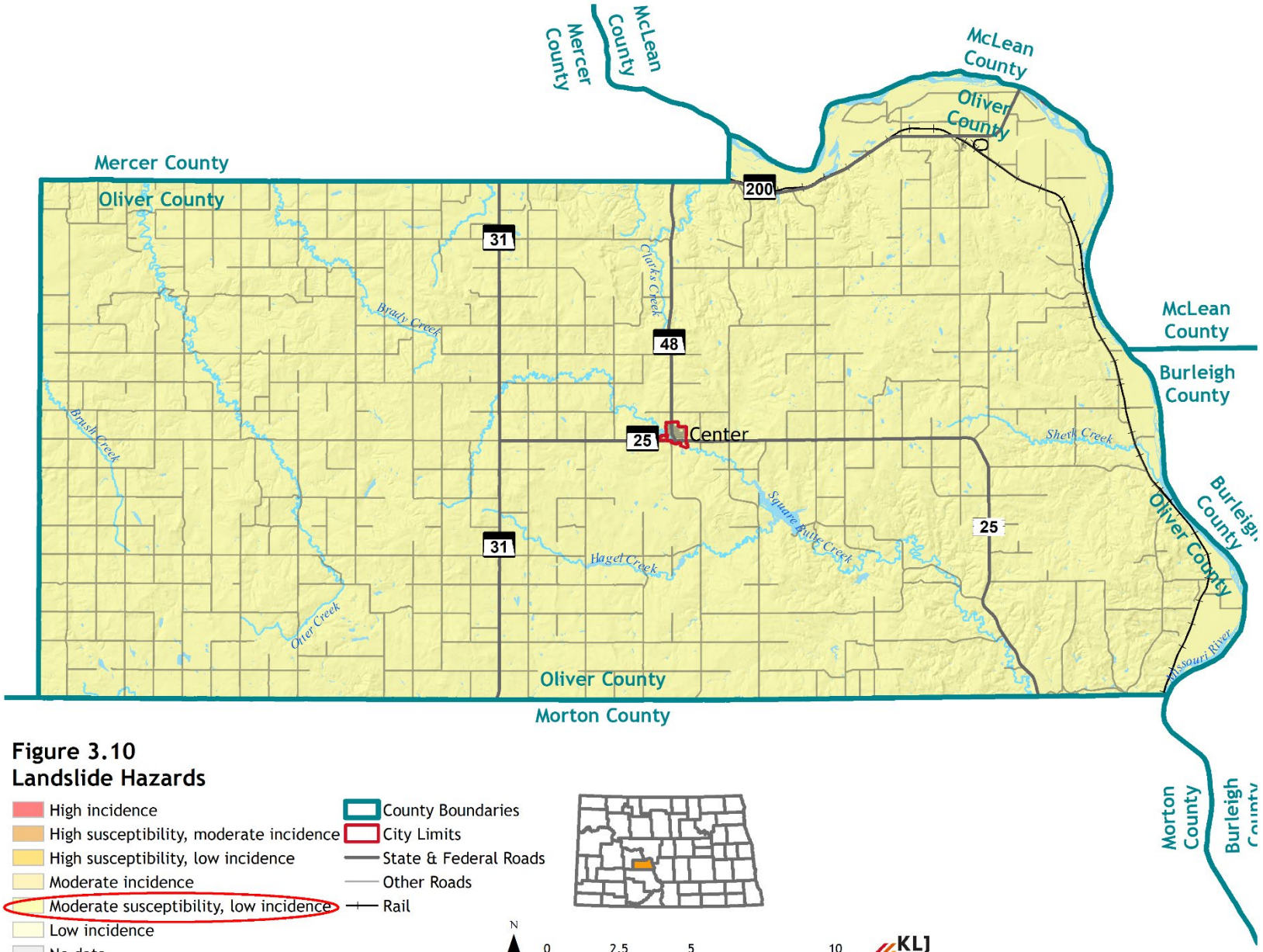


Figure 3.10
Landslide Hazards

- **Oliver 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 3.10 illustrates that Oliver County is in a **moderate susceptibility/low incidence landslide** area according to the USGS. It is important to note that these areas are delineated at a national scale and not intended for precise analysis. There is no history of a landslide in Oliver County causing significant damage.
- In Oliver County, there are no known sinkholes or known underground coal mining sites that may lead to sinkholes.

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 2000 Decennial Census an estimated 174 housing units in the county were built before 1940. Applying the county's average household size of 2.22 persons, **there are approximately 383 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.
- All residents live within the moderate-low susceptibility landslide area. It is important to note that this area is delineated at a national scale and not intended for precise analysis. There is sufficient terrain relief in Oliver County that suggest landslides are feasible. **However, no known residents are at risk of landslides.**
- There are no known instances of residences being located in the vicinity of past coal mining activity. Therefore, there is no actual population vulnerability to sinkholes.

Critical Facilities

- According to the USGS Earthquake Hazard Area map shown in Figure 3.9, a potential earthquake in Oliver County would most likely only result in a light perceived shaking and no damages. The oldest facilities in each jurisdiction would be most likely to experience some damages. There is no history of earthquakes in the county causing structure damage.
- The moderate-low susceptibility landslide hazard area identified in Figure 3.10 does not adequately identify risk to critical facilities. There is no history of landslides in the county causing structure damage. The LEPC estimates that no critical facilities have potential to be affected by a landslide.
- There are no known instances of critical facilities being located in the vicinity of past coal mining activity. Therefore, the actual critical facility vulnerability to sinkholes is nil.

Property

- According to the USGS Earthquake Hazard Area map shown in Figure 3.9, a potential earthquake in Oliver 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 2000 Decennial Census an estimated 174 housing units in the county were built before 1940. Age information is not available for other types of structures in the county.

- Many parts of the County and some parts of Center have terrain that is potentially susceptible to landslides. No primary structures are believed to be vulnerable to landslides. There is no history of landslides in the county causing structure damage.
- There are no known instances of structures being located in the vicinity of past coal mining activity. The LEPC estimates that no structures have potential to be affected by sinkholes.

Future Development

- Center has, but Oliver County has not, adopted the North Dakota State Building Code. The State Building Code consists of the 2018 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

- Cities, townships, and counties that elect to enforce a building code are responsible for adopting and enforcing the State Building Code, but may amend the Code to conform to local needs. Center requires building permits for significant construction activity but does not have a building inspector.
- 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*: Consider adopting the North Dakota State Building Code.
- *Key Issue*: Much of county is within a moderate susceptibility/low incidence landslide hazard area as defined by USGS.
  - *Potential Action Item*: Identify characteristics of high susceptibility landslide hazard areas and create a landslide hazard susceptibility document for distribution to relevant jurisdictions and organizations within the county.
  - *Potential Action Item*: Improve base material, elevate or relocate roads that may be impacted.

Severe Summer Weather

All Jurisdictions	*Overall Risk:* High *Probability:* Highly Likely (Approximately seven event days per year countywide) *Magnitude:* Critical (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

Hazard Profile

The elements of severe summer weather include tornadoes, wind, hail and lightning. All areas of the county are at equal risk.

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. 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 1959-2018. Florida led the nation during from 1959-2013 with 471 lightning fatalities. Livestock deaths and property damage are the most common lightning-related threats in North Dakota.

Local Risk

Severe summer weather events in Oliver County are summarized in Table 3.5. **On average, a severe summer weather event occurs in the county approximately six days per year.** Summer weather classification criteria and a detailed listing of events can be found in Appendix C.

Table 3.5 – Severe Summer Weather Events in Oliver County, 1996-2018			
Summer Storm Events	**Event Days***	**Annual Probability**	**Event Days per Year**
Total	*121*	*550.0%*	*5.5*
Hail	63	286.4%	2.9
High/Thunderstorm Wind	50	227.3%	2.3
Tornado/Funnel Cloud	7	31.8%	0.3
Excessive Heat	1	4.6%	0.0

**Number of days with a reported event*
Source: National Climatic Data Center Storm Events Database

- A severe hail event is defined as a storm producing hailstones greater than 0.75 inches in diameter. According to the National Climatic Data Center, **the largest hailstone recorded in Oliver County from 1996 to 2018 was 2.75 inches in diameter**, which occurred in 2014. Common impacts from hail include broken windows, damaged shingles, dented or broken gutters, and damaged vehicles. Heavy hail events can also injure livestock and destroy crops.
- A severe wind event is defined as gusts of at least 50 kts or 58 MPH. According to the National Climatic Data Center the greatest straight-line wind gust recorded in Oliver County from 1996 to 2018 is 70 kts (~80 MPH), which occurred in July 2014. Common impacts from severe winds include broken trees and limbs, damaged agricultural structures and damaged power poles.
- Historical tornadoes in the county are shown in Figure 3.11. There were 4 tornadoes/funnel clouds reported in the county between 1996 and 2018, a majority of which were rated at EF0 or EF1. These tornadoes generally resulted in minimal damage, but the impact would be devastating if a large tornado were to directly strike a city or populated area.
- Lightning presents an ongoing risk to people and property in the county. From 1996 to 2018 there were no lightning events in Oliver County.
- The National Climatic Data Center Storm Events Database includes brief summaries of significant storm events. A selection of recent summer storm events within Oliver County are summarized below.
  - *July 21, 2005*. Hail damages to homes, vehicles, and trees totaled $30,000.
  - *May 25, 2010*. High winds caused $30,000 in damages.
  - *July 6, 2014*. High winds caused $60,000 of damage to a farmstead.
  - *July 21, 2014*. High winds felled trees and power lines in Center and the community of Price resulting in $170k in damages.
  - *September 3, 2014*. Hail with a diameter of 1.75 inches fell in Center and near Hannover causing $60,000 in damages.
  - *September 4, 2014*. Hail with diameters up to 2.75 inch fell near Center causing $300,000 in property and crop damages.
  - *July 23, 2015*. A thunderstorm with high winds caused damages in Center and in other parts of the county. One farmstead had $50,000 in property and crop damages.

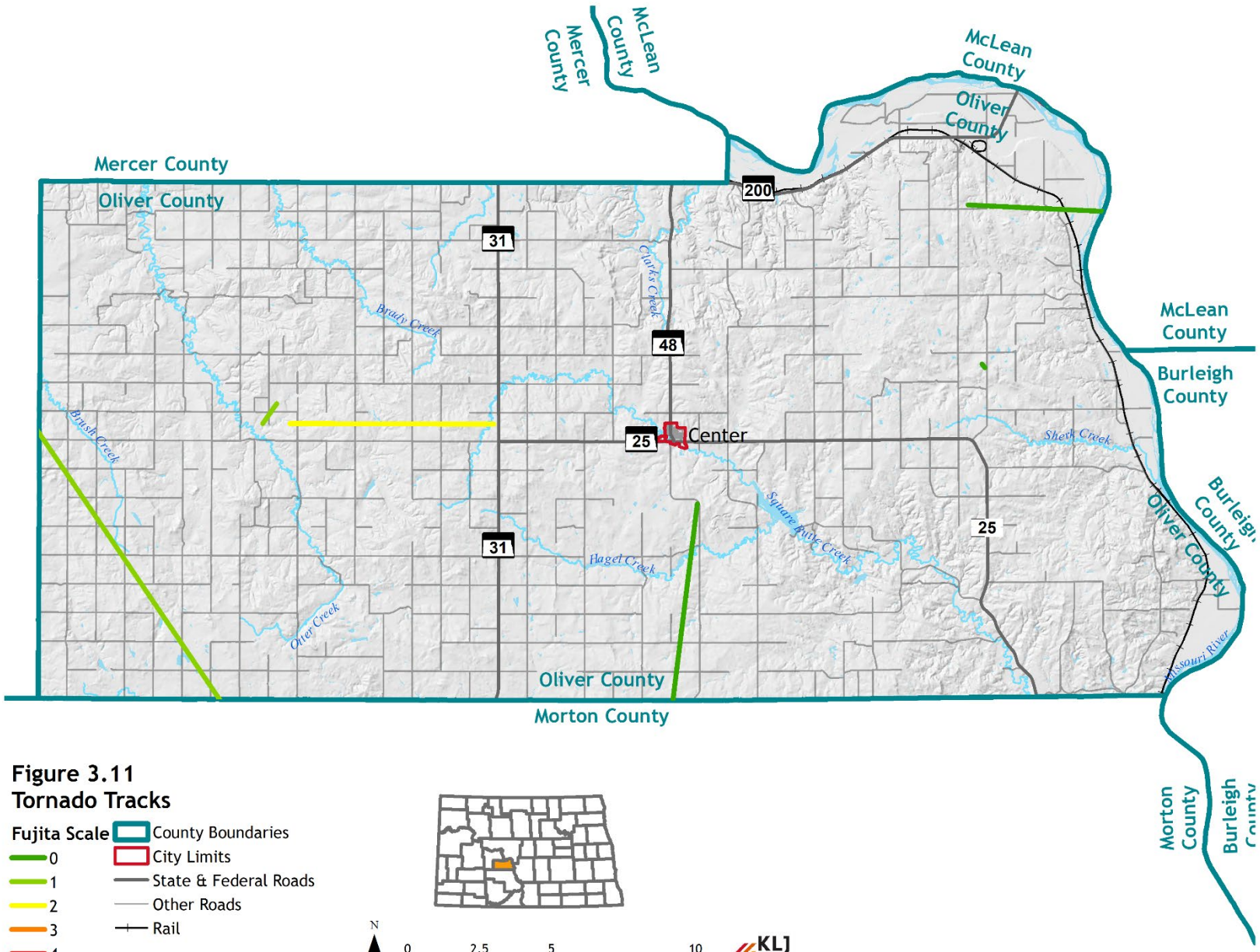


Figure 3.11
Tornado Tracks

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 35 mobile homes in Oliver County according to the city of Center. Applying the county's average household size of 2.22 persons, **there are approximately 78 people in the county with an enhanced vulnerability to severe summer weather.**
- Major recreation areas in the county include Nelson Lake, Cross Ranch State Park, Square Butte Golf Course, and the campground in Center. People using these areas have an enhanced vulnerability to severe summer weather because warning sirens may not be heard by them, and there are no storm shelters readily available for them.

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 or structures, electrical infrastructure and event facilities.

Property

- The variability of storm storm events makes it difficult to estimate property damages with any level of adequate precision. For the purposes of this document, a direct tornado hit on Center will serve as a worst case scenario. Assuming 75% of properties were damaged at an average of 50% of their property value, potential losses could exceed $6 Million in residential properties and $1 Million on commercial properties. Additional public structures such as the school, city hall, county courthouse, and fire hall could also suffer damage that could be in the millions of dollars.
- The most damaging summer storm event recorded by the National Climatic Data Center since 1996 is a hail storm event in September 2014 that caused an estimated $300,000 in damages.

Future Development

- Center has, but Oliver County has not, adopted the State Building Code. The Code includes a provision that buildings must be constructed to withstand a wind load of 75 MPH constant velocity and three-second gust of 90 MPH.

Existing Capabilities

- Center has two early warning sirens. Reverse 911 is used to alert participating people to emergencies. Some parts of Oliver County have very poor cell phone coverage, so the effectiveness of Reverse 911 is limited. Center has a zoning ordinance and a comprehensive plan. The City has adopted the State Building Code and requires building permits. The City has backup generators at the Civic Center and at the sewage lift station. No other critical facilities in the County have backup generators.

Key Issues and Potential Action Items

- *Key Issue*: Oliver County averages approximately seven 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.
  - *Potential Action Item*: Identify or construct emergency shelters for mobile home residents in the Center.

Severe Winter Weather

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

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. All areas of the county are at equal risk.

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.

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

Severe winter weather events in Oliver County are summarized in Table 3.6. **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.

- Oliver County was included in four winter storm-related Presidential Disaster Declarations between 1993 and November 2018.
- Power loss happens occasionally throughout the county during severe winter storms. 2018.

Table 3.6 - Severe Winter Weather Events in Oliver County, 1996-2018			
Winter Storm Events	**Event Days***	**Annual Probability**	**Event Days per Year**
Total	*121*	*550.0%*	*5.5*
Winter Storm	26	118.2%	1.2
Blizzard	27	122.7%	1.2
Extreme Cold/Wind Chill	22	100.0%	1.0
Heavy Snow	16	72.7%	0.7
High Wind	24	109.1%	1.1
Ice Storm	1	4.5%	0.05
Winter Weather	5	22.7%	0.2

**Number of days with a reported event*
Source: National Climatic Data Center Storm Events Database

- Blowing snow resulting in road hazards and blocked roads preventing essential transportation were commonly identified impacts.

- The National Climatic Data Center Storm Events Database includes brief summaries of significant storm events. A selection of recent summer storm events within Oliver County are summarized below.

    - *January 4, 1997.* A severe blizzard caused $250k in damages and one injury.
    - *January 9, 1997.* A severe blizzard caused $1.5 million in damages and one injury.
    - *April 4, 1997.* A severe blizzard caused $1.5 million in damages.
    - *January 25, 2010.* A blizzard caused $300k in damages, largely to downed power lines.
    - *April 2, 2010.* A winter storm downed power lines and damaged electrical utilities resulting in nearly $1 million in damages.
    - *February 13, 2011.* High winds caused $20,000 in property and damages.

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 35 mobile homes in Oliver County according to the City of Center. Applying the county's average household size of 2.22 persons, **there are approximately 78 persons in the county with an enhanced vulnerability to severe winter weather.**

- **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 **523 residents in the county are 65 years of age or older.**

- **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 Oliver County is approximately 1,004 people (51 percent of the total population).**

- **Stranded motorists are another vulnerable population.** Closed roads and whiteout conditions force them to stop driving and look for temporary shelter.

Critical Facilities

- A winter storm event that "traps" fire and ambulance responders within the facility or without access to 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 health care or elderly care facilities.

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 2000 Decennial Census estimates, there are approximately 174 housing units in the county that were built before 1940. 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 2017 Census of Agriculture, the **market value of livestock in Oliver 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.

Future Development

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

Existing Capabilities

- Center's Civic Center and sewage lift station have backup generators.

- Snow removal on rural and city roads is generally timely and effective. Emergency Snow routes are identified and prioritized.

- Center has adopted the State Building Code and issues building permits. The Building Code establishes appropriate construction standards for snow loads in the County.

Key Issues and Potential Action Items

- *Key Issue*: Oliver 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.
  - *Potential Action Item*: Evaluate opportunities to relocate to optimal locations those critical facilities that are most important to maintain operational readiness during severe winter weather.

- *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 600 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.
  - *Potential Action Item:* Identify and acquire backup generators for all critical facilities in a prioritized manner.

Wildland Fire

Rural County	*Overall Risk:* High *Probability:* Highly Likely (estimated ___ annual fires) *Magnitude:* Critical (a large wildland fire could potentially cause damages totaling millions of dollars and put human lives at risk)
Center	*Overall Risk:* High *Probability:* Possible *Magnitude:* Critical (estimated 75 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

Hazard Profile

A wildland fire 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 occur in or near urban/suburban areas. Wildland fires 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 wildland fires 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 3.12 shows fuel types in the Oliver County. Predominate fuel types are classified using the 13 standard fuel models for fire behavior by Anderson. **The most prevalent fuel in the county is the grass group**. The fuel generally burns with a low intensity, but can spread quickly. Grass fuel widely distributed throughout the county. Significant parts of the County are Timber with grass and understory which is a higher risk fuel category. The City of Center has a significant amount of Timber fuel in the vicinity of the wildland-urban interface.

- The USGS Federal Wildland Fire Occurrence Database does not show any wildland fires in Oliver County from 1980 through 2016. However, local fire departments report wildland fires averaging approximately five annually.

- In 2009 the North Dakota Forest Service developed a wildland fire risk assessment for every county in the state based on wildland fire occurrence, fire department response capabilities and weather. The assessment ranked Oliver County as having a high risk for wildland fire.

  There are an average of 5-7 wildland fires a year in Oliver County.

Vulnerability

Population

- Residents of non-urbanized areas (in the wildland-urban interface) are generally at a higher risk of wildland fire. According to 2019 Census Bureau estimates, there are approximately 1,959 residents in the county; of these, 1,367 live outside of an incorporated city and are at increased vulnerability to wildland fire. Assuming an average of 10 percent of residents in incorporated cities live along or near the wildland-urban interface, 59 additional residents are vulnerable to wildland fire. Using these estimates approximately 1,426residents (73 percent of total population) in the county are vulnerable to wildland fire.

Critical Facilities

- Although nearly all of the county's key facilities are within urbanized areas which are considered defensible space for wildland fire, several critical facilities are located along the edges of Center near the wildland-urban interface or in rural areas. Several of the critical facilities are at significant risk from wildland fire.

Property

- The 2018 State of North Dakota Enhanced Mission Area Operations Plan included information about crop indemnity payments from the USDA Risk Management Agency. There were no wildland fire-related crop indemnity payments in Oliver County between 2003 and 2017.

- There is no recent history of significant property loss other than cropland from wildland fires in Oliver County.

- The 2018 State of North Dakota Enhanced Mission Area Operations Plan indicates that the housing unit values in high and moderate wildland fire risk areas in Oliver County was $3.8 million in 2013.

Future Development

- There are no requirements for defensible space, adequate water supply, or road access.

- Most likely future development locations for all also locations at greatest risk from wildland fire.

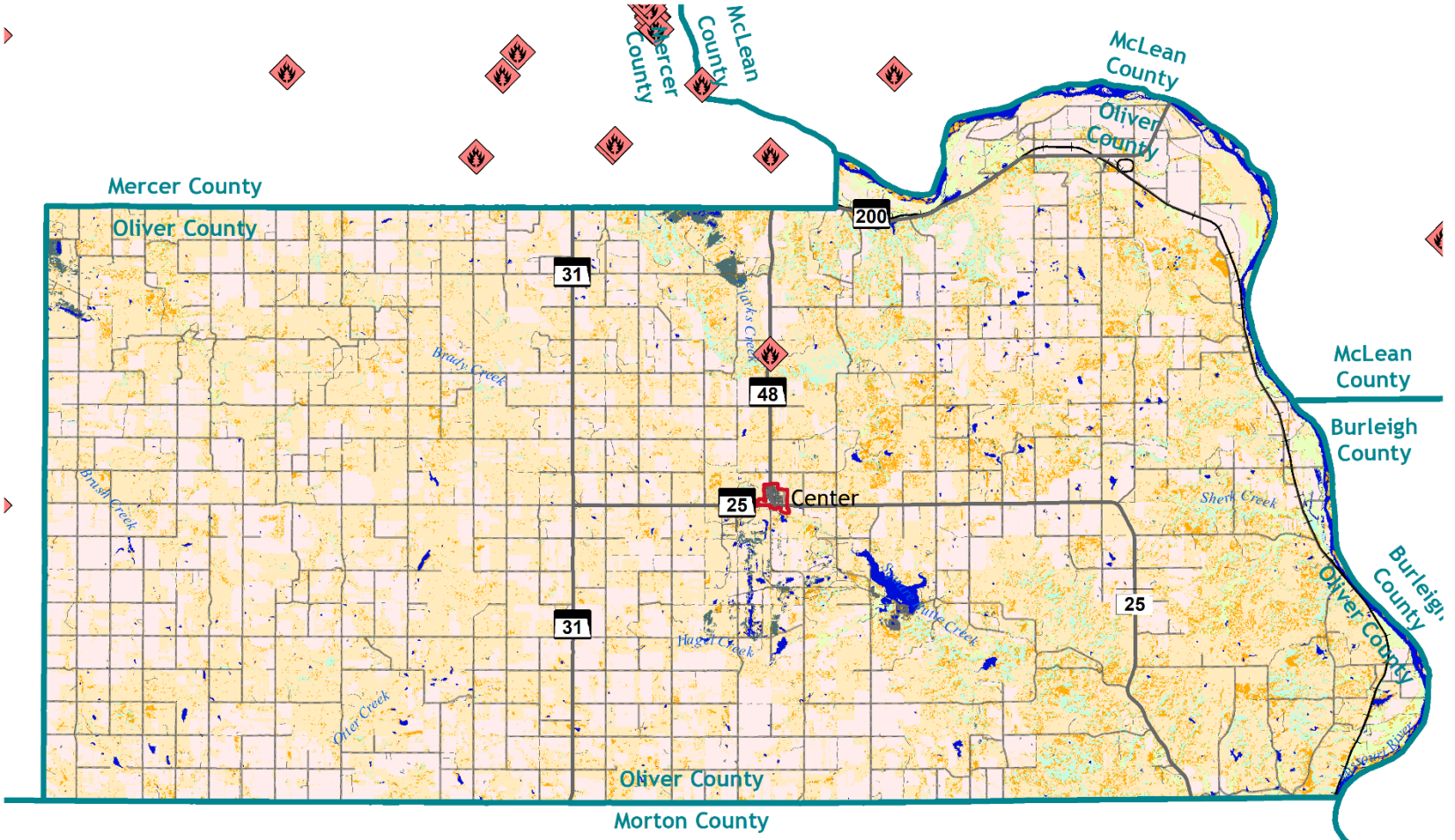


Figure 3.12
Wildfire Fuels

Burnable Fuels
- Grass
- Grass and Shrub
- Shrubs
- Timber Litter
- Grass/Shrubs with Canopy Litter

Nonburnable Areas
- Urban Areas
- Agriculture
- Open Water
- Bare Ground

- County Boundaries
- City Limits
- State & Federal Roads
- Other Roads
- Rail

N

0 2.5 5 10 Miles

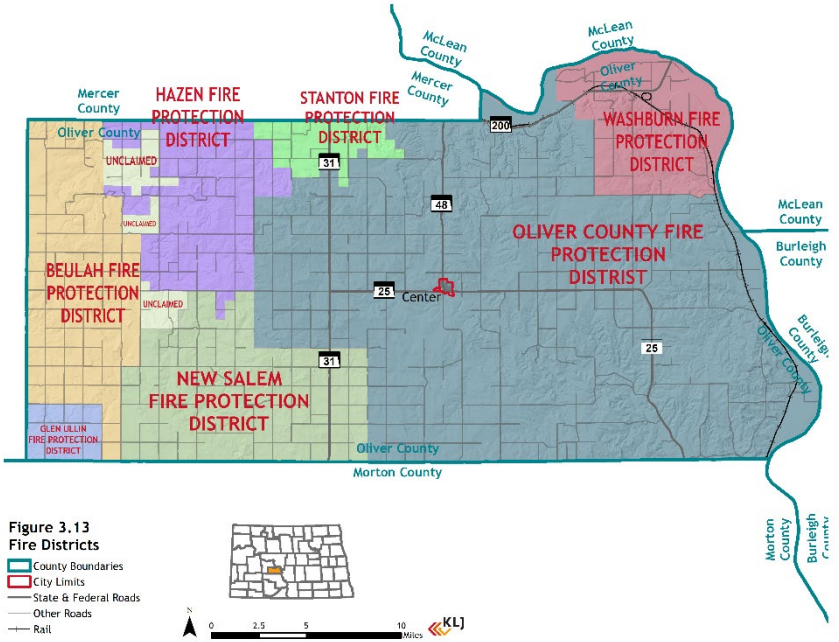
KLJ

Existing Capabilities

- Oliver County has a burn ban ordinance that is actively enforced. Illegal burning is a Class B misdemeanor. The media is notified when a burn ban is in effect.
- The County has four fire danger signs: one in Center, two near Nelson Lake, and one near Sanger.
- The County has a wildland fire response plan that includes detailed response and evaluation procedures.
- The Oliver County Fire Protection District has two tankers, one rescue truck, one first responder truck, and two grass units.
- Some parts of the County are served by other fire protection districts. The County has mutual aid agreements with all of them. District boundaries are shown in Figure 3.13.
- The Milton R Young power plan, BNI Coal Mine, and the Nature Conservancy at Cross Ranch State Park all have fire suppression equipment that can supplement the County's capacity in the event of a large wildland fire. BNI has three large water trucks, scrapers, and trained staff that can respond to wildland fires.
- Based on feedback from local fire department staff, the Planning Team thinks there is adequate capacity to respond to wildland fires, due to the current mutual aid agreements and the high degree of support from local ranchers and farmers.

Key Issues and Potential Action Items

- *Key Issue*: Oliver County experiences approximately five wildland fires per year. Most wildland fires in the county cause minimal property damage. However, several critical facilities are at risk from wildland fire.



- *Potential Action Item*: Perform fuel reduction activities in high-risk rural areas.
- *Potential Action Item*: Educate residents about defensible space best practices and encourage its maintenance at the wildland urban interface.
- *Potential Action Item*: Encourage the use of non-combustible materials (stone, brick, stucco, etc.) for new construction in wildland fire hazard areas.
- *Potential Action Item*: Incorporate wildland urban interface guidelines into the county's subdivision regulations.

Dam Failure

Rural County	*Overall Risk:* Low *Probability:* Unlikely (no history of significant failure) *Magnitude:* Limited
Center	*Overall Risk:* Low *Probability:* Unlikely (not within inundation area) *Magnitude:* Negligible (not within inundation area)
Seasonal Pattern	None
Primary Impacts	Agricultural loss (crops, livestock) Blocked roads Economic loss Human loss and injuries Increased stress on medical services Localized evacuation Release of hazardous 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. 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. T**here are 99 dams in Oliver County; two are classified as high hazard dams.** Three are classified as significant hazard dams. Dams in the county are shown in Figure 3.14 and documented in Table 3.8.
- Nelson Lake Dam is a high risk dam with unofficial camping sites and boat ramps. It is owned by MinnKota Power. There are approximately 25 residences that would be affected by a dam failure.
- Square Butte Creek Dam 5 is the other high risk dam. It has no public facilities. It is owned by the Oliver Water Resource District and is used for flood control. There are approximately nine residences that would be affected by a dam failure.
- The Daub Dam is owned by the ND Game and Fish Department and is located at Arroda Lake and used for recreation.
- The Square Butte Creek Dam 2 is owned by the Oliver Water Resource District and is used for flood control.
- The Square Butte Creek Dam 4 is owned by the Oliver Water Resource District and is used for flood control.

Table 3.8 – Oliver County High & Significant Hazard Dams

Dam Name	Action Plan	Owner	Purpose	Year Built	Max Storage (acre-feet)
Square Butte Creek Dam 5	No	Oliver Water Resource District	Flood Control	1979	5,800
Nelson Lake Dam	No	MinnKota Power Inc.	Mining	1967	20,122
Square Butte Creek Dam 4	No	Oliver Water Resource District	Flood Control	1974	6,544
Square Butte Creek Dam 2	No	Oliver Water Resource District	Flood Control	1973	2,080
Daub Dam	No	ND Game and Fish	Recreation	1971	1,346

** additional notes.*

Source: ND State Water Commission

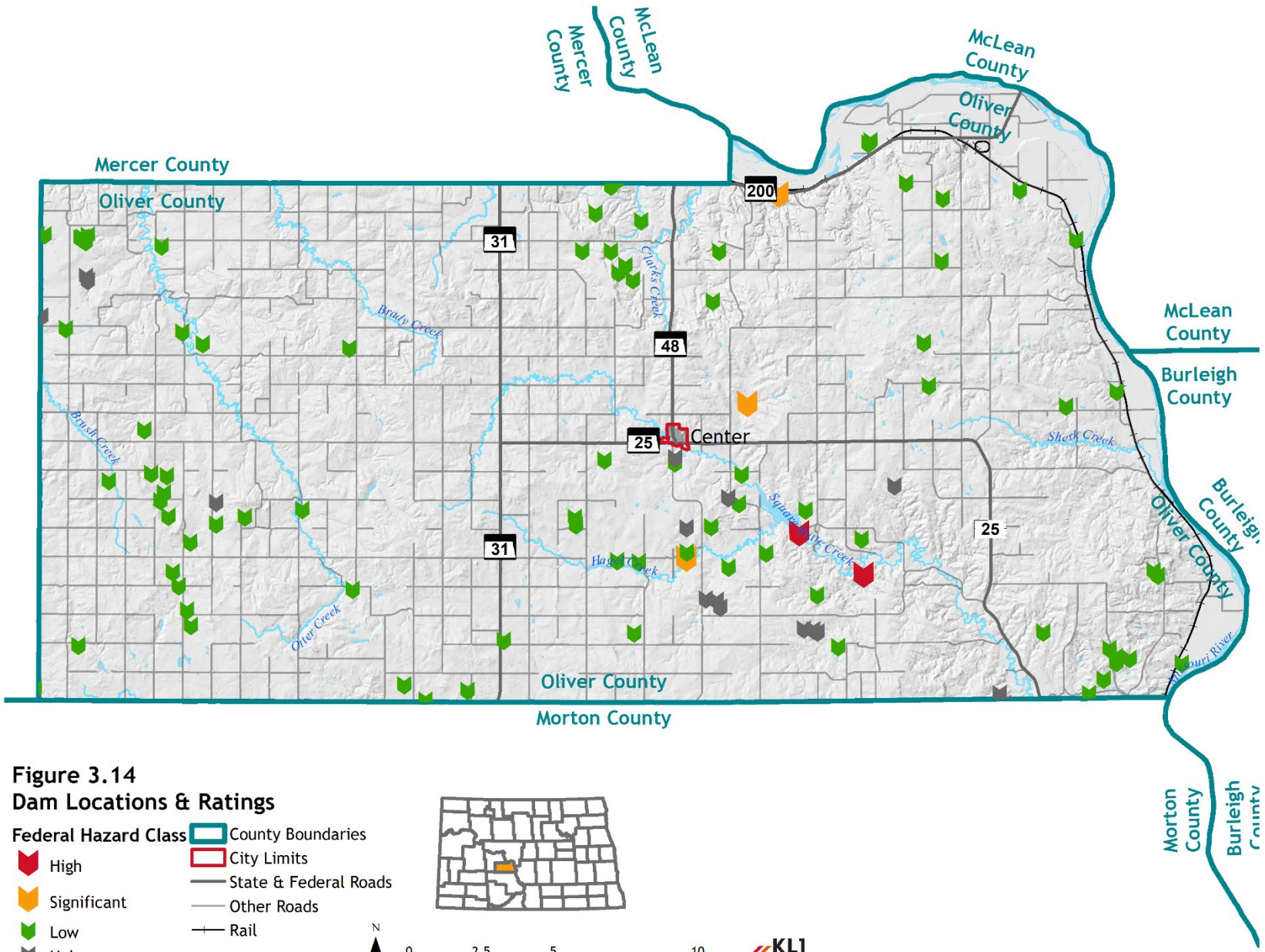


Figure 3.14
Dam Locations & Ratings

Federal Hazard Class
- High
- Significant
- Low
- Unknown

- County Boundaries
- City Limits
- State & Federal Roads
- Other Roads
- Rail

N

0 2.5 5 10 Miles

KLJ

Vulnerability

Population

- An estimated total of 34 residences are at risk from 2 high risk dams. This equates to approximately 75 people.

Critical Facilities

- No critical facilities in Oliver County at risk from dam failure.

Property

- An estimated total of 34 residences and associated accessory structures are at risk from two high risk dams.

Future Development

- There are no development provisions that specifically address dam failure inundation areas.

Existing Capabilities

- Both high risk dams need emergency action plans.

Key Issues and Potential Action Items

- Key Issue: If any significant or high risk dams do not have emergency action plans, they should be targeted for completion.
  - *Potential Action Item:* Complete an Emergency Action Plan for potential dam failure of both high risk dams.

Hazardous Materials Release

Rural County
Overall Risk: Moderate
Probability: Likely (estimated at least one incident per year)
Impact: Limited (approximately 18 percent of county within potential hazard area, a large event could have a significant impact)

Center
Overall Risk: High
Probability: Possible
Impact: Catastrophic

Seasonal Pattern
None

Primary Impacts
Blocked roads
Economic loss
Human loss and injuries
Increased stress on medical services
Localized evacuation

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 Oliver County**. Highways and railroads are the primary transportation routes through the county. There is only one train per day traveling through Oliver County.

- **Pipelines are alternative transportation routes that also present a risk for a hazardous materials release**. There are no crude oil or natural gas pipelines in Oliver County.

- 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 currently 6 Tier II facility sites in Oliver County.

- 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. Other sources of information about hazardous materials releases include the ND Department of Emergency Services and the ND Department of Health. The have been no notable hazardous material release incident in Oliver County.

- Figure 3.15 shows major transportation corridors in the county, with evacuation areas of 1/2 mile and 1 mile. 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 3.15. Census blocks in rural areas are generally large, which makes detailed estimates difficult.
  - The entire population of Center is within 1/2 mile of a major highway.
  - Approximately 400 rural residents (40 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.

Property

- Nearly the entirety of Center is within the 1/2 mile hazard area.

Future Development

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

Existing Capabilities

- 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.
  - *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*: Educate first responders and residents about shelter in place procedures.
  - *Potential Action Item*: Designate evacuation shelter facility for each city located a safe distance from potential sources of a hazardous materials incident.
  - *Potential Action Item*: Explore the possibility of bypasses around populated areas when possible.
  - *Potential Action Item*: Consider limiting development in areas with greatest proximity to potential hazardous materials incidents

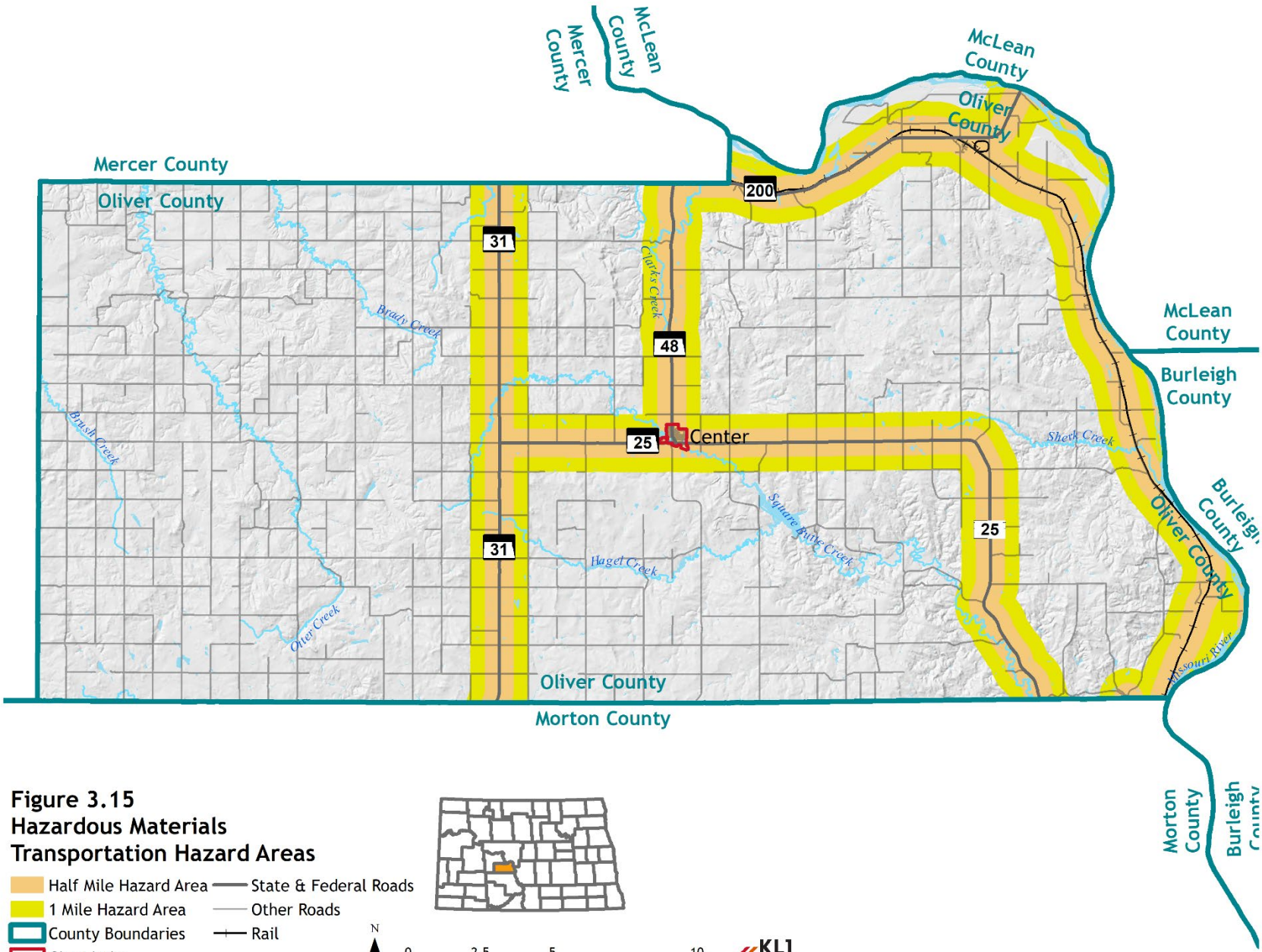


Figure 3.15
Hazardous Materials
Transportation Hazard Areas

Urban Fire

All Jurisdictions	*Overall Risk:* Moderate *Probability:* Possible (recent history of major incidents) *Impact:* Limited (magnitude could vary widely)
Seasonal Pattern	None
Primary Impacts	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. 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 of Center are vulnerable to an urban fire event. They represent approximately 26% of the County's population.

Critical Facilities

- Critical facilities in historic downtowns generally have a greater vulnerability to urban fire because of close building proximity. Other large facilities, such as grain elevators, electric substations and energy production facilities, may also be vulnerable to fire.

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

- Center has 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 a recent significant urban fire event. Nevertheless, it is always good to build awareness of risks.
  - *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 structures that could be a target for arson.
  - *Potential Action Item*: Maintain defensible space at perimeter of structures.

Infectious Diseases and Pest Infestation

All Jurisdictions	*Overall Risk:* Moderate *Probability:* Possible (No incidence of major disease outbreak in recent decades) *Impact:* Limited (Approximately 46 percent of the 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

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

There are numerous ways for Infectious 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 Oliver County residents are no exception, although the generally low population density of the area makes rapid transmission of Infectious disease less likely.

There is no recent history of major crop or animal epidemic disease or contamination in the county. The current COVID-19 pandemic has resulted in 2 deaths, and 151 reported cases of the disease in Oliver County.

Vulnerability

Population

- Generally, elderly and young persons are most at risk for Infectious disease. The estimated number of residents age 65 or older are summarized below for each jurisdiction.
  - Center: 158 residents
  - Rural County: 365 residents

- The estimated number of residents under age five are summarized below for each jurisdiction.
  - Rural County: 71 residents
  - Center: 31

- 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 two foodborne illness deaths in Oliver 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 one influenza death in Oliver 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 Oliver County this would equate to 6**95 ill, 6 requiring hospitalization and 0 deaths from a medium level influenza pandemic**.

Critical Facilities

- Assisted living facilities, hospitals and schools have an increased vulnerability to infectious disease due to the high density and demographics of occupants. Other places of public assembly may also contribute to disease spread.

Property

- The statewide Multi-Hazard Mitigation Plan estimated that Infectious disease could impact 20 percent of crop and livestock values. According to the 2017 Census of Agriculture the market value of crops in Oliver County was $21 million and the market value of livestock was $25 million. Estimating 20 percent loss for each sector results in $4.2 million in infectious 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 infectious disease. Potential future development is expected to primarily be low density single-family housing.

Existing Capabilities

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

- Sakakawea Medical Center in Hazen is a critical access hospital that serves Oliver County. The closest major hospitals are located in Bismarck. Coal Country Community Health Center is a clinic located in Center.

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.

Space Weather

All Jurisdictions	*Overall Risk:* Moderate *Probability:* Possible (recent history of major incidents) *Impact:* Limited (magnitude could vary widely)
Seasonal Pattern	None
Primary Impacts	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

Space Weather is a direct threat to most communities because of the widespread reliance on technological systems. NASA describes space weather as any and all conditions and events on the sun, in the solar wind, in near-Earth space, and in Earth's upper atmosphere that can affect space-borne and ground based technological systems. Generally, it takes the form of particles, electromagnetic energy, and magnetic fields. Space weather events which occur in space near the earth or its atmosphere can be classified as one of three types.

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

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

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

These events can affect critical facility infrastructure and technology in various ways. Generally, they can disrupt surface-to-surface and surface-to-orbit communications. Additionally, strong electrical currents driven along Earth's surface during auroral events disrupt electric power grids and contribute to the corrosion of oil and gas pipelines. Changes in the ionosphere during geomagnetic storms interfere with high-frequency radio communications and Global Positioning System navigation. During polar cap absorption events caused by solar protons, radio communications can be compromised for commercial airliners on transpolar crossing routes.

Local Risk

There are no recorded catastrophic space weather effects in North Dakota. The nearest recorded storm affected Montreal, Canada on March 13, 1989, when a geomagnetic storm took out their commercial electric power for nine hours, affecting six million people. Other recorded space weather events occurred in September 1859, May 1921, May 1967, and November 2003.

As a reference for magnitude, a space weather event occurred in July 2012 that was not directed toward Earth. If it had been, the effects would have very more severe than any since the September 1859 "Carrington Event." The Carrington Event impacted telegraph systems all over Europe and North America. Auroras were seen as

far south as the Caribbean in the northern hemisphere. If such an event were to take place now, the effects would be far more devastating. Testimony before Congress as to the level of impact suggests the entire electrical transmission grid could be affected and power plants, substations and transformers that keep the grid operational could be destroyed. Experts disagree about the potential level of impact. Opinions range from disrupting electrical power supply for a few weeks all the way to loss of 90 percent of human lives due to failure of nearly all computer and electrical systems, and ancillary effects. All areas of Oliver County are at equal risk. Especially significant potential impacts of major space weather events in Oliver County include:

- One of the most significant and immediate potential impacts of a space weather event would be disruption or destruction of electronic systems used for healthcare in Oliver County. Mitigation measures to protect or replace these electronic systems are not in place. The electronic systems of the West River Medical Center and the nursing home are not hardened to withstand such an event.

- Emergency communications systems and all other communications systems are critical to emergency notification and response functions in Oliver County, and could be disrupted or destroyed by a major space weather event. Mitigation measures to protect or replace these communications systems are not in place.

Vulnerability

Population

- Except in the case of a high intensity solar radiation storm, the direct impacts of a space weather event on people is limited. However, nearly all or all of the Oliver County population relies directly or indirectly on electricity for normal, essential functions such as heating and cooling, obtaining water, waste disposal, food refrigeration, communications, and transportation. If a space weather event caused the loss of power, the impact for a short time would be an inconvenience for most, but critical to life support for a few. Loss of power for a long time could result in the inability to sustain life in Oliver County as we know it.

Critical Facilities

- All critical facilities in Oliver County rely on electrical power to function properly. Most of these critical facilities do not have a backup power source. Therefore, short term and long term functionality of most critical facilities in Oliver County could be reduced or destroyed. There are 12 critical facilities in Center and four in rural Oliver County that would be impacted by long term loss of power. Electrical power to all of Oliver County is sourced from Roughrider Electric Cooperative and runs through three substations. The Coop does have a plan to get local power infrastructure up and running after such an event in a matter of weeks or months. However, a major space weather event could make fixing these substations moot in view of other electrical grid damage. Therefore, the time to get power back could be much greater.

Property

- The loss of electricity for a short time would primarily impact structures that are heated with electricity or protected from seepage by sump pumps in areas with high water tables. Buildings directly or indirectly dependent on electricity will likely be uninhabitable during winter months.

Future Development

- There are no direct Impacts of space weather events on future development. Traditional development patterns would be subject to the same impacts anticipated for existing property, critical facilities, and populations.

Existing Capabilities

- There are no known capabilities in place in Oliver County to mitigate the impacts of space weather events.

Key Issues and Potential Action Items

- *Key Issue*: Widespread, long term loss of electrical power will lead to loss of life, disruption of life as we know it in Oliver County.
  - *Potential Action Item*: Encourage household level preparations to mitigate the impacts of a sustained widespread power loss.
  - *Potential Action Item*: Harden electrical components and systems for critical facilities (especially emergency response services) against the anticipated impacts of a space weather event.
  - *Potential Action Item*: Develop a strategic action plan to harden medical facilities and electronic systems against the anticipated impacts of a space weather event.
  - *Potential Action Item*: Appoint a strategic planning team to consider the long term impacts of a major space weather event and develop a strategic plan to mitigate the impacts on Oliver County.

Transportation Incident

All Jurisdictions	*Overall Risk:* Moderate *Probability:* Possible (recent history of major incidents) *Impact:* Limited (magnitude could vary widely)
Seasonal Pattern	None
Primary Impacts	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

"Transportation Incident, for the purposes of this plan, is any large-scale vehicular, railroad, aircraft or watercraft accident involving mass casualties. Mass casualties can be defined as an incident resulting in a large number of deaths and/or injuries that reaches a magnitude that overtaxes the ability of local resources to adequately respond." [p271 ND Enhanced Mitigation Mission Area Operations Plan] The impacts of transportation incidents are most significant because of the loss of life or major injury. In rural communities, even relatively small incidents may overtax local resources because of the limited resources available to the communities. Another significant hazard associated with these incidents may be hazardous materials release. Other hazards that may precipitate a transportation incident include severe winter weather and flooding. It should also be noted that the hazard of terrorist attacks has also been aimed at transportation infrastructure and transit systems.

These events can affect critical infrastructure systems and local economies in various ways. Generally, they can block major transportation systems for extended periods of time. Additionally, strong electrical currents driven along Earth's surface during auroral events disrupt electric power grids and contribute to the corrosion of oil and gas pipelines.

Local Risk

There have been no documented transportation incidents in Oliver County.

There are 67 miles of state/federal highways in Oliver County and 36 miles of BNSF railroad lines. While the presence of these major transportation facilities in the county are a basis for local risk, this risk is compounded because hazardous materials are transported regularly along the state highways and the railroad. Additionally, railroad crossings are another significant point of risk for transportation incidents when a collision between motor vehicles and trains takes place. Railroad operations are sometime interrupted by flooding as well.

There is one private airfield in Oliver County. An aircraft crash is statistically more likely to take place during takeoffs or landings at these airports than elsewhere.

Vulnerability

Population

- The population of Oliver County is not generally vulnerable to transportation incidents. The largest potential vulnerability stems from inhabited structures located close to railroads and major roadways.

Critical Facilities

- Several critical facilities are located along state highways and railroads. They could potentially have access limited because of a transportation incident. Additionally, the highways and railroads themselves are critical infrastructure that could be disrupted for a significant time period.

Property

- Potential property damage from a transportation incident is most likely when a major transportation route is situated close to major structures. Highway 48 and Highway 25 go through Center and there are many buildings located nearby, but only ten commercial buildings located within 10 feet of the roadway edge.

Future Development

- Potential future development property damage from a transportation incident is unlikely as long as appropriate setback requirements are adhered to during development.

Existing Capabilities

- Local emergency response capabilities in Oliver County include the Oliver County Ambulance Service that covers the heart of the county, and five additional ambulance services stationed outside the County which provide service to some parts of the county. All six are EMT certified ambulance services.
- Local fire department response capabilities include certification in extrication, jaws of life, and hazardous materials.
- The Sakakawea Medical Center in Hazen has an emergency room but is classified as a Level IV trauma center. The nearest Level II trauma centers are located in Bismarck.

Key Issues and Potential Action Items

- *Key Issue*: Oliver County's very rural setting results in limited resources being available to respond to transportation incidents.
  - *Potential Action Item*: Develop a plan to increase the ambulance responder level of training and equipment.
  - *Potential Action Item*: Develop a plan to increase the West River Medical Center from a Trauma IV to a Trauma III facility.
  - *Potential Action Item*: Develop a plan to reward emergency response staff in ways the encourage them to stay in Oliver County and to increase their skill levels.

Summary

There are 12 priority hazards identified for Oliver County. The key issues for each hazard are summarized below. Hazards are summarized for the county overall. Hazard risk for each jurisdiction is summarized in Table 3.13.

Table 2.13 Summary of Risk by Hazard and Jurisdiction	Rural County	Center
Drought	H	H
Flood	M	M
Geologic Hazards	L	L
Severe Summer Weather	H	H
Severe Winter Weather	H	H
Wildland Fire	H	H
Dam Failure	L	L
Hazardous Materials Release	M	H
Urban Fire	L	L
Infectious Disease & Pest Infestation	M	M
Space Weather	M	M
Transportation Incident	M	M

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.

Flood

- Oliver County experiences approximately one flood event every two years. Flood events in the county are primarily related to heavy rainfall and snowmelt runoff.
- Roads and bridges in the county are sometimes 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

- Oliver County averages approximately six 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

- Oliver 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 600 residents in the county are elderly or live in a mobile home.

Wildland Fire

- Oliver County experiences approximately 5 to 7 wildfires per year. Most wildfires in the county cause minimal property damage. However, several critical facilities are at risk from wildland fire.

Dam Failure

- Nelson Lake Dam failure would be a significant event with an estimated 25 homes inundated. A Square Butte Creek Dam 5 failure would also potentially inundate nine residences.

Hazardous Materials Release

- Many residents in the county, including all city residents, live in a potential hazard area for a hazardous materials incident.

Urban Fire

- There is no recent history of large-scale urban fire in the county.

Infectious Diseases and Pest Infestation

- Human and agricultural disease have the potential to greatly impact the health and economy of the county. The COVID-19 pandemic resulted in two deaths as of the time of this writing.
- Some areas of the county have large amounts of standing water during the spring and summer months, which can attract potentially disease-carrying insects.

Space Weather

- Widespread, long term loss of electrical power will lead to loss of life, disruption of life as we know it in Oliver County.

Transportation Incident

- Oliver County's very rural setting results in limited resources being available to respond to transportation incidents.

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*. Center and Oliver County have zoning ordinances.
- *Comprehensive Plan*. No jurisdiction has a comprehensive plan.
- *Floodplain Ordinance*. Center and Oliver County have floodplain ordinances that are actively enforced.
- *Building Code*. Center has adopted the North Dakota State Building Code.

Administrative and Technical Capabilities

- Oliver County has an Emergency Management Department that oversees mitigation, response and recovery activities county-wide.
- Center and the County have a floodplain administrator.

Fiscal Capabilities

- Oliver County and the City of Center are eligible for a variety of federal grants, including Community Development Block Grants.
- Oliver County and the City of Center have the ability to issue bonds and levy taxes.

The County and the City of Center 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 the 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.

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

Previous Mitigation Actions

Mitigation actions from the 2013 Oliver County Multi-Hazard Mitigation Plan are shown in Appendix D. The plan included 27 actions. Seven actions were completed. Seven actions were dropped or are no longer relevant. Eleven actions have been incorporated into this plan. The remaining two actions were substantially modified and incorporated into 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

Oliver 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 for the participating jurisdictions, identified in Tables 4.1 – 4.2 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 E. 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.

Table 4.1 – Oliver County Action Items					
ID	**Priority**	**Action**	**Hazard**	**Cost**	**Time Frame**
A	H	Map the rural fire hose hookups via SW Water Authority	Drought	staff time	2022
B	L	Floodplain Manager training for county and city staff	Flooding	staff time	2023
C	M	Tabletop exercise with BNI Mining Company	Geologic Hazards	staff time	2023
D	H	**Install sirens for golf course and Nelson Lake campground**	Severe Summer Weather	moderate cost	2022
E	H	**Work with Red Cross to make the Civic Center an official shelter**	Multiple Hazards	staff time	2022
F	M	Administer Firewise program and implement best practices during wildfire season	Wildland Fire	staff time	ongoing
G	H	Public Education	Multiple Hazards	staff time	ongoing
H	M	Continue fire training and exercises to include ambulance and law enforcement	Wildland Fire	staff time	ongoing
I	M	Tabletop exercise to include school, clinic, ambulance, dispatch, and emergency management	Infectious Disease	staff time	ongoing
J	M	Conduct functional and full-scale exercise for dam failure with Minnkota Power	Dam Failure	staff time	2023
K	M	Annually review emergency plans for dam failure with LEPC and dispatch	Dam Failure	staff time	ongoing
L	H	**Facilitate HazMat training for all emergency entities every 2 years**	Hazardous Materials Release	staff time	ongoing
M	M	Annually review and update Oliver HazMat Plan	Hazardous Materials Release	staff time	ongoing
N	M	Review security plans and conduct tabletop exercise school and law enforcement staff	Homeland Security Incident	staff time	2022
O	H	Help facilitate a Minnkota Plant fire tabletop exercise that would include a large structure fire	Urban Fire	staff time	2023
P	M	Annually review and update the Oliver County LEOP and City of Center Emergency Plans	Multiple Hazards	staff time	ongoing
Q	M	Help facilitate a mass casualty tabletop exercise with the State Health Department to find gaps in local resources	Transportation Incident	high cost	2023
R	H	**Develop storm shelter signage to direct residents to nearest shelter**	Severe Summer and Winter Weather	low cost	2022
S	H	**Identify & expand/replace damaged culverts on county roads**	Flooding	high cost	multi-year

Table 4.1 continued – Oliver County Action Items					
ID	**Priority**	**Action**	**Hazard**	**Cost**	**Time Frame**
T	M	Support the Oliver/Morton WRD in developing emergency plans for remaining dams in county	Dam Failure	staff time	multi-year
U	H	**Acquire additional hazmat equipment for Fire Department**	Hazardous Materials Release	high cost	multi-year
Z	H	Install emergency generators at critical facilities in a prioritized manner	Multiple Hazards	high cost	multi-year

Table 4.2 – Center Action Items					
ID	**Priority**	**Action**	**Hazard**	**Cost**	**Time Frame**
B	M	Floodplain Manager training for county and city staff	Flooding	staff time	2023
E	H	Work with the Red Cross to make the Civic Center an official shelter	Severe Winter Weather	staff time	2022
F	M	Administer Firewise program and implement best practices during wildfire season	Wildland Fire	staff time	ongoing
G	H	Public Education	Multiple Hazards	staff time	ongoing
H	M	Continue fire training and exercises to include ambulance and law enforcement	Wildland Fire	staff time	ongoing
I	M	Tabletop exercise to include school, clinic, ambulance, dispatch, and emergency management	Infectious Disease	staff time	ongoing
J	M	Conduct functional and full-scale exercise for dam failure with Minnkota Power	Dam Failure	staff time	2023
L	H	**Facilitate HazMat training for all emergency entities every 2 years**	Hazardous Materials Release	staff time	ongoing
N	M	Review security plans and conduct tabletop exercise school and law enforcement staff	Homeland Security Incident	staff time	2022
P	M	Annually review and update the Oliver County LEOP and City of Center Emergency Plans	Multiple Hazards	staff time	ongoing
Q	M	Help facilitate a mass casualty tabletop exercise with the State Health Department to find gaps in local resources	Transportation Incident	staff time	2023
R	H	**Develop storm shelter signage to direct residents to nearest shelter**	Multiple Hazards	low cost	2022
U	H	**Acquire additional hazmat equipment for Fire Department**	Hazardous Materials Release	high cost	multi-year
V	M	**Inspection and cleaning schedule for stormwater management system**	Flooding	staff time	ongoing
W	H	**Apply floodproofing to city lift stations**	Flooding	moderate cost	ongoing
X	L	**Work with FEMA to update FIRM for Center**	Flooding	staff time	multi-year
Y	M	**Review floodplain management education resources**	Flooding	staff time	ongoing

Notes for Action Items

The Oliver 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: Map the rural fire hose hookups via SW Water Authority

When severe drought occurs and water is unable in pastures, it will be helpful to identify and publicize the location of available water supply.

Responsible party: Oliver County Emergency Manager

B: Floodplain manager training for county and city staff

This training will enhance the abilities of staff to serve the public, ensure compliance with NFIP requirements, and better meet the objectives of the NFIP program.

Responsible party: Oliver County Emergency Manager

C: Tabletop exercise with BNI Mining Company

Ongoing mining operations may lead to landslides that impact the public and the company's operations. This exercise will help the County and the company to be better prepared in case of a significant landslide.

Responsible party: Oliver County Emergency Manager, BNI Mining Company officials

D: Install siren(s) for golf course and Nelson Lake campground

The golf course and adjacent campground to not have any mechanism for alerting people to extreme summer weather events. Installing sirens is a critical step to increasing preparedness to such events.

Responsible party: Oliver County Emergency Manager and County Commissioners

E. Work with Red Cross to make the Civic Center an official shelter

The Civic Center has been designated as a planned official shelter per the last MHMP but appropriate supplies and protocols need to be in place to create official status with the Red Cross.

Responsible party: Oliver County Emergency Manager and City governing body

F. 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 the 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-liaison-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: County Commission Chairperson and Mayor for the city (coordinating with local fire districts)

G: 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
- Storm shelter promotion
- Summer and winter weather safety
- Flood safety and NFIP promotion
- Fire weather notifications and fire prevention and safety

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

Responsible party: Oliver County Emergency Manager

H: Continue fire training and exercises to include ambulance and law enforcement

A key part of wildfire preparedness is ensuring all response participants have worked together and know their roles. This training helps create this familiarity.

Responsible party: Oliver County Emergency Manager, local fire department, ambulance and law enforcement staff

I: Tabletop exercise to include school, clinic, ambulance, dispatch and emergency management

Infectious disease response requires all participants having worked together and knowing their roles. This exercise should incorporate all local organizations that would be involved in a response, as well as Southwest District Health.

Responsible party: Oliver County Emergency Manager

J: Conduct functional and full scale exercise for dam failure with Minnkota Power

The most significant dam failure in the County would include have a huge impact on Minnkota Power and parts of Oliver County. The regional significance cannot be overstated. Therefore a full scale exercise is warranted.

Responsible party: Governing body of Hettinger

K: Annually review emergency plans for dam failure with LEPC and dispatch

There are two high risk dams and three significant risk dams in Oliver County. It is essential to verify not significant changes have taken place that warrant changes to the emergency plans, and to ensure dispatch and LEPC members are fully prepared to respond quickly in the event of a pending failure or failure.

Responsible party: Oliver County Emergency Manager

L: Facilitate HazMat training for all emergency entities every two years

Mercer County and Oliver County are both sites of major energy generation facilities and at risk from major hazmat incidents. It is important to continue the ongoing practice of alternating HazMat training for each county every other year.

Responsible party: Oliver County Emergency Manager

M: Annually review and update the Oliver HazMat Plan

Oliver County are the site of major energy generation facilities and at risk from major hazmat incidents. It is important to review and update response plans to account for any changes in circumstances, hazard levels, and response capacity every year.

Responsible party: Oliver County Emergency Manager

N: Review security plans and conduct tabletop exercise with school and law enforcement staff

Many schools in North Dakota have implemented increased security measures. A tabletop exercise should be conducted with local school and law enforcement staff to help evaluate the need for any changes to security plans and to enhance preparedness for an active shooter.

Responsible party: School district leaders, law enforcement leaders, and Oliver County Emergency Manager

O: Help facilitate a Minnkota Plant fire tabletop exercise that would include a large structure fire

A structure fire at the existing Minnkota facilities could pose the most significant urban fire risk in the County. Conducting a tabletop exercise will help identify the need for any changes to existing response plans.

Responsible party: Governing bodies of all jurisdictions

P: Annually review and update the Oliver County LEOP and City of Center Emergency Plans

Severe summer or winter weather, large-scale flooding or wildland fires, and potentially other hazards could result in shortages of medical supplies, food or water, loss of power, and other significant impacts. Annually reviewing these plans should help ensure the capacity for appropriate response.

Responsible party: Oliver County Emergency Manager and City officials

Q: Help facilitate a mass casualty tabletop exercise with the State Health Department to find gaps in local resources

Many parts of Oliver County are extremely isolated, resulting in long response times by local responders and nearby responding mutual aid organizations. A tabletop exercise can help identify gaps in resources and potential improvements to response plans for a transportation incident.

Responsible party: Oliver County Emergency Manager

R: Develop storm shelter signage to direct residents to nearest shelter

In addition to public education campaigns to alert people to available shelters, signage should be posted to help people find their way and know they are at the right place.

Responsible party: Oliver County Emergency Manager and city staff

S: Identify and expand/replace damaged culverts on county roads

Flooding impacts can be reduced by properly sized culverts. This mitigation action is a multi-year effort that is not yet complete.

Responsible party: County Road Supervisor

T: Support the Oliver/Morton Water Resource District (WRD) in developing emergency plans for remaining dams in the County

Some significant risk dams do not have emergency plans. The Water Resource District is the best situated organization to facilitate the completion of these plans.

Responsible party: Oliver/Morton WRD Board

U: Acquire additional HazMat equipment for Fire Department

Adequate preparation for HazMat incidents includes proper equipment. The Fire Department needs additional equipment to better respond to such incidents.

Responsible party: Oliver County Emergency Manager

V: Inspection and cleaning schedule for stormwater management system

Localized flooding can be reduced in Center with appropriate maintenance of the stormwater management system. This is an ongoing annual effort.

Responsible party: Center Public Works Manager

W: Apply floodproofing to city lift stations

At least one Center lift station is at risk from flooding. Appropriate floodproofing can ensure proper operation in the event of a significant flood.

Responsible party: Center Public Works Manager

X: Work with FEMA to update the FIRM for Center

Center's FIRM is does not include detailed mapping and does not reflect more recent development.

Responsible party: Oliver County Emergency Manager and City governing body

Y: Review floodplain management education resources

In order to support and encourage adequate preparation by city residents, a public education campaign should be conducted annually. New and better educational resources should be obtained to aid this effort.

Responsible party: Center floodplain manager

Z: Install emergency generators at critical facilities in a prioritized manner

Blizzards and severe winter weather can cause power outages that may last for days. Verify if funding for generators is available through FEMA's HMGP and PDM grant programs and pursue all available options.

Responsible party: Oliver County Emergency Manager, critical facility owners

Chapter 5: Plan Maintenance

This chapter details the plan maintenance process to make sure the Oliver 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 E. 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 Oliver 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 Countywide Planning Mechanisms

The County's 2014 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. The county's population is projected to see only slight growth through 2024. 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. Two ways to help maintain interest are:

- Continue the practice of having an Emergency Management information booth at the annual community/county events such as the Kris Kringle Mart.

- Periodically provide a news release or short article for the local newspaper on some aspect of emergency management such as tips for keeping your home safe from wildland fires.

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, the County lacks zoning controls and does not have a comprehensive plan. Establishing zoning and completing a comprehensive plan could help ensure that some of the mitigation action items are more effectively implemented. A comprehensive plan could also provide guidance for future updates to zoning regulations.

Some specific actions that would aid implementation of this plan in the cities are the following:

- Center could include an overlay district to address areas with special building limitations or concerns such as areas susceptible to flooding or close to hazardous materials transport routes.

- Oliver County could consider adopting the state building code and specifically adding snow load standards to reduce risk of structural collapse. It could also consider requiring building permits and not allowing construction in dam failure inundation areas.

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).

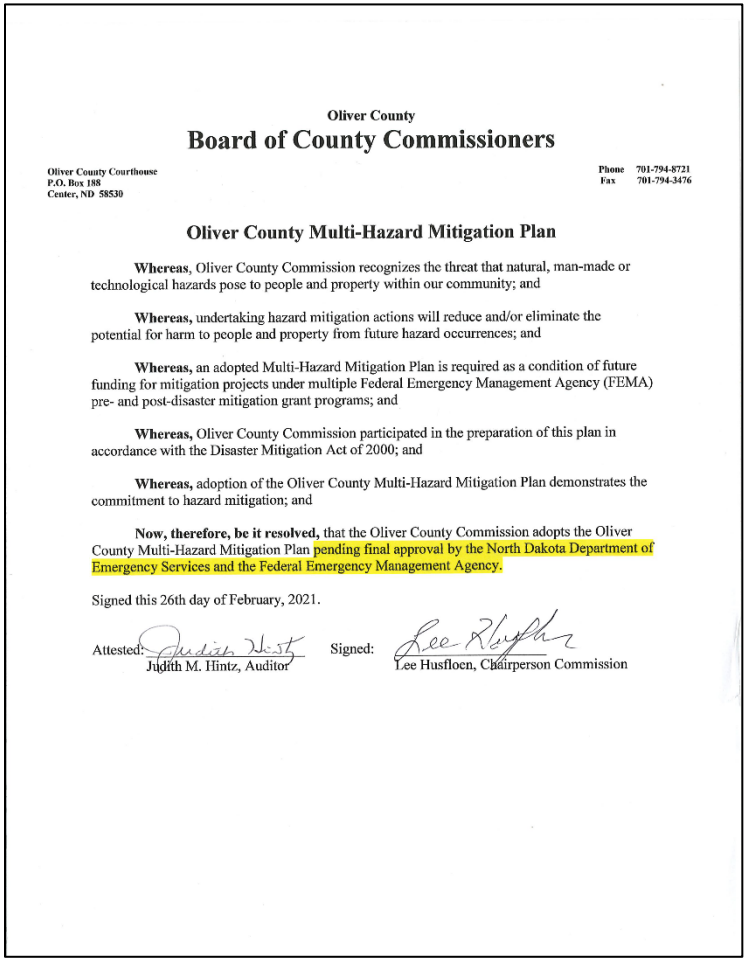
All jurisdictions should prioritize action items applicable to them and incorporate them into their annual budget decisions.

Updating the Plan

The Oliver 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.

Appendix A: Approval and Adoption Documentation



Oliver County
Board of County Commissioners

Oliver County Courthouse
P.O. Box 188
Center, ND 58530

Phone 701-794-8721
Fax 701-794-3476

Oliver County Multi-Hazard Mitigation Plan

Whereas, Oliver County Commission recognizes the threat that natural, man-made or technological hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce and/or eliminate the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, Oliver County Commission participated in the preparation of this plan in accordance with the Disaster Mitigation Act of 2000; and

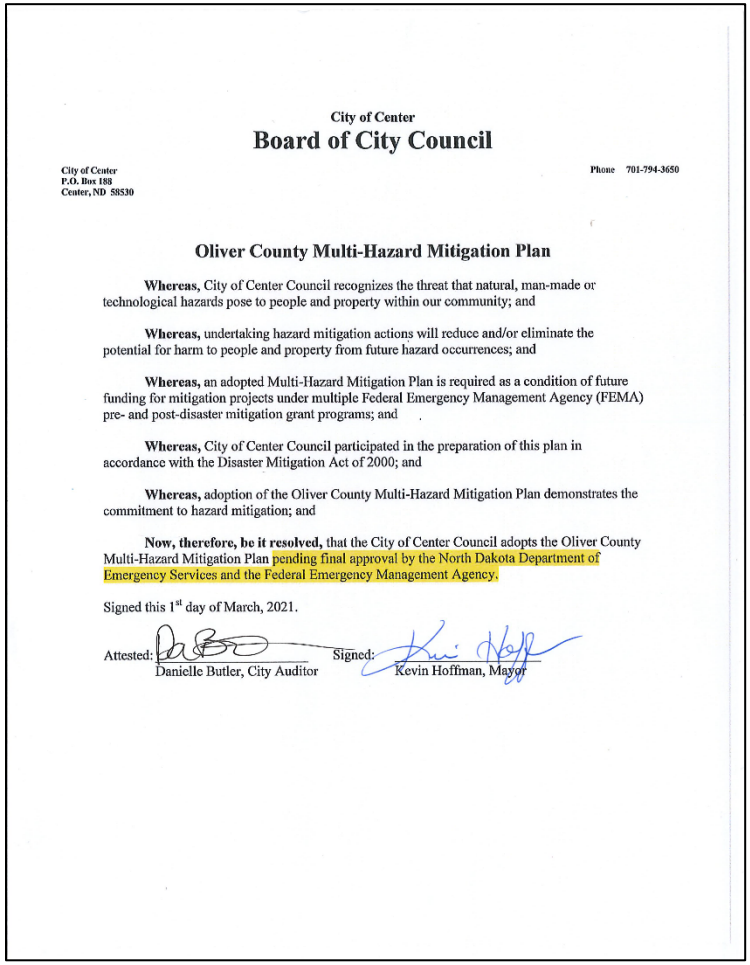
Whereas, adoption of the Oliver County Multi-Hazard Mitigation Plan demonstrates the commitment to hazard mitigation; and

Now, therefore, be it resolved, that the Oliver County Commission adopts the Oliver County Multi-Hazard Mitigation Plan pending final approval by the North Dakota Department of Emergency Services and the Federal Emergency Management Agency.

Signed this 26th day of February, 2021.

Attested: Judith West
Judith M. Hintz, Auditor

Signed: Lee Husfloen
Lee Husfloen, Chairperson Commission



City of Center
Board of City Council

City of Center
P.O. Box 188
Center, ND 58530

Phone 701-794-3650

Oliver County Multi-Hazard Mitigation Plan

Whereas, City of Center Council recognizes the threat that natural, man-made or technological hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce and/or eliminate the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, City of Center Council participated in the preparation of this plan in accordance with the Disaster Mitigation Act of 2000; and

Whereas, adoption of the Oliver County Multi-Hazard Mitigation Plan demonstrates the commitment to hazard mitigation; and

Now, therefore, be it resolved, that the City of Center Council adopts the Oliver County Multi-Hazard Mitigation Plan pending final approval by the North Dakota Department of Emergency Services and the Federal Emergency Management Agency.

Signed this 1st day of March, 2021.

Attested: Danielle Butler
Danielle Butler, City Auditor

Signed: Kevin Hoffman
Kevin Hoffman, Mayor

Appendix B: Planning Process

Project Schedule

Note: Sign-In Sheets and Advertisements can be found later in this appendix. A list of representatives from participating jurisdictions is available with the sign-in sheets.

LEPC Meeting (September 27, 2018; Oliver Ambulance Bay, Center)

MHMP kickoff meeting topics included the purpose of the plan, required participants, the process, and a FEMA map review. A majority of the meeting was spent discussing general information about each hazard the county may experience. The hazards listed in the statewide plan were used as a starting point for discussion.

City Stakeholder Meeting(November 5, 2018; Center City Hall)

An overview of the project process was presented, and there was discussion about MHMP goals, hazards addressed, historical flooding incidence, critical facilities, and development trends.

LEPC Meeting (November 29, 2018; Oliver County Courthouse)

Primary discussion was on the past and potential impacts of various hazards. There was also some discussion about potential mitigation actions.

Kris Kringle Mart Booth (December 2, 2018; City of Center)

The emergency manager was on-site at this public event. She engaged citizens who stopped to visit with her and invited them to complete a survey about hazards in Oliver County. Twenty-seven people completed the survey.

Center Stakeholder Meeting (January 7, 2019; City of Center)

Potential hazards in Oliver County were first reviewed. Then there was discussion about development activity and potential impacts on new development. A detailed presentation was given about the various hazards and past impacts. Discussion followed.

Stakeholder Meeting (June 13, 2019; Oliver County Courthouse)

Discussion topics included capabilities assessment, hazard review, and potential mitigation actions. The committee also reviewed actions from the previous plan and identified their current status.

Stakeholder Meeting (December 4, 2019; Oliver County Courthouse)

A draft plan was distributed and discussed. There was discussion about the priority of various mitigation projects. It was decided to poll people who could not make the meeting as well.

Public Review Meeting (February 24, 2021; Oliver Courthouse)

Key elements of the draft plan were presented. Discussion focused on prioritizing and finalizing mitigation actions for the plan.

Community Survey

The community survey asked questions related to hazard prioritization and preferred mitigation strategies. The survey was distributed at a community event in December,2018. More information about publicity can be found later in this appendix. Results from the community survey were utilized to help develop the risk assessment and mitigation strategy.

Oliver Public Survey Results: 12/2/18

1. **Where do you live? (((27 total Surveys)))**
   a. In rural Oliver County. 6
   b. Center. 19
   c. Outside Oliver County. 2
2. **Choose the top three hazards that are a threat to your community?**
   a. Chemical Substance spill/release. 13
   b. Winter Storm. 18
   c. Summer Storm. 13
   d. Biological Food Contamination
   e. Wildfire. 9
   f. Animal Disease Outbreak. 3
   g. Armed Assault. 2
   h. Dam Failure. 1
   i. Chemical/Biological Food or Food Production Attack. 1
   j. Human Pandemic Outbreak. 3
   k. Flood. 10
   l. Cyber Attack. 2
   m. Other, Drugs
3. **Choose the top two human caused hazards that are a threat to your community?**
   a. Communicable Disease (human, crop, livestock). 12
   b. Dam Failure. 4
   c. Hazardous Materials Release. 15
   d. Homeland Security Incident. 4
   e. Urban Fire 16
   f. Other.
4. **Is your home located in a floodplain?**
   a. Yes. 3
   b. No. 21
   c. I don't know. 3
5. **Do you have flood insurance?**
   a. Yes. 4
   b. No. 23
   c. I don't know.
6. **If you don't have flood insurance, why not? (Select all that apply)**
   a. Not necessary because my property never floods. 11
   b. Too expensive. 2
   c. Not necessary because my property is elevated or otherwise protected. 7
   d. Never considered it. 5
   e. Other

7. **Potential action items to mitigate the effects of flooding are shown below. Please identify up to 3 action items that you think the County should consider pursuing.**
    a. Construct additional food protection dikes in strategic locations. 3
    b. Develop municipal storm sewer cleaning/inspection procedures. 11
    c. Educate residents about the benefits of flood insurance. 2
    d. Encourage all communities to join the National Flood Insurance Program (NFIP). 1
    e. Identify & protect commonly washed-out roads. 13
    f. Install riprap on river banks. 7
    g. Install sewer backflow prevention valves on select facilities. 6
    h. Property acquisition, relocation & elevation.
    i. Restrict development in high risk flood areas. 12
    j. Treat invasive species to restore natural stream function. 6
    k. Upgrade municipal storm water management infrastructure. 11
    l. Other.
8. **Potential action items to mitigate the effects of severe summer storms (hail, lightening wind, tornado, heavy rain) are shown below. Please identify up to 3 action items that you think the County should consider pursuing.**
    a. Back-up power sources. 16
    b. Building code enforcement. 3
    c. Construction/designation of community shelters. 12
    d. Distribute additional NOAA weather radios. 5
    e. Installing shatter-resistant window film on key public facilities. 2
    f. Installing surge protection on critical electronic equipment. 3
    g. Installing new warning sirens. 7
    h. Public education on summer storm safety. 9
    i. Require sheltering plan for new mobile home parks. 7
    j. Weather spotter training. 9
    k. Other
9. **Potential action items to mitigate the effects of severe winter storms (snow, ice, wind) are shown below. Please identify up to 3 action items that you think the County should consider pursuing.**
    a. Back-up power sources. 16
    b. Designation and advertisement of accessible heating centers during power outages. 6
    c. Encourage homeowners to install carbon monoxide monitors & alarms. 13
    d. Include safety strategies for severe weather in driver education classes & materials. 4
    e. Identify critical routes to keep plowed. 12
    f. Improve access to livestock during snowstorms. 1
    g. Public education on winter weather safety. 12
    h. Retrofitting public buildings to withstand snow loads & prevent roof collapse.1
    i. Snow fences/living snow fences. 13
    j. Tree removal/maintenance near power lines. 4
    k. Work with electric provider to bury power lines. 1

10. Potential action items to mitigate the effects of wildfires are shown below. Please identify up to 3 action items that you think the county should consider pursing.

a. Construct water storage tanks in strategic rural areas. 4
b. Develop defensible space education for rural homeowners. 4
c. Ensure adequate water supplies for fire suppression. 15
d. Implement a brush/fuel removal program to create defensible zones around major streets, powerlines & other infrastructure systems. 6
e. Install dry hydrants at strategic locations. 4
f. Install water supply monitors at storage facilities. 2
g. Provide training & additional resources to improve fire department response to wild fire. 14
h. Public education about special precautions during periods of high fire risk. 8
i. Remove abandoned or collapsed structures. 14
j. Routinely inspecting & repairing fire hydrants. 6

Reviewed Documents

Documents reviewed and incorporated into this plan include:

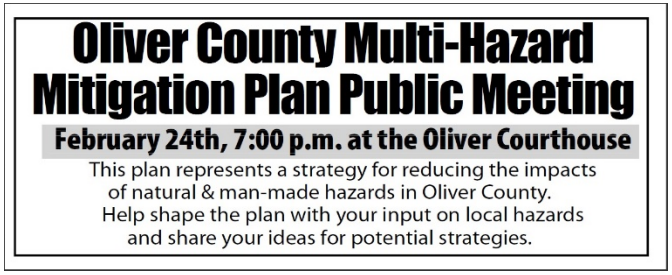
2014 Oliver County Multi-Hazard Mitigation Plan
Oliver County Risk MAP Study (risk assessment)
2018 State of North Dakota Enhanced Mission Area Operation Plan (risk assessment and mitigation ideas)

Neighboring Jurisdictions, Local and Regional Agencies

Representatives from North Dakota DES attended two LEPC/Planning Team Meetings. Representatives from MinnKota Power Cooperative attended two meetings as well. Local agencies represented included the Sheriff's Department, Auditor's Department from Oliver County, and the Oliver County Ambulance Squad.

Publicity

The public meetings were advertised in the *The Center Republican*. (See example notice below.)



Attendance

Representatives from each participating jurisdiction who attended at least one project meeting are listed below.

Oliver County:

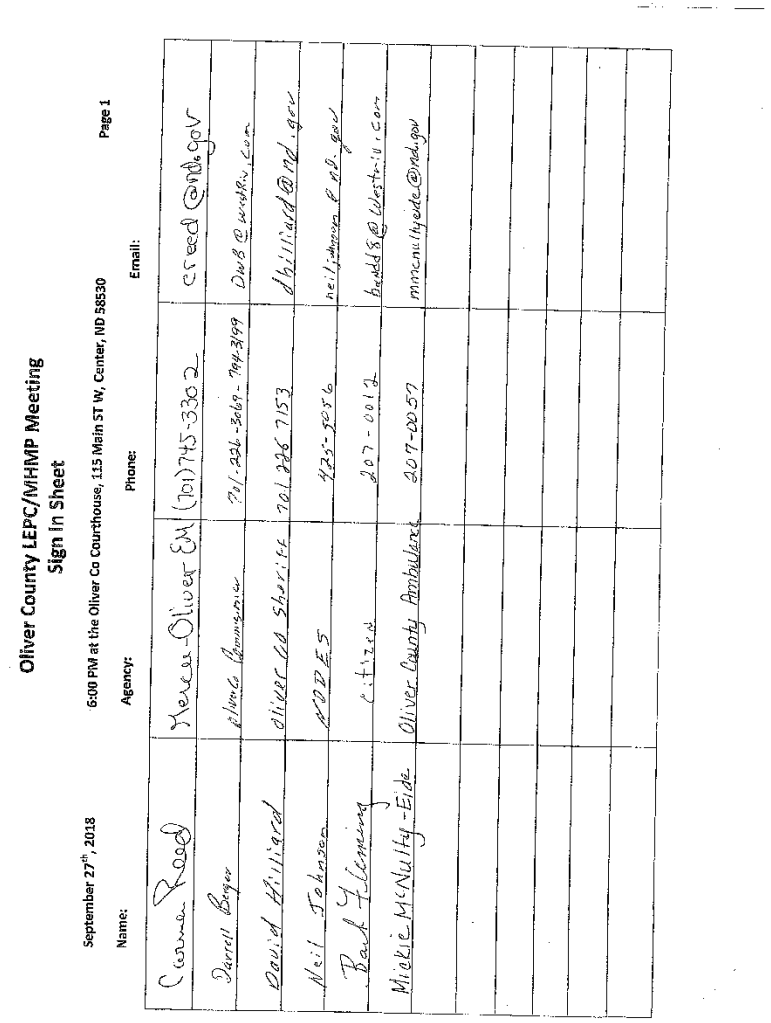
- Carmen Reed, Emergency Manager
- Darrell Berger, Oliver County Commissioner
- David Hilliard, Sheriff
- Neil Johnson, NDDES
- Barb Fleming, Citizen
- Mickie McNulty-Eide, Oliver County Ambulance Squad Leader
- Kevin Thomas, MinnKota Power Coop
- James Christoff, Oliver County Sheriff Department
- Scott Hopfauf, Minnkota Power Coop
- Troy Halberg, MinnKota Power Coop
- Jace Pastir, Oliver Co Sheriff Department
- Travis Davenport, Oliver County Ambulance
- Deb Anderson, Oliver County Ambulance
- Judith Hintz, Oliver County Auditor
-

CIty of Center:

- JD Hanson, City Council
- Allen Troy, City Council
- Kevin Hoffer, City Council
- Terrie Nehring, Auditor
- Shandy Kraft, Deputy Auditor
- Harold Wilkens, Mayor
- John Mahoney, City Attorney
- Mike Schutt, City Council

Planning Team members are identified in the following table.

Planning Team Members		
Name	**Title**	**Representing**
Carmen Reed	Emergency Manager	Oliver County
Darrell Berger	Commissioner/Fire Department	Oliver County
David Hilliard	Sheriff	Oliver County
Neil Johnson	Regional EM	ND DES
Barb Fleming	Resident	Oliver County
Mickie McNulty-Eide	Oliver Ambulance	Center
JD Hanson	City Council Member/Fire Department	Center
Allen Troy	City Council Member	Center
Terrie Nehring	City Auditor	Center
Shandy Kraft	City Deputy Auditor	Center
Mike Schutt	City Council Member	Center
Kevin Hoffman	City Council Member	Center
Harold Wilkens	Mayor	Center
John Mahoney	City/States Attorney	Center
Kevin Thomas	MinnKota Power Rep	Center
Scott Hopfauf	MinnKota Power Rep	Center
Troy Karlberg	MinnKota Power Rep	Center
Jace Pastir	Oliver Deputy	Center
James Christoff	Oliver Deputy	Center
Travis Davenport	Oliver Ambulance	Center
Deb Anderson	Oliver Ambulance	Center
Judith Hintz	Oliver Ambulance	Center



Oliver County LEPC/MHMP Meeting
Sign In Sheet

September 27th, 2018 — 6:00 PM at the Oliver Co Courthouse, 115 Main ST W, Center, ND 58530 — Page 1

Name:	Agency:	Phone:	Email:
Carmen Reed	Oliver EM	(701)745-3302	creed@nd.gov
Darrell Berger	Oliver Commissioner	701-220-3069 - 794-3199	DwB@westriv.com
David Hilliard	Oliver Co Sheriff	701 226 7153	dhilliard@nd.gov
Neil Johnson	NDDES	425-7836	neiljohnson@nd.gov
Barb Fleming	Citizen	207-0012	bwebb5@westriv.com
Mickie McNulty-Eide	Oliver County Ambulance	307-0059	mmcnultyeide@nd.gov

City of Center Meeting
Sign In Sheet

November 5th, 2018 | 7:00 PM at the Civic Center, 312 Lincoln Ave N, Center, ND 58530 | Page 1

Name:	Agency/Resident:	~~Phone:~~ Agency	Email:
JD Hanson	416 Prairie Ave N Center ND 58530	Center Council	
Allen Troy	123 Wilcox Ave S Center ND 58530	Center Council	
Terrie Nehring	2234 35th Ave SW Center, ND 58530	Center Auditor	
Shandy Kraft	122 Butte Ave N Center ND 58530	Center Deputy Auditor	
Mike Schutt	342 Center Ave Center, ND 58530	Center Council	
Kevin Hoffa	404 Lakota Ave N Center ND 58530	Center Council	
Harold Willeems	211 Market Blvd-W Center, N.D. 58530	Center ~~Council Chair~~ Mayor	
John Mahoney	124 W Main St. Center ND 58530	Center Attorney & Oliver States Attorney	

Oliver County LEPC/MHMP Meeting
Sign In Sheet

November 29th, 2018 | 6:00 PM at the Oliver Co Courthouse, 115 Main ST W, Center, ND 58530 | Page 1

Name:	Agency:	Phone:	Email:
Carmen Creed	Oliver-Mercer EM	701)870-0689	creed@nd.gov
Kevin Thomas	Minnkota Power Coop	(701) 794-8711	KThomas@minkota.com
James Christoff	Oliver County S.O	701-301-0768	jchristoff@nd.gov
Neil Johnson	NDDES	701-425-5056	neiljohnson@nd.gov
Scott Hoffarth	Minnkota Power	701.794.7220	SHoffarth@minkota.com
Barb Fleming	Citizen	701-794-3320	bandd8@Westriv.com
David Hilliard	Oliver Co. S.O.	701 226 7153	

City of Center MHMP Meeting
Sign In Sheet

January 7th, 2019 | **7:00 PM at the Center Civic Center, 312 Lincoln AV N, Center, ND 58530** | **Page 1**

Name:	Address:	Agency/Resident:	Email/Phone#:
JD Hanson	416 Prairie Ave N Center	Center Council	
Allen Troy	123 Wilcox Ave S. Center	Center Council	
Terrie Nehring	2234 35 Ave SW Center	Center Auditor	
Mike Schurr	392 Center Ave Center	Center Council	
Harold Wilkens	211 Market ST. W Center	Center Mayor	
John Mahoney	124 Main ST. W. Center	Center City Attorney	

Oliver County LEPC/MHMP Meeting
Sign In Sheet

June 13th, 2019 | **7:00 PM at the Oliver Co Courthouse, 115 Main ST W, Center, ND 58530** | **Page 1**

Name:	Agency:	Phone:	Email: / Mileage
Carmen Reed	Mercer-Oliver EM	701-870-0689	creed@nd.gov / 30
Bob Fleming	Citizen	701-202-0012	bandds@westnet.com 1
Neil Johnson	ND DES	701-328-8130	neiljohnson@nd.gov mile
TROY HALLBERG	MINNKOTA POWER	701-400-9465	THALLBERG@MINNKOTA.COM mile
David Hilliard	Oliver Co S.O.	701 726 7153	dhilliard@nd.gov
Jace Pastir	Oliver Co S.O.	701 595 2045	jwpastir@nd.gov
James Christoff	Oliver Co S.O	701-301-0768	jchristoff@nd.gov
Travis Davenport	Oliver Co. Ambulance	701 880 8879	travisd@urtc.com

Sign-In Sheet

JAN 22, 2019 6:30 PM

NAME	MAILING ADDRESS Phone #	ORGANIZATION	E-MAIL ADDRESS
Shawn Hanna	353rd St N 9280222	City Council	mardriver52@hotmail
KEVIN Page	P.O. 1372 Hettinger 567-4688	Adams County Commissioner	page1497@NDSupernet.com
Joel Quambeck	Wells Fargo	KLJ	joel.quambeck@kljeng.com
Neil Johnson	Bismarck	NDDES	neil.johnson@nd.gov
Travis Collins	PO Box 1040 Hettinger	Adams Co SO	tlcollins@nd.gov
PAT CARROLL	PO Box 589 Hettinger	ADAMS CO	pcarroll@nd.gov
KRISTA FALLER	POBOX 589 701-567-4363	ADAMS CO	kfaller@nd.gov
Joe K Wanner	227 North Sixth St Dickinson	SWDHU	jkwanner@nd.gov
Kevin Hagen	1402 15th Ave NW Reeder	Reeder Fire	hagen-kevin@hotmail.com
Michele Gaylord	PO Box 589 Hettinger	Adams Co EM	adams-em@nd.gov

Sign-In Sheet Adams County LEPC/MHMP Meeting March 7, 2019 5:30PM MDT

NAME	Representing	Phone #	Email
Lucille Bartels	Haynes	567-2560	lucillebartels@msn.com
Sarah Chadwick	Haynes	567-2560	
Joe K Wanner	SWDHU	390-4097	jkwanner@nd.gov
Ken Musick	SWDHU	701-590-2501	kemusick@nd.gov
Neil Johnson	NDDES	701-328-8130	neil.johnson@nd.gov
PAT CARROLL	ADAMS CO	701-567-4363	pcarroll@nd.gov
Krista Faller	Adams Co.	701-567-4363	Kfaller@nd.gov
James Lindquist	Adams Co.	701-928-1572	jimrlindquist@gmail.com
Theo Schalesky	Adams Co	701-567-3376	adamscounty@ndsupernet.com
Michele Gaylord	Adams Co	701-567-4598	adams-em@nd.gov

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.

Oliver County Hazard Events, 1996-2018							
Location	**Date**	**Type**	**Magnitude**	**Deaths**	**Injuries**	**Property Damage**	**Crop Damage**
OLIVER (ZONE)	1/17/1996	Blizzard		0	0	0	0
OLIVER (ZONE)	2/1/1996	Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/10/1996	High Wind	50	0	0	0	0
OLIVER (ZONE)	2/26/1996	Blizzard		0	0	0	0
OLIVER (ZONE)	3/23/1996	Winter Storm		0	0	0	0
OLIVER CO.	5/30/1996	Tornado		0	0	0	0
OLIVER CO.	6/30/1996	Thunderstorm Wind	55	0	0	12000	0
OLIVER CO.	6/30/1996	Hail	0.75	0	0	0	0
OLIVER CO.	7/10/1996	Thunderstorm Wind	55	0	0	500	0
OLIVER CO.	7/10/1996	Hail	0.75	0	0	0	0
OLIVER CO.	7/10/1996	Hail	2.75	0	0	0	0
OLIVER CO.	7/10/1996	Hail	1.75	0	0	0	0
OLIVER CO.	7/10/1996	Hail	1	0	0	0	0
OLIVER (ZONE)	11/5/1996	Winter Storm		0	0	0	0
OLIVER (ZONE)	11/19/1996	Winter Storm		0	0	0	0
OLIVER (ZONE)	11/23/1996	Winter Storm		0	0	0	0
OLIVER (ZONE)	12/16/1996	Blizzard		0	0	0	0
OLIVER (ZONE)	12/25/1996	Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	1/4/1997	Blizzard		0	1	$250,000	0
OLIVER (ZONE)	1/4/1997	Blizzard		0	0	0	0
OLIVER (ZONE)	1/9/1997	Blizzard		0	1	$1,530,000	0
OLIVER (ZONE)	3/12/1997	Winter Storm		0	0	0	0
OLIVER (ZONE)	3/21/1997	Flood		0	0	0	0
OLIVER (ZONE)	4/4/1997	Blizzard		0	0	$1,520,000	0
OLIVER (ZONE)	2/25/1998	Blizzard		0	0	0	0
OLIVER CO.	5/13/1998	Hail	1	0	0	0	0
OLIVER CO.	5/13/1998	Tornado		0	0	0	0

OLIVER (ZONE)	11/9/1998	Heavy Snow		0	0	0	0
OLIVER (ZONE)	11/18/1998	Winter Storm		0	0	0	0
OLIVER (ZONE)	1/1/1999	Winter Storm		0	0	0	0
OLIVER (ZONE)	1/26/1999	Winter Storm		0	0	0	0
OLIVER (ZONE)	4/1/1999	Blizzard		0	0	0	0
OLIVER (ZONE)	4/3/1999	Winter Storm		0	0	0	0
OLIVER CO.	5/26/1999	Hail	0.88	0	0	0	0
OLIVER CO.	6/3/1999	Hail	1	0	0	0	0
OLIVER CO.	6/13/1999	Tornado		0	0	0	0
OLIVER CO.	6/21/1999	Hail	0.75	0	0	0	0
OLIVER CO.	8/15/1999	Hail	1.25	0	0	0	0
OLIVER CO.	8/15/1999	Hail	2	0	0	0	0
OLIVER CO.	8/15/1999	Hail	0.75	0	0	0	0
OLIVER (ZONE)	10/31/1999	High Wind	60	0	0	0	0
OLIVER (ZONE)	2/25/2000	Winter Storm		0	0	0	0
OLIVER (ZONE)	2/26/2000	Winter Storm		0	0	0	0
OLIVER (ZONE)	3/8/2000	Winter Storm		0	0	0	0
OLIVER (ZONE)	4/5/2000	High Wind	60	0	0	0	0
OLIVER (ZONE)	4/13/2000	Winter Storm		0	0	0	0
OLIVER (ZONE)	4/14/2000	Winter Storm		0	0	0	0
OLIVER CO.	6/11/2000	Hail	0.75	0	0	0	0
OLIVER CO.	6/11/2000	Hail	0.75	0	0	0	0
OLIVER CO.	6/11/2000	Hail	1	0	0	0	0
OLIVER CO.	6/11/2000	Tornado		0	0	0	0
OLIVER CO.	11/1/2000	Tornado		0	0	0	0
OLIVER (ZONE)	11/7/2000	Winter Storm		0	0	0	0
OLIVER (ZONE)	12/16/2000	Blizzard		0	0	0	0
OLIVER CO.	6/9/2001	Hail	0.75	0	0	0	0
OLIVER CO.	6/9/2001	Hail	1.75	0	0	0	0
OLIVER CO.	6/9/2001	Hail	0.75	0	0	0	0

OLIVER CO.	6/9/2001	Thunderstorm Wind	65	0	0	0	0
OLIVER CO.	6/9/2001	Thunderstorm Wind	70	0	0	0	0
OLIVER CO.	7/19/2001	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	7/22/2001	Thunderstorm Wind	57	0	0	0	0
OLIVER (ZONE)	11/1/2001	High Wind	39	0	0	0	0
OLIVER (ZONE)	4/18/2002	Winter Storm		0	0	0	0
OLIVER (ZONE)	5/7/2002	Winter Storm		0	0	0	0
OLIVER CO.	6/14/2002	Hail	0.88	0	0	0	0
OLIVER CO.	7/24/2002	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	7/31/2002	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	8/30/2002	Flash Flood		0	0	0	0
OLIVER CO.	8/30/2002	Flash Flood		0	0	0	0
OLIVER CO.	8/30/2002	Hail	0.75	0	0	0	0
OLIVER CO.	8/30/2002	Hail	0.75	0	0	0	0
OLIVER CO.	8/30/2002	Hail	1	0	0	0	0
OLIVER CO.	8/30/2002	Hail	1	0	0	0	0
OLIVER (ZONE)	11/29/2002	High Wind	35	0	0	0	0
OLIVER (ZONE)	12/17/2002	Winter Storm		0	0	0	0
OLIVER CO.	7/3/2003	Hail	0.75	0	0	0	0
OLIVER CO.	7/3/2003	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	7/3/2003	Thunderstorm Wind	52	0	0	0	0
OLIVER (ZONE)	1/4/2004	Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	1/24/2004	Winter Storm		0	0	0	0
OLIVER (ZONE)	1/27/2004	Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/10/2004	Blizzard		0	0	0	0
OLIVER (ZONE)	2/10/2004	Winter Storm		0	0	0	0
OLIVER (ZONE)	3/10/2004	Blizzard		0	0	0	0
OLIVER (ZONE)	3/10/2004	High Wind	44	0	0	0	0
OLIVER (ZONE)	3/13/2004	High Wind	53	0	0	0	0
OLIVER (ZONE)	5/15/2004	High Wind	37	0	0	0	0

OLIVER CO.	7/10/2004	Thunderstorm Wind	56	0	0	0	0
OLIVER CO.	8/23/2004	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	8/23/2004	Tornado		0	0	0	0
OLIVER (ZONE)	12/11/2004	High Wind	50	0	0	0	0
OLIVER (ZONE)	12/20/2004	High Wind	45	0	0	0	0
OLIVER (ZONE)	1/13/2005	Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	3/9/2005	High Wind	42	0	0	0	0
OLIVER CO.	5/7/2005	Flash Flood		0	0	0	0
OLIVER CO.	6/19/2005	Hail	1	0	0	0	0
OLIVER CO.	6/19/2005	Hail	1.75	0	0	0	0
OLIVER CO.	6/19/2005	Hail	1	0	0	0	0
OLIVER CO.	7/10/2005	Hail	0.88	0	0	0	0
OLIVER CO.	7/21/2005	Hail	1.75	0	0	30000	0
OLIVER CO.	7/21/2005	Hail	0.88	0	0	0	0
OLIVER (ZONE)	2/16/2006	Cold/Wind Chill		0	0	0	0
OLIVER CO.	5/27/2006	Hail	1	0	0	0	0
OLIVER CO.	7/12/2006	Hail	0.75	0	0	0	0
OLIVER (ZONE)	7/12/2006	Wildfire		0	0	0	0
OLIVER CO.	8/24/2006	Hail	1.75	0	0	0	45000
OLIVER CO.	8/24/2006	Hail	1.75	0	0	0	0
OLIVER CO.	8/24/2006	Hail	0.75	0	0	0	0
OLIVER CO.	8/24/2006	Thunderstorm Wind	56	0	0	0	0
OLIVER (ZONE)	2/28/2007	Winter Storm		0	0	0	0
OLIVER (ZONE)	3/30/2007	Ice Storm		0	0	0	0
OLIVER CO.	5/14/2007	Thunderstorm Wind	61	0	0	1000	0
OLIVER (ZONE)	5/14/2007	High Wind	36	0	0	0	0
OLIVER CO.	5/21/2007	Hail	1	0	0	100	0
OLIVER CO.	5/21/2007	Thunderstorm Wind	52	0	0	0	0
OLIVER (ZONE)	11/13/2007	High Wind	35	0	0	0	0
OLIVER (ZONE)	2/10/2008	Extreme Cold/Wind Chill		0	0	0	0

OLIVER (ZONE)	3/24/2008	High Wind	50	0	0	0	0
OLIVER (ZONE)	5/1/2008	High Wind	36	0	0	0	0
OLIVER CO.	6/18/2008	Hail	0.75	0	0	0	0
OLIVER CO.	6/18/2008	Hail	1	0	0	0	0
OLIVER (ZONE)	7/11/2008	High Wind	35	0	0	0	0
OLIVER (ZONE)	7/12/2008	High Wind	35	0	0	0	0
OLIVER CO.	7/19/2008	Hail	0.88	0	0	0	0
OLIVER CO.	7/28/2008	Funnel Cloud		0	0	0	0
OLIVER CO.	8/21/2008	Hail	0.88	0	0	0	0
OLIVER (ZONE)	10/26/2008	High Wind	35	0	0	0	0
OLIVER (ZONE)	11/6/2008	Blizzard		0	0	0	0
OLIVER (ZONE)	12/13/2008	Blizzard		0	0	0	0
OLIVER (ZONE)	12/14/2008	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	12/20/2008	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	12/26/2008	Heavy Snow		0	0	0	0
OLIVER (ZONE)	12/29/2008	Heavy Snow		0	0	0	0
OLIVER (ZONE)	1/8/2009	Heavy Snow		0	0	0	0
OLIVER (ZONE)	1/11/2009	Blizzard		0	0	0	0
OLIVER (ZONE)	1/16/2009	Winter Weather		0	0	0	0
OLIVER (ZONE)	1/31/2009	High Wind	35	0	0	0	0
OLIVER (ZONE)	2/9/2009	Heavy Snow		0	0	0	0
OLIVER CO.	3/6/2009	Flood		0	0	88000	0
OLIVER (ZONE)	3/23/2009	Blizzard		0	0	0	0
OLIVER (ZONE)	3/30/2009	Heavy Snow		0	0	0	0
OLIVER CO.	4/1/2009	Flood		0	0	99000	0
OLIVER CO.	6/22/2009	Thunderstorm Wind	65	0	0	12000	0
OLIVER CO.	6/22/2009	Thunderstorm Wind	56	0	0	0	0
OLIVER CO.	9/10/2009	Thunderstorm Wind	52	0	0	10000	0
OLIVER (ZONE)	12/23/2009	Winter Storm		0	0	0	0

OLIVER (ZONE)	12/25/2009	Blizzard		0	0	0	0
OLIVER (ZONE)	1/5/2010	Winter Weather		0	0	0	0
OLIVER (ZONE)	1/6/2010	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	1/18/2010	Winter Weather		0	0	0	0
OLIVER (ZONE)	1/22/2010	Winter Storm		0	0	0	0
OLIVER (ZONE)	1/25/2010	Blizzard		0	0	$321,000	0
OLIVER (ZONE)	3/9/2010	Winter Weather		0	0	0	0
OLIVER (ZONE)	4/2/2010	Winter Storm		0	0	$950,000	0
OLIVER (ZONE)	5/6/2010	Winter Weather		0	0	0	0
OLIVER CO.	5/24/2010	Thunderstorm Wind	50	0	0	0	0
OLIVER (ZONE)	5/25/2010	High Wind	52	0	0	$30,000	0
OLIVER (ZONE)	6/18/2010	High Wind	35	0	0	0	0
OLIVER CO.	7/20/2010	Hail	1	0	0	0	0
OLIVER CO.	8/1/2010	Hail	1.75	0	0	0	0
OLIVER (ZONE)	10/26/2010	Blizzard		0	0	0	0
OLIVER (ZONE)	10/26/2010	High Wind	52	0	0	0	0
OLIVER (ZONE)	12/20/2010	Heavy Snow		0	0	0	0
OLIVER (ZONE)	1/31/2011	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/1/2011	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/1/2011	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/8/2011	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/13/2011	High Wind	35	0	0	$20,000	0
OLIVER (ZONE)	3/11/2011	Blizzard		0	0	0	0
OLIVER (ZONE)	3/22/2011	Winter Storm		0	0	0	0
OLIVER (ZONE)	4/14/2011	Heavy Snow		0	0	0	0
OLIVER (ZONE)	4/30/2011	Blizzard		0	0	0	0
OLIVER (ZONE)	5/31/2011	High Wind	35	0	0	0	0

OLIVER CO.	6/2/2011	Flood		0	0	500000	0
OLIVER CO.	6/12/2011	Flash Flood		0	0	20000	0
OLIVER CO.	6/20/2011	Funnel Cloud		0	0	0	0
OLIVER CO.	6/20/2011	Funnel Cloud		0	0	0	0
OLIVER CO.	7/1/2011	Flood		0	0	0	0
OLIVER (ZONE)	7/16/2011	Excessive Heat		0	0	0	0
OLIVER CO.	7/24/2011	Hail	0.75	0	0	0	0
OLIVER CO.	7/24/2011	Hail	0.88	0	0	0	0
OLIVER CO.	8/1/2011	Flood		0	0	0	0
OLIVER (ZONE)	9/20/2011	High Wind	35	0	0	0	0
OLIVER (ZONE)	1/18/2012	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	10/17/2012	High Wind	50	0	0	0	0
OLIVER (ZONE)	11/10/2012	Heavy Snow		0	0	0	0
OLIVER (ZONE)	1/20/2013	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	1/30/2013	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/2/2013	Blizzard		0	0	0	0
OLIVER (ZONE)	3/4/2013	Blizzard		0	0	0	0
OLIVER (ZONE)	4/14/2013	Winter Storm		0	0	0	0
OLIVER CO.	7/9/2013	Hail	1	0	0	0	0
OLIVER CO.	7/9/2013	Hail	1.75	0	0	0	0
OLIVER CO.	8/30/2013	Hail	1.25	0	0	0	0
OLIVER (ZONE)	12/2/2013	Heavy Snow		0	0	0	0
OLIVER (ZONE)	12/6/2013	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	1/4/2014	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	1/15/2014	High Wind	56	0	0	0	0
OLIVER (ZONE)	1/22/2014	Extreme Cold/Wind Chill		0	0	0	0

OLIVER (ZONE)	1/26/2014	Blizzard		0	0	0	0
OLIVER (ZONE)	3/1/2014	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	3/31/2014	Blizzard		0	0	0	0
OLIVER CO.	7/6/2014	Thunderstorm Wind	74	0	0	60000	0
OLIVER CO.	7/6/2014	Thunderstorm Wind	65	0	0	10000	0
OLIVER CO.	7/21/2014	Thunderstorm Wind	70	0	0	100000	0
OLIVER CO.	7/21/2014	Thunderstorm Wind	61	0	0	45000	0
OLIVER CO.	7/21/2014	Thunderstorm Wind	61	0	0	25000	0
OLIVER CO.	7/21/2014	Thunderstorm Wind	61	0	0	0	0
OLIVER CO.	7/21/2014	Thunderstorm Wind	61	0	0	0	0
OLIVER CO.	9/3/2014	Hail	1.75	0	0	60000	0
OLIVER CO.	9/3/2014	Hail	1	0	0	0	0
OLIVER CO.	9/4/2014	Hail	2.75	0	0	200000	100000
OLIVER CO.	6/24/2015	Hail	0.88	0	0	0	0
OLIVER CO.	7/23/2015	Thunderstorm Wind	65	0	0	20000	30000
OLIVER CO.	7/23/2015	Hail	1	0	0	0	0
OLIVER (ZONE)	7/28/2015	High Wind	37	0	0	0	0
OLIVER (ZONE)	8/22/2015	High Wind	36	0	0	0	0
OLIVER CO.	10/1/2015	Hail	1	0	0	0	0
OLIVER (ZONE)	10/11/2015	High Wind	50	0	0	0	0
OLIVER (ZONE)	11/18/2015	High Wind	56	0	0	0	0
OLIVER (ZONE)	2/6/2016	High Wind	59	0	0	0	0
OLIVER CO.	6/21/2016	Thunderstorm Wind	65	0	0	10000	0
OLIVER CO.	7/10/2016	Thunderstorm Wind	52	0	0	10000	0
OLIVER CO.	7/10/2016	Hail	0.75	0	0	0	0
OLIVER CO.	7/20/2016	Funnel Cloud		0	0	0	0
OLIVER CO.	7/20/2016	Hail	1	0	0	0	0
OLIVER CO.	7/20/2016	Hail	1	0	0	0	0
OLIVER CO.	7/20/2016	Hail	1.25	0	0	0	0
OLIVER CO.	7/20/2016	Hail	1.25	0	0	0	0

OLIVER CO.	7/20/2016	Hail	1.5	0	0	0	0
OLIVER (ZONE)	11/27/2016	Heavy Snow		0	0	0	0
OLIVER (ZONE)	12/5/2016	Blizzard		0	0	0	0
OLIVER (ZONE)	12/25/2016	Blizzard		0	0	0	0
OLIVER (ZONE)	1/2/2017	Heavy Snow		0	0	0	0
OLIVER (ZONE)	1/30/2017	High Wind	39	0	0	0	0
OLIVER (ZONE)	3/7/2017	High Wind	52	0	0	0	0
OLIVER CO.	6/10/2017	Hail	1	0	0	0	0
OLIVER CO.	6/10/2017	Hail	1	0	0	0	0
OLIVER CO.	6/10/2017	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	6/10/2017	Thunderstorm Wind	52	0	0	0	0
OLIVER CO.	7/14/2017	Thunderstorm Wind	50	0	0	0	0
OLIVER CO.	7/21/2017	Tornado		0	0	0	0
OLIVER (ZONE)	3/5/2018	Heavy Snow		0	0	0	0
OLIVER (ZONE)	3/23/2018	Heavy Snow		0	0	0	0
OLIVER CO.	6/1/2018	Thunderstorm Wind	52	0	0	8000	0
OLIVER CO.	6/28/2018	Hail	1	0	0	0	0
OLIVER CO.	9/12/2018	Hail	1	0	0	0	0
OLIVER (ZONE)	12/26/2018	Heavy Snow		0	0	0	0
OLIVER (ZONE)	1/27/2019	High Wind	52	0	0	0	0
OLIVER (ZONE)	1/29/2019	Extreme Cold/Wind Chill		0	0	0	0
OLIVER (ZONE)	2/3/2019	Heavy Snow		0	0	0	0
OLIVER CO.	7/8/2019	Hail	1	0	0	0	0
OLIVER CO.	7/12/2019	Hail	1	0	0	0	0
OLIVER CO.	8/6/2019	Hail	2	0	0	5000	50000
OLIVER CO.	8/6/2019	Thunderstorm Wind	61	0	0	0	0
OLIVER CO.	8/6/2019	Hail	1	0	0	0	0
OLIVER CO.	8/6/2019	Hail	1.5	0	0	0	0
OLIVER CO.	8/25/2019	Hail	1	0	0	0	0

Appendix D: Mitigation Action Determination

Mitigation activities were discussed at the last City meeting and at four of the LEPC/Planning Team meetings. The public was also invited to provide input on mitigation actions with the community survey and the February 2021 public meeting. Activity selection was based on several processes. First, the consultant provided a list of recommendations for new potential action items based on survey results, community meeting and LEPC/Planning Team comments. Second, each hazard was reviewed for level of priority and need for mitigation action items. Third, previous mitigation actions were reviewed and appropriate ones included in this plan. Fourth, the potential mitigation action items were reviewed by the Oliver County Emergency Manager and by the LEPC Planning Team for feasibility and prioritized by the LEPC/Planning Team to best fit Oliver County's capacity and context.

Hierarchy of Needs

1. Life/Safety – protecting the lives and ensuring the safety of people is the highest priority

2. Emergency Response Capability – maintaining the capacity of local emergency responders is the second highest priority

3. Critical Facilities Protection – protecting the structure and functionality of critical facilities is the third highest priority

4. Property Protection – protecting existing structures and property which represent the wealth and means to livelihood from hazards is the fourth highest priority

5. Future Development/Economic Capacity – the final priority is to maintain capacity for current business and economic activity, as well as protecting the potential for future development activity

Status of Previous Mitigation Action Items

The 27 mitigation actions from the previous plan have been evaluated and addressed in the following ways in this Plan:

Complete – Seven action items were completed

Ongoing – Eleven action items are still valid and will be ongoing actions under this plan.

Dropped – Seven action items were dropped as no longer relevant or significant.

Incorporated – Two action items were incorporated into this plan with some modifications. Their underlying objectives will be addressed the modified action items.

ACTION:	STATUS:
Acquire Sirens for the Golf Course & Cross Ranch State Park (State)	Siren for Golf Course is Ongoing? Can't buy items for State.
Acquire pagers and/or cell phone alert system	Completed
Develop Storm Shelter Signage to direct residents to nearest shelter	Ongoing. Ads in Local Paper & Posters are used.
Schedule HazMat training for responders	Ongoing. HazMat Training done between Mercer & Oliver Counties 2-3 years.
Designate the Civic Center & Courthouse as storm shelters	Civic Center is the storm Shelter.
Develop on-call procedures for Fire Department.	Not relevant.
Develop inspection & cleaning schedule for storm water system	Ongoing through the City PW.
Develop operating procedures for emergency heating shelters??	Not relevant/dropped.
Develop drought emergency procedures??	Not relevant/dropped.

Acquire generator for Civic Center.	Completed.
Install Battery Backup for Center City Sirens	Completed.
Acquire Binoculars for Fire Vehicles.	Not relevant/dropped.
Develop hazmat summary sheet to be included in first responder vehicles??	Completed.
Establish Living Snow fence along Hwy 25 between MM14 & 25.	Completed
Establish living snow fence along Hwy 48 at edge of town.	Completed
Apply Flood proofing to City Lift Stations.	Ongoing
Acquire additional hazmat equipment for Fire Department	Ongoing
Acquire replacement siren for north side of Center	Completed
Identify & repair/replace damaged culverts on county roads.	Ongoing
Educate residents about winter weather safety.	Ongoing
Educate residents about fire safety on fire prevention week.	Ongoing
Work with FEMA to update FIRM in Center.	Ongoing
Support the Oliver/Morton WRD in developing emergency plans for remaining dams in county.	Ongoing
Reserve one 911/LEoP Meeting specifically for discussion of Hazardous Materials.	Dropped.
Explore possibility of creating a paid staff position for fire department.	Dropped.
Review Floodplain management education resources	Ongoing.
Update list of nurses that would respond during a mass casualty.	Dropped.

Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action/Project Title		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Project Status	❑ Project completed ❑ Project canceled ❑ Project on schedule ❑ Anticipated completion date:_____ ❑ 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?	
Capability Assessment	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 NFIP participation changed in the participating jurisdictions?	
Risk 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?	
	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	

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?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	