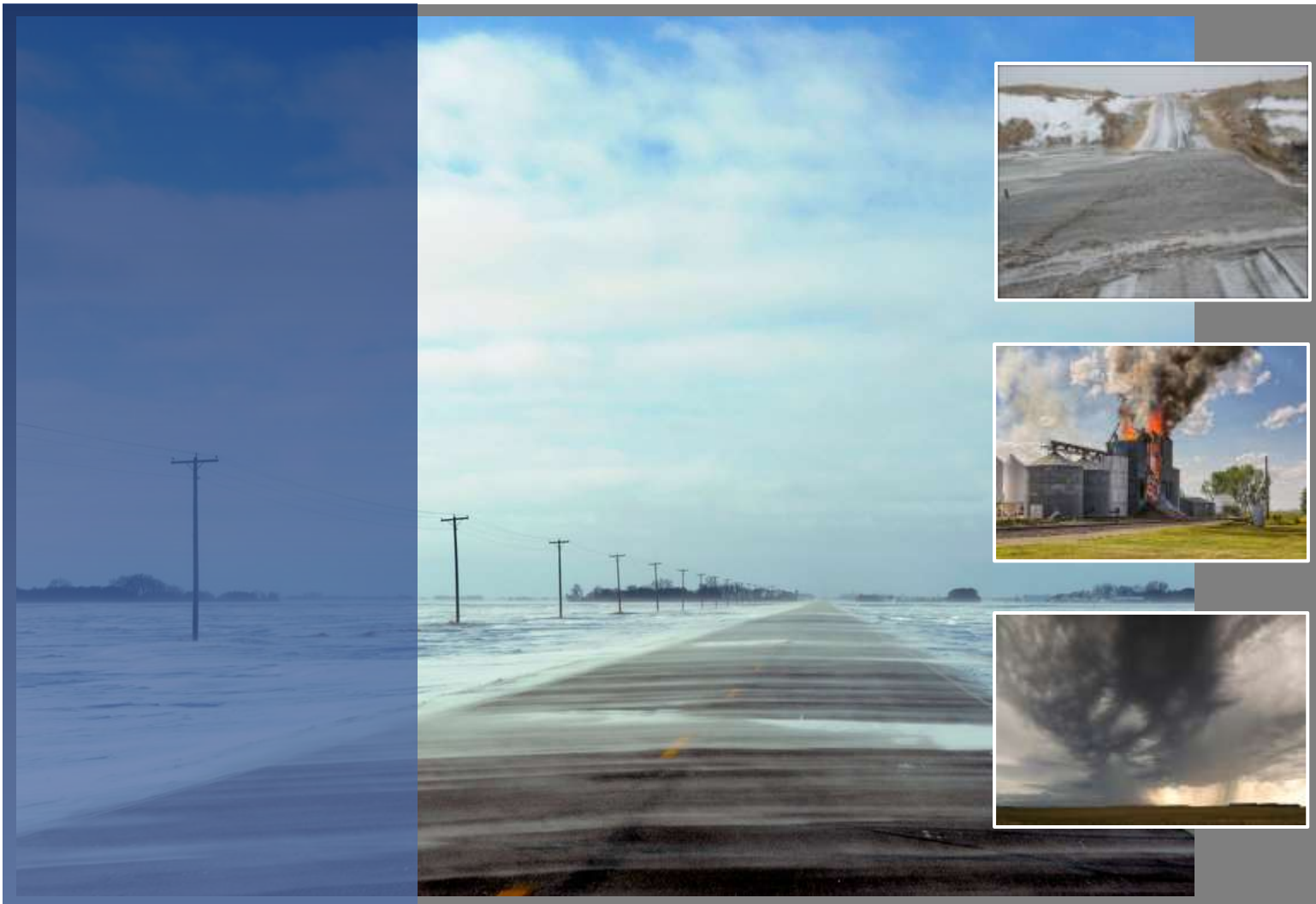

2018

Cavalier County Multi-Hazard Mitigation Plan

March, 2018

Cavalier County, ND

City of Alsen
City of Calio
City of Calvin
City of Hannah
City of Langdon
City of Loma
City of Milton
City of Munich
City of Nekoma
City of Osnabrock
City of Sarles
City of Wales

PARAMOUNT PLANNING

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Cavalier County

Multi-Hazard Mitigation Plan Update

FINAL DRAFT

March 2018

Prepared for:

Cavalier County Emergency Management
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Foreword

The ***2017 Cavalier County Multi-Hazard Mitigation Plan*** was developed in collaboration with local and county mitigation and resilience stakeholders. The primary contractor was Paramount Planning Group, LLC in partnership with the Cavalier County Emergency Management Department. These two parties collaborated in the review and updating of the previous Multi-Hazard Mitigation Plan which was approved by FEMA on March 6th, 2013.

Key revisions and overarching themes of the ***2018 Cavalier County Multi-Hazard Mitigation Plan*** include:

- Adding of community profiles including basic characteristics and other information.
- Revision of community capabilities, verification of critical facilities and vulnerabilities.
- County-wide Risk Assessment
- Review and update of Mitigation Strategies
- Update to Hazard Identification and occurrences.
- Community outreach and stakeholder involvement

AUTHORITY

Federal Government: Hazard Mitigation Plans are required on the local level under the Code of Federal Regulations (CFR) Title 44 – §201.6 – Local Mitigation Plans. "A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants and in order to apply for and receive mitigation project grants under all other mitigation grant programs." The Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707), of 1988 also highlights the requirement of a mitigation plan that "outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government." in Section 322. This was later amended by the Disaster Mitigation Act of 2000.

State Government: North Dakota Century Code, Chapter 37-17.1-02, requires that the North Dakota Department of Emergency Services (NDDES) "Provide for a statewide emergency management system embodying all aspects of prevention, mitigation, preparedness, response, and recovery and incorporating the principles of the national incident management system and its incident command system, as well as other applicable federal mandates." The North Dakota Department of Emergency Services administers mitigation guidance and funding to state and local applicants following a Presidentially-declared disaster.

Local Government: Local governments plan an essential role in implementing effective mitigation, both before and after disaster events. Each local government will review damages, losses, and related impacts to determine the need or requirement for mitigation action and planning, whenever seriously affected by a disaster, or when applying for state or federal recovery assistance. In Cavalier County, the County Board of Commissioners is responsible for carrying out plans and policies.

Table of Contents

SECTION I: Introduction

I. A. Introduction

The intent of this plan is to reduce the consequence and severity of natural hazards on the people and property of Cavalier County, North Dakota through the identification of high probability hazards and the development of risk-based mitigation projects.

Hazard Mitigation is defined as any action taken to reduce or eliminate long term risk to people and property from natural disasters. (FEMA) Hazard Mitigation has been a top priority for the Federal Emergency Management Agency, or FEMA, and reducing the effects of disasters on citizens is one of the federal governments primary goals, as well as the State of North Dakota and Cavalier County Emergency Management. By utilizing specific projects, policies, codes, and measures; it is possible to achieve the aforementioned goal.

Hazard Mitigation is considered one of the most cost-effective tools by reducing the impact of disasters on people and property. According to the Multihazard Mitigation Council, each $1 spend on mitigation, saves communities $4 in future losses[1], highlighting the importance of multi-jurisdictional and county Hazard Mitigation Planning. The council also estimates that the

[1] https://www.nibs.org/?page=mmc, Accessed on Sept. 30th, 2017.

government saves approximately $970 million of the Federal Treasury every year by using the ~ $265 million in FEMA grants.

Local Multi-Hazard Mitigation Plans are required by the Disaster Mitigation Act of 2000 in order to be eligible for certain federal disaster assistance and hazard mitigation grants and funding programs and must be updated every 5 years. Eligibility requires each community (incorporated city, County) to adopt the Multi-Hazard Mitigation Plan (MHMP) through local legal boards.

This Multi-Hazard Mitigation Plan represents the efforts of Cavalier County and its combined local governments to fulfill the responsibility for hazard mitigation planning.

I. B. Scope

This plan is developed to cover all Cavalier County and its 12 incorporated cities of Alsen, Calio, Calvin, Hannah, Langdon, Loma, Milton, Munich, Nekoma, Osnabrock, Sarles, and Wales. It also serves the concerns and needs of the 40 townships, local school districts, and other entities participating in this plan. The plan covers all federally declared disasters, as well as other hazard occurrences and emergencies that have occurred in the county. This plan evaluates and ranks the major hazards affecting Cavalier County as determined by frequency, impact, injuries, and deaths.

I. C. Purpose

The 2018 Cavalier County Multi-Hazard Mitigation Plan was written to help guide all hazard mitigation projects in the county. The plan uses local risk assessments, hazard occurrences, and community profiles and takes in local citizen input to form hazard mitigation action items.

C.1 Plan Goals

- Enhance local understanding of mitigation planning and its benefits to local communities.
- Minimize risk and vulnerability of Cavalier County to the impacts of natural hazard on people and property (economy, public health and safety, and environment) through the implementation of effective mitigation projects.
- Provide protection for critical facilities, infrastructure, utilities, and services from hazard impacts.
- To evaluate and rank the hazards that impact Cavalier County.
- Improve public awareness, education, and preparedness for all hazard types across all jurisdictions.
- Enhance public awareness of hazards.
- Increase community capabilities to enhance capacity while mitigating losses
- Maintain FEMA Eligibility to the county and local communities for federal grant funding.

I. D. Planning Process

For more detailed information, please see Section VI: Plan Development Process

It is vital that hazard mitigation planning, and emergency management planning in general, has significant public input and participation from all communities and stakeholders affected. This played a major part in the development of this plan and is a key consideration for priority rankings and mitigation strategies throughout this document.

The Cavalier County MHMP planning team is headed by the Cavalier County Emergency Management Director, who is also the primary point of contact. Paramount Planning is the lead planning consultant contracted to work with county Emergency Management to assist in developing the plan. Members of the Cavalier County MHMP Planning Team include representatives from the public and government sectors, below is a table identifying the team members, but does not represent the entirety of individuals involved in the planning process.

Cavalier County MHMP Planning Team

Name	Jurisdiction / Agency	Title
Karen Kempert	Cavalier County	Emergency Manager
Blain Johnson	Paramount Planning	Owner / Principal Consultant
Kerry Mikkelsen	Cavalier Rural Electrical CO-OP	Owner
Nick Moser	Cavalier County	County Commissioner
Terri Gustafson	Cavalier County	Public Health Nurse
Terry Johnston	Cavalier County	Road Supervisor
Elsie Magnus	Cavalier County	County Commissioner
David Zeis	Cavalier County	County Commissioner
Dean Bubach	City of Alsen	Mayor
Richard Haas	City of Calio	Mayor
Tony Nieman	City of Calvin	Mayor
Scott Howatt	City of Hannah	Mayor
Roxanne Hoffarth	City of Langdon	Auditor
Jim Kjos	City of Loma	Mayor
Donald Jonasson	City of Milton	Mayor
Mark Zimmer	City of Munich	Mayor
Paul Liebersbach	City of Nekoma	Mayor
Dale Kuchar	City of Osnabrock	Mayor
Jason Estenson	City of Sarles	Mayor
Bob Hodgson	City of Wales	Former Mayor

D.1 Participation Challenges

Like many areas in the upper Midwest, and particularly in Cavalier County, residents were hard at work at their full-time jobs; generally farming; which caused some challenges in terms of public participation in the planning process. Public participation was requested through the newspaper, social media, radio, flyers, and other outlets during various points in the process, but feedback and involvement was minimal. Some individuals even declined during one-on-one

reach outs conducted in an attempt to get more participation. Each jurisdiction however did participate in one way or another, but further response would have been preferred.

I. E. Review of Existing Plans and Information

Part of the development of this plan was the review and incorporation of existing plans, studies, reports, assessments, and other technical information. The following is a list of the documents used in the development of the plan.

Documents and plans used

Title	Author	Year	Description	Used In
2009 Hazardous Material Flow Study	Pembina/Cavalier Counties	2009	Hazardous Materials Information	Sec. III B.4
2011 Devils Lake/Stump Lake Risk Assessment	ND Department of Human Services	2011	Flood history and probability data.	Sec. III C.2
Agricultural Census	US Dept. of Ag	Oct, 2017	Community profiles/Hazard	Sec. II, III
American Fact Finder	US Census Bureau	Oct, 2017	Community facts and figures	Sec. II
Cavalier County Emergency Operations Plan	Cavalier County EM	Continuous	Countywide Emergency Operations Plan	Sec. II Mitigation Actions
Cavalier County Hazard Mitigation Plan	Cavalier County	March 2013	Previous Hazard Mitigation Plan	Entire document
Cavalier County Hazardous Materials Response Plan	Cavalier County	June 2012	County Hazardous Materials Information	Sec. III C.4
Cavalier County Soil Survey	ND Soil Conservation Service	1986	Informing Drought sections, and general geology in planning process.	N/a
Cavalier County Strategic Plan	Cavalier County	2016	Agriculture, business, and infrastructure information	Sec. IV
Cavalier, Ramsey and Towner County Comprehensive Housing Study	Community Partners Research, Inc.	Sep. 2011	County housing information	Sec. II (A.ll)
Devils Lake Basin Water Management Plan	ND State Water Commission	2013	Flood history and vulnerability	Sec. III C.2
Homme Dam Watershed Project	Walsh County Soil Conservation Distr.	Feb, 2012	Flood history and flood vulnerability	Sec. III C.2
National Centers for Environmental Information (NCIC)	NOAA	Sep, 2017	Hazard Descriptions and histories	Sec. III
ND Pipeline Association	NDPA	Oct, 2017	Pipeline Mapping	Sec. III B.4
NFIP Rating System	FEMA	Jan, 2018	Flood Hazard, NFIP	Sec. III C.2
North Dakota Multi-Hazard Mitigation Plan	North Dakota Department of Emergency Services	2014	Statewide Hazard Mitigation Plan	Sec. III (All)
Storm Events Database	NOAA	Oct, 2017	Storm Events History and	Appendix

			Probability	VII.B
Water Development Report (2017-2019)	ND State Water Commission	Jan, 2017	Drought, Flooding, Water Sources	Sec. III C. 1, C.2

Resources referenced and data used

Jurisdiction/Agency	Data obtained
911/Emergency Management	Alert & Warning Procedures Communication Capability/ Emergency/Disaster Procedures (EOP) Tier II Reporting Community Education
Alsen City Commission	Emergency Declarations City Budget
Calio City Commission	Emergency Declarations City Budget
Calvin City Commission	Emergency Declarations City Budget
Cavalier County Auditor	Audits Fiscal Budget and Management
Cavalier County Building/Planning/Zoning	Zoning policies Inspection process Floodplain Administration (NFIP)
Cavalier County Commission	Zoning policies Emergency Declarations
Cavalier County Extension Service	Plant & Animal Health Community Education
Cavalier County GIS	Cavalier County Mapping Repetitive Loss from Flooding GIS Layer (ongoing)
Cavalier County Health District	Disease Outbreak History and probability Mass Fatality EOP Annex Sheltering Information
Cavalier County Highway Department	Bridge Information Overland Flooding Information Snow Removal Capacity
Cavalier County Job Development Authority	Business/Resource Information Economic Data
Cavalier County Sheriff's Office	Emergency Response Policies (Evacuation, SIP, Traffic control) Resource list
Cavalier County Water Board	Flooding areas of concern Dam Failure Impacts Drought Issues Water sources for county
Cenex Harvest States (Osnabrock)	Tier II Reporting Hazardous Materials Response Plan
Hannah City Commission	Emergency Declarations City Budget
Landon School	Public Education Emergency drills
Langdon City Commission	Emergency Declarations

	City Budget Floodplain Management Plan (NFIP)
Langdon School	Safety Drills Cancellation Policies
Loma City Commission	Emergency Declarations / Hazard Impacts City Budget
Milton City Commission	Emergency Declarations / Hazard Impacts City Budget
Munich City Commission	Emergency Declarations / Hazard Impacts Flood Mapping City Budget
Nekoma City Commission	Emergency Declarations / Hazard Impacts City Budget
North Dakota Department of Health	Influenza/Disease Information and probability
North Dakota State Water Commission	Local and Regional Water Sources and Districts
Osnabrock City Commission	Emergency Declarations / Hazard Impacts City Budget
Sarles City Commission	Emergency Declarations / Hazard Impacts City Budget
Wales City Commission	Emergency Declarations / Hazard Impacts City Budget

E.1 Integration into existing planning mechanisms

The heart of Cavalier County is the city of Langdon, serving as the county government seat and primary business hub for the region. All the cities are too small to have comprehensive plans, studies, or zoning codes separate from the county-level. The cities of Alsen, Calio, Calvin, Hannah, Langdon, Loma, Milton, Munich, Nekoma, Osnabrock, Sarles, and Wales do not have specific plans but support county planning efforts. This hazard mitigation plan will be considered when building codes are developed and updated, with the plan also being considered with new development or construction.

A summary of how the multi-hazard mitigation plan can be integrated into existing frameworks is listed below:

- Use the MHMP to help the county's Local Emergency Operations Plan meet the goal of protecting the public citizens and property from natural hazards
- Initiate zoning ordinances in conjunction with new NFIP maps and flood projects.
- Develop incentives, and allocate Cavalier County resources for cities, businesses, and citizens to pursue hazard mitigation projects.
- Partner with other agencies, organizations, and groups to support hazard mitigation activities and goals identified in this plan.
- Use MHMP to inform officials and decision-makers when developing codes, policies, and procedures.

- Use the MHMP to inform new zoning and building codes and into the Langdon Land Use Plan, along with other future related plans and policies.

I. F. Plan Maintenance and Involvement

The Cavalier County Hazard Mitigation Plan is considered a living document, meaning it should be updated, revised, and referenced as needed throughout a given year. It is required to be updated and approved by FEMA at a minimum of every 5 years, though Cavalier County will try to ensure that an annual review takes place incorporating appropriate updates.

Annual evaluations will be led by the Cavalier County Emergency Manager with additional assistance as needed. Information will be added and changed as projects are completed or withdrawn. The Cavalier County Local Emergency Planning Sub-Committee (LEPC) will meet annually to review this draft beginning in 2017, making appropriate suggestions, and in the future reviewing hazard occurrences over the past year. The committee will also review the MHMP goals and objectives to determine their current relevance, revise mitigation projects as needed, and address current and expected hazards. The committee will also review the risk assessment portion of the plan to determine if any information needs to be updated or modified and to what extent.

The county Emergency Manager is ultimately responsible for contacting plan participants across the county that were involved in the planning process and are signatories on this plan to get risk, hazard, and mitigation project updates; along with contacting any new stakeholders and organizing appropriate public meetings. Changes will also be accepted via written requests from citizens, businesses, or cities.

The revised plan (changed or unchanged) will be posted on the Cavalier County webpage (www.cavaliercountyem.com) for a period of no less than 2 weeks. Public Notices will also be announced and published in local media annual to garner additional input for the plan.

Maintenance & Public Involvement Schedule

Timeline	Responsibility	Update Description
Continuous	County Emergency Manager	Hazards, Mitigation Projects, and new development/risks as they develop.
Continuous	County Emergency Manager	Solicitation of community input/ideas
Annually	LEPC	Annual Review with stakeholders
Annually	County Emergency Manager	City and county mitigation projects/strategies
Every 5 Years	Cavalier County	State of ND and FEMA 5-Year complete revision

SECTION II: Community Profiles

II. A. Community Profiles

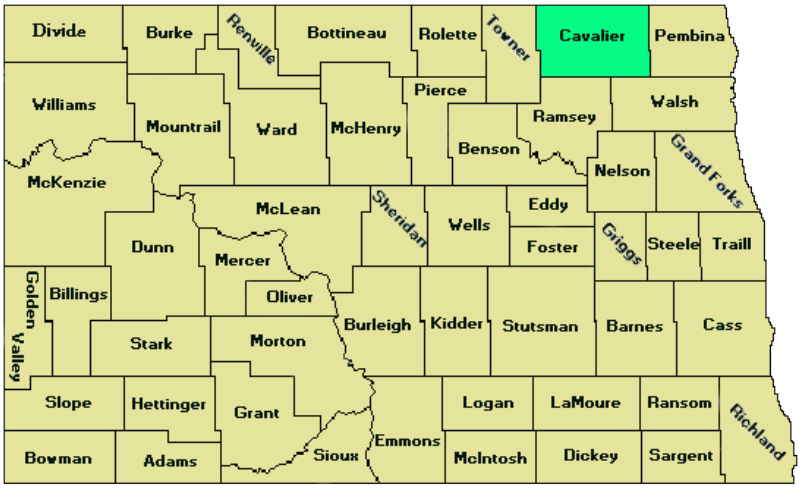
Identifying community characteristics, vulnerabilities, and hazard risk is the most important part of this plan. This section highlights the overall county profile as well as the 12 city jurisdictions within the county to target population centers for hazard mitigation strategies.

Cavalier County Population by Community

Community	2010 Population	% of County
Alma Township	30	0.75%
Alsen City	35	0.88%
Banner Township	29	0.72%
Billings Township	13	0.33%
Bruce Township	17	0.42%
Byron Township	27	0.68%
Calio City	22	0.55%
Calvin City	20	0.50%
Cypress Township	40	1.00%
Dresden Township	41	1.02%
Easby Township	41	1.02%
East Alma Township	23	0.58%
Elgin Township	242	6.06%
Glenila Township	13	0.32%
Gordon Township	11	0.27%
Grey Township	20	0.50%
Hannah City	15	0.38%
Harvey Township	32	0.80%
Hay Township	35	0.88%
Henderson Township	40	1.00%
Hope Township	24	0.60%
Huron Township	24	0.60%
Langdon Township	29	0.73%
Langdon City	1,878	47.03%
Linden Township	25	0.63%
Loam Township	41	1.02%
Loma City	16	0.40%
Manilla Township	83	2.08%
Milton City	58	1.45%
Minto Township	24	0.60%
Montrose Township	42	1.05%
Moscow Township	17	0.42%
Mount Carmel Twp	41	1.02%
Munich City	210	5.26%
Nekoma Twp	26	0.65%
Nekoma City	50	1.25%
North Loma Twp	9	0.23%
North Olga Twp	39	0.98%
Osford Twp	47	1.18%
Osnabrock Twp	36	0.90%
Osnabrock City	134	3.36%
Perry Twp	45	1.13%
Sarles City	28	0.70%
Seivert Twp	15	0.38%
South Dresden Twp	33	0.83%
South Olga Twp	39	0.98%
Storlie Twp	21	0.53%
Trier Twp	50	1.25%
Wales City	31	0.78%
Waterloo Twp	36	0.90%
West Hope Twp	45	1.13%
Cavalier County	**3,993**	**100%**

The primary population of the county, 53%, resides in the county seat of Langdon and immediate Elgin Township. The cities of Munich and Osnabrock also have higher populations. The other cities and townships in the county have less than 100 people each. Most of the cities are losing population slowly as farming operations combine and the general migration continues to be out of the county.

CAVALIER COUNTY



Source:
Rootsweb, ancestry
© 2017

Landsat / Copernicus, Map Data ©2017 Google

About the County:

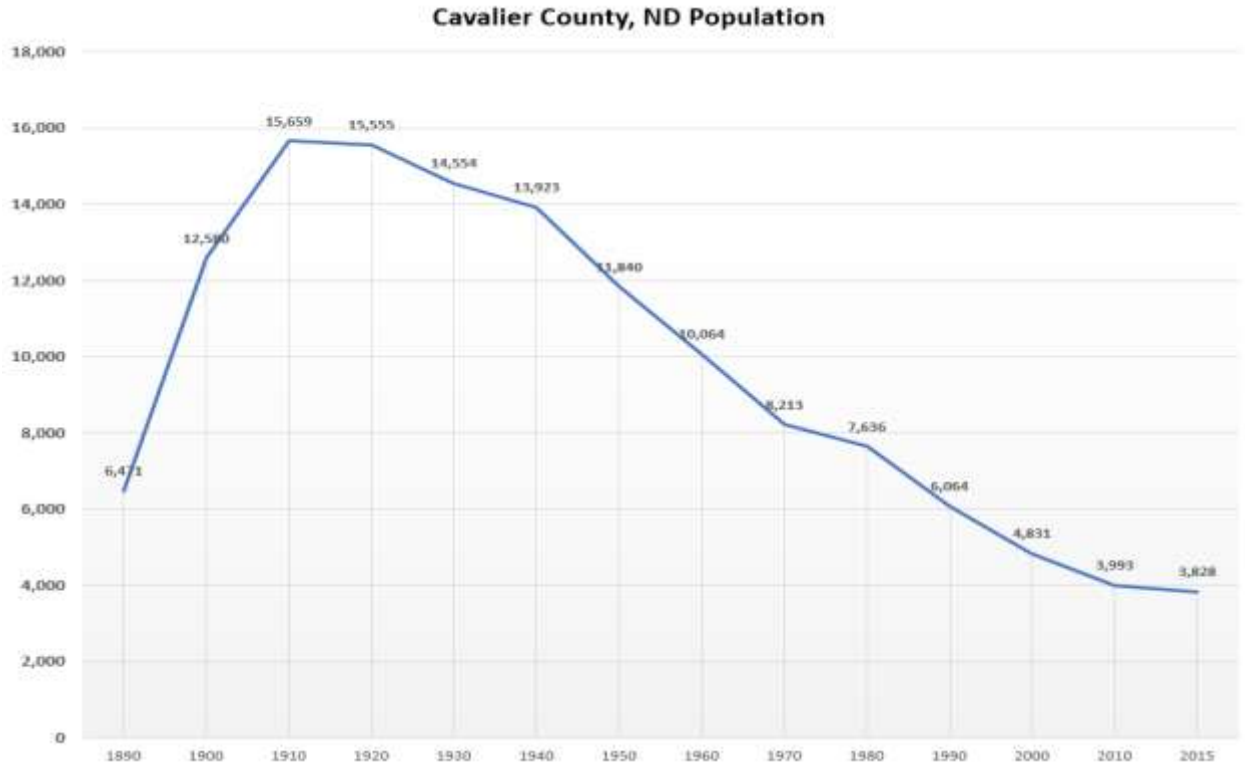
Cavalier County is located in the northeast region of the State of North Dakota in the high plains. The county borders Canada on the north, Towner County on the west, Ramsey and Walsh Counties to the south, and Pembina county to the east. The area was first inhabited by Native American Ojibwe (Chippewa) and Dakota Sioux. It was settled by French and American Fur traders from Winnipeg, Canada. The area was purchased through the Treaty of 1818 and organized from the western part of Pembina County in 1873; establishing a territorial legislature in 1879. Cavalier County was officially organized as a territorial county on July 8th, 1884 and was settled and populated over the next 20 years with the construction of the Great Northern Railway through the area. Langdon was chosen as the county seat in 1884 and the county courthouse has been located there since then. The county's primary economic driver is the agricultural industry and has extremely fertile soils, making cropland valuable and important in the local economy. The rolling hills are only interrupted by the Pembina Gorge, in the northeast section of the county, one of the most scenic areas in the state. The gorge, formed by the melting glacier thousands of years ago, is home to many hiking, skiing, dirt biking, and other recreational activities.

County Characteristics:

Population: 3,993 *(3,828 Est. 2016)*
Density: 2.7 people/psm
Area: 1,510 sq. miles total

Founded: July 8, 1884
Cities: 12
Townships: 40

Seat: Langdon
Unincorp. Communities: 4



County Jurisdictions:

Cities: 12

Alsen
Calio
Calvin
Hannah
Langdon
Loma
Milton
Munich
Nekoma
Osnabrock
Sarles
Wales

Townships: 40

Alma
Banner
Billings
Bruce
Byron
Cypress
Dresden
Easby
East Alma
Elgin
Fremont
Glenila
Gordon
Grey
Harvey
Hay
Henderson
Hope
Huron
Langdon
Linden
Loam
Manilla
Minto
Montrose
Moscow
Mount Carmel
Nekoma
North Loma
North Olga
Osford
Osnabrock
Perry
Seivert
South Dresden
South Olga
Storlie
Trier
Waterloo
West Hope

Unincorporated Communities: 4

Clyde
Dresden
Hove Mobile Park
Maida

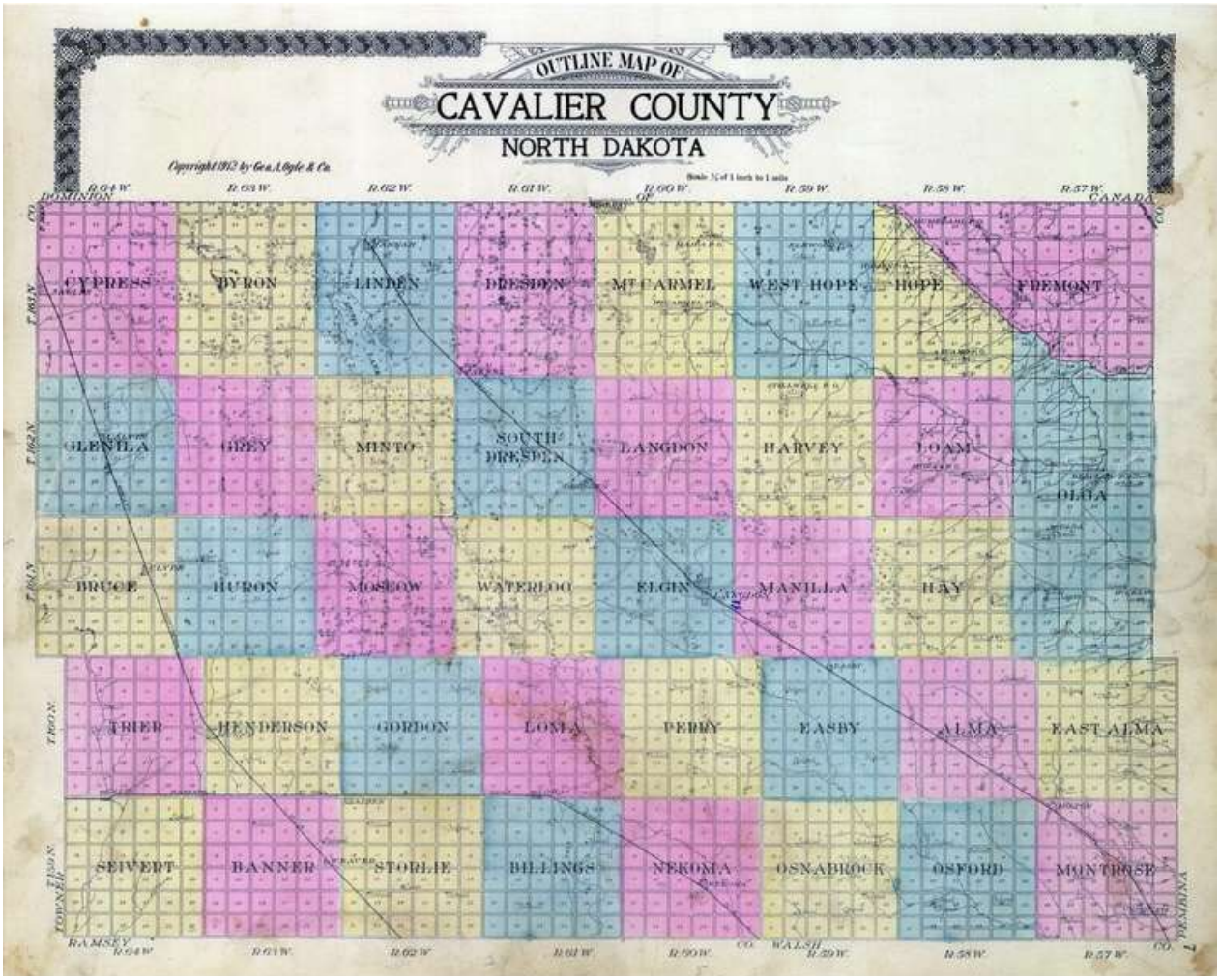


Figure 1: Outline Map of Cavalier County, 1912

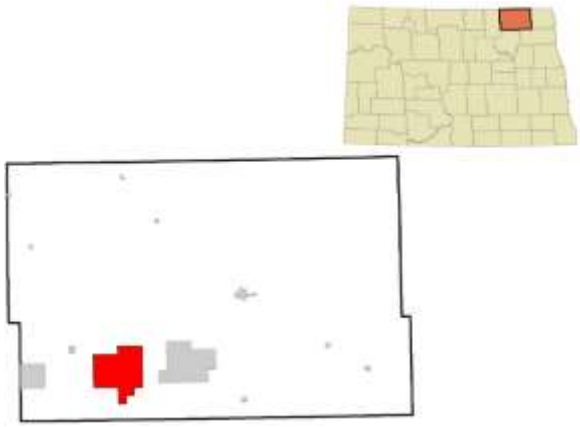
CITY OF ALSEN

Google, Map data, ©2017

Community Characteristics

Population: 35
Area: 29.88 sq. miles
Elevation: 1,581 ft
Founded: 1905

NFIP Participant: No
FIRM Date: N/A
Housing Units: 30
Median Age: 44.1



Community Summary

The city of Alsen is located in the southwest part of the county and is the largest city geographically in the county. The current estimated population is 33 people, down 2 from the 2010 census. It's population has slowly declined since the height of 358 in 1930. In the past five years, the bean plant and elevator have added several additions and improvements. There is no new major construction or development anticipated for Alsen.

Hazard Rankings 7-18-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Winter Storm
2. Severe Summer Storm
3. Flood
4. Hazardous Materials Spill
5. Drought
6. Tornado
7. Shortage of Critical Materials
8. Wildfire
9. Urban Fire
10. Infectious Disease Outbreak
11. Erosion/Landslide
12. Terrorism

Other: No

Critical Facilities

There are no critical facilities identified in the City of Alsen, ND.

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
960	Alsen Farmers Elevator Company	Alsen Farmers Elevator Co.	101 Hwy 66	Alsen	ND	58311

Community Issues & Concerns

Alsen suffered from flooding in 2011 and 2016 which damaged several roads and the liftstation. City would like to purchase a generator for the lift station and begin mowing around city limits to reduce risk to wildfires as well as look into new zoning requirements to prevent the building of structures in hazard areas.

Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Alsen is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

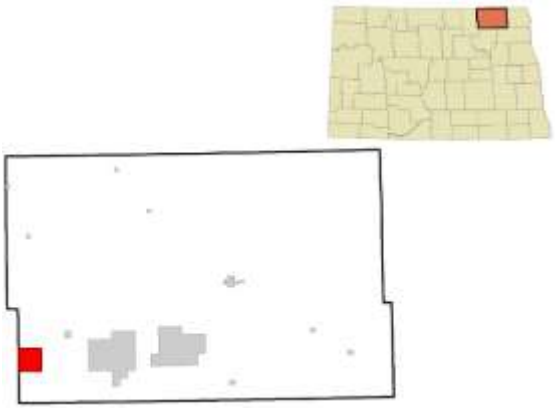
CITY OF CALIO

Google, Map data, ©2017

Community Characteristics

Population: 22
Area: 8.89 sq. miles
Elevation: 1,562 ft
Founded: 1905

NFIP Participant: No
FIRM Date: N/A
Housing Units: 6
Median Age: 73.7



Community Summary

The city of Calio is located in the extreme southwest part of the county. The current estimated population is 21 people, down 1 from the 2010 census. It's population has slowly declined since the height of 152 in 1930. The Calio bar added on and Beck's Seed Farm Construction put up a new building in the past five years.

Hazard Rankings 5-22-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Summer Storm
1. Severe Winter Storm
2. Erosion/Landslide
2. Flood
2. Urban Fire
5. Shortage of Critical Materials
5. Tornado
5. Wildfire
10. Hazardous Materials Spill
12. Drought
12. Infectious Disease Outbreak
12. Terrorism

Other: Frost Heaves and Washouts

Critical Facilities

There are no critical facilities identified in the City of Calio, ND.

Tier II Facilities

There are no Tier II identified in the City of Calio, ND.

Community Issues & Concerns

Over the past five years, the City of Calio has been impacted by road washouts and frost heaves along with the occasional storms that has uprooted trees, etc. The city wants to look into additional tree rows to be planted around the city for protection for wind and snow buildup in city limits.

Capability Assessment

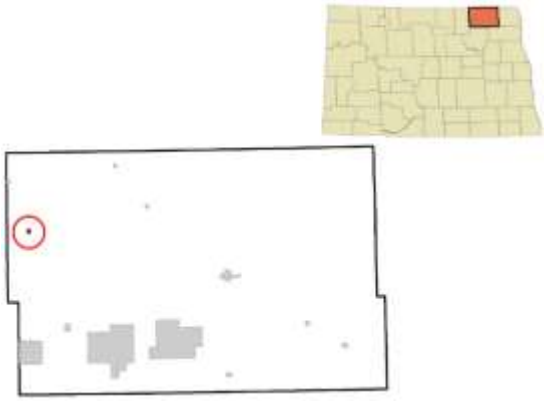
Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Calio is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

CITY OF CALVIN

Google, Map data, ©2017

Community Characteristics

Population: 20
Area: 0.22 sq. miles
Elevation: 1,617 ft
Founded: 1905
NFIP Participant: No
FIRM Date: N/A
Housing Units: 6
Median Age: 52.7



Community Summary

The city of Calvin is located in northwest Cavalier County. The current estimated population is 19 people, down 1 from the 2010 census. Its population has slowly declined since the height of 152 in 1950. The elevator in Calvin expanded its shuttle loader and storage capacity in 2014, adding 435,000 bushels of storage space[2]. There is no new major development expected in the

[2] http://www.grandforksherald.com/business/agriculture/2189453-chs-invest-50-million-northeast-north-dakota-northwest-minnesota

city. Calvin has many abandoned buildings that increases the chance of fire risk/structural collapse though few people will be at risk.

Hazard Rankings

7-20-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Tornado
2. Flood
3. Hazardous Materials Spill
4. Urban Fire
5. Wildfire
6. Severe Summer Storm
7. Severe Winter Storm
8. Drought
9. Shortage of Critical Materials
10. Infectious Disease Outbreak
11. Erosion/Landslide
12. Terrorism

Other: None

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Calvin Fire	Fire Department Building	Emergency Services	$351,000	420 2nd Avenue	Calvin	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
259	CHS Milton	CHS Milton - Calvin	401 Railroad Ave	Calvin	ND	58323
1825	Farmers Union Oil Company	FUOC – Langdon – Calvin Location	122 Main St	Calvin	ND	58323

Community Issues & Concerns

Over the past five years, the City of Calvin has suffered from soft spots in streets and roadways causing impassable sections, though the city has attempted to repair them. New gravel, additional drainage options are being looked into, as well as additional building codes for future city development.

Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Calvin is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

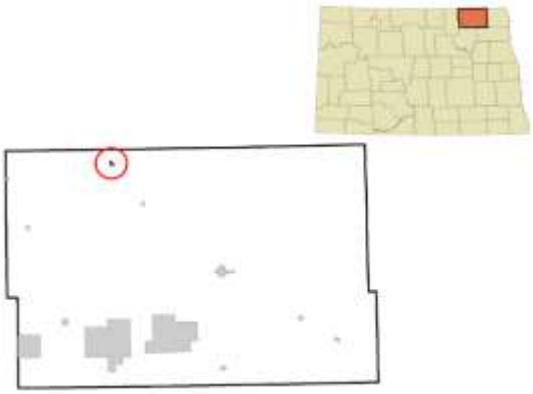
CITY OF HANNAH

Google, Map data, ©2017

Community Characteristics

Population: 15
Area: 0.19 sq. miles
Elevation: 1,565 ft
Founded: 1897

NFIP Participant: No
FIRM Date: N/A
Housing Units: 6
Median Age: 28.6



Community Summary

The city of Hannah is located in northwest Cavalier County. The current estimated population is 14 people, down 1 from the 2010 census. Its population has slowly declined since the height of 162 in 1930. There is no new construction or development anticipated in Hannah. The city sits just 3 miles south of the International Border with Canada, the closest in the county, and one of Cavalier Counties three Customs and Border Protection crossing sites lies directly north of town on County Highway 13.

Hazard Rankings

10-2-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Summer Storm
2. Severe Winter Storm
3. Flood
4. Tornado
5. Wildfire
6. Drought

Other: No

7. Hazardous Materials Spill
8. Shortage of Critical Materials
9. Urban Fire
10. Infectious Disease Outbreak
11. Erosion / Landslide
12. Terrorism

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Hannah Fire	Fire Department Building	Emergency Services	$270,000	10492 88th Ave NE	Hannah	ND
Café/USPS	Hannah Café, USPS	Restaurant/ government	N/a	210 3rd Street	Hannah	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
186	Simplot Grower Solutions	Simplot – Hannah	213 Railroad St	Hannah	ND	58249

Community Issues & Concerns

The city is looking into purchasing a backup generator for the café and post office in town as well as clearing culverts and drainage ways in and around town as future hazard mitigation projects. The city would like to keep the grass mowed for wildfire prevention, lessen standing water around town after snowmelt/rains, upkeep of the city café/grocery store, and tearing down abandoned properties around the area. The city is also requesting assistance from the county in purchasing a new warning siren for residents.

Capability Assessment

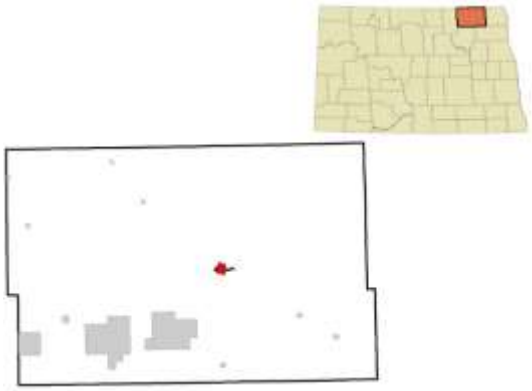
Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Hannah is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

CITY OF LANGDON

Google, Map data, ©2017

Community Characteristics

Population: 1,878
Area: 1.68 sq. miles
Elevation: 1,611 ft
Incorporated: 1885
NFIP Participant: Yes
FIRM Date: 06/28/1974
05/05/2003 *(revised)*
Housing Units: 1,065 **Median Age:** 51.5



Community Summary

The city of Langdon is located near the center of Cavalier County. It is the county seat and the largest city in the county. The current estimated population is 1,787 people, down 91 from the 2010 census. Its population has slowly declined since the height of 2,335 in 1980. There is a new Dollar General store that was built in 2017 on the east side of town, but new development is limited. The city is the critical business hub of the area provides entertainment, equipment, supplies, and material for the county at-large. It is home to the only medical facility in the county, the county courthouse, a large high school and airport.

Hazard Rankings

7-18-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Winter Storm
2. Severe Summer Storm
3. Tornado
4. Urban Fire
5. Hazardous Materials Spill
6. Infectious Disease Outbreak
7. Drought
8. Shortage of Critical Materials
9. Terrorism
10. Wildfire
11. Erosion/Landslide
12. Flood

Other: No

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
911 Repeater	Tower, Generator	Govt/ Emerg. Services	$80,000	10991 Hwy 5 S	Langdon	ND
CC Memorial	Hospital	Healthcare	Unknown	909 2nd St	Langdon	ND
City Hall	City Government Building	Government	$4,026,438	324 8th Ave	Langdon	ND
County Courthouse	Courthouse Building	Government	$5,391,140	901 3rd Street	Langdon	ND
Emergency Response Garage	Emergency Response Garage	Govt/ Emerg. Services	$118,809	908 2nd Street	Langdon	ND
KNDK	Radio Station	Private	Unknown	1403 3rd St	Langdon	ND
Langdon Generator	Generator for Courthouse	Government	$35,000	901 3rd Street	Langdon	ND
Langdon Rural and City Fire	Fire Department Building	Emergency Services	$1,512,800	324 8th Ave	Langdon	ND
Leevers Foods	Grocery Store	Private	Unknown	124 9th Ave	Langdon	ND
Public Service Answering Point	911/Dispatch Center - Courthouse	Emergency Services	N/a	901 3rd Street	Langdon	ND
Roberts Field	Airport	Private	Unknown	1310 12th St	Langdon	ND
Search and Rescue	Cavalier County SAR	Em. Services	$440,000	901B 3rd St	Langdon	ND
UTMA	Telephone/Internet	Public	Unknown	411 7th Ave	Langdon	ND
Water Pump	Water Storage Bldg	Government	Unknown	South 2nd St	Langdon	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
5495	Border Aviation	Border Aviation	1518 9th Ave W	Langdon	ND	58249
6098	CHS Milton	CHS Milton – Langdon	123 4th St	Langdon	ND	58249
3898	Erling's Oil Company	Erling's Oil Co – Langdon Bulk Plant	511 4th Ave	Langdon	ND	58249
1758	Farmers Union Oil Company	FUOC – Langdon	513 3rd Ave	Langdon	ND	58249
3242	North Dakota DOT	NDDOT -- Langdon	1042 Hwy 5	Langdon	ND	58249

1957	DuBois Oil Co., Inc.	Dubois Oil Co., Inc	9742 Dresden Rd	Langdon	ND	58249
179	Simplot Grower Solutions	Simplot – Langdon	120 5th Ave	Langdon	ND	58249
115	Strata Corporation	Strata Concrete, Langdon	9002 ND Hwy 1 S	Langdon	ND	58249
1478	United Telephone Co	Langdon CO	411 7th Ave	Langdon	ND	58429
1477	United Telephone Co	Langdon Warehouse	9348 Hwy 1 N	Langdon	ND	58429

Community Issues & Concerns

Since 2011, the city of Langdon had several minor severe storms that have knocked down trees and lightly damaged some properties, but nothing extreme. The city has added two duplex buildings in residential areas. The city would like to look into more property to build rental units and industrial businesses. It is currently looking at stricter zoning and building codes to alleviate potential consequences from hazards, but other projects are on hold as budgets are tight at the moment.

Capability Assessment

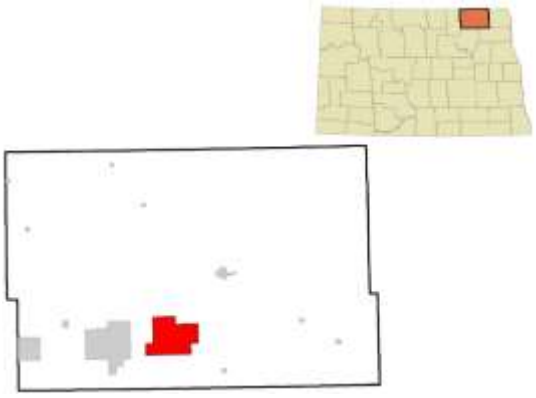
Category	Capabilities
Planning & Regulatory	*City Renaissance Zoning Code – 21 City Blocks (Tax breaks and incentives)* *Has zoning and ordinance in place to regulate development and construction* *Some building codes* *2016 Water Quality Report* *Housing Incentives Program* *Participates in the NFIP and has Floodplain Ordinance* *Langdon Land Use Plan*
Administrative & Technical	*City Council (+3 City Staff)* *City Street Department* *City Emergency Manager* *City Engineer/Public Works Director* *Fire Department* *Ambulance Service* *Hospital, Clinic* *Emergency Sirens*
Education & Outreach	*NDSU Extension Center* *KNDK Radio Station for public awareness weeks (countywide)* *Education programs at local schools*
Financial	*Moderate – City has a modest budget to work with each year, but partners with county on many mitigation projects for funding purposes.*
Capabilities and resources in the city of Langdon are more substantial than other communities and jurisdictions in Cavalier County, due to the fact that there is a population of nearly 2,000 residents and has substantial commercial and industrial sectors as well as government and infrastructure. The city has the ability to expand on zoning regulations and building codes through a strong city government structure.	

CITY OF LOMA

Google, Map data, ©2017

Community Characteristics

Population: 16
Area: 26.83 sq. miles
Elevation: 1,572 ft
Founded: 1905
NFIP Participant: No
FIRM Date: N/A
Housing Units: 13
Median Age: 31.1



Community Summary

The city of Loma is located in south central Cavalier County. The current estimated population is 15 people, down 1 from the 2010 census. Its population has slowly declined since the height of 293 in 1930. There is no new construction or development anticipated in Loma. Loma is unique in that it is one of the largest cities in the state geographically, yet has only 15 residents, making it one of the least densely populated cities in the United States. The city of Loma is largely a grain elevator along Highway 66 and has no definite street structure. Most of the town has long since been abandoned and the buildings torn down. The only identifiable town building, a white-square gas station along 98th Ave NE, was demolished recently.

Hazard Rankings 8-18-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Winter Storm
2. Flood
3. Severe Summer Storm
4. Tornado
5. Urban Fire
6. Hazardous Materials Spill
7. Wildfire
8. Drought
9. Infectious Disease Outbreak
10. Erosion/Landslide
11. Terrorism
12. Shortage of Critical Materials

Other: No

Critical Facilities

There are no critical facilities identified in the City of Loma, ND.

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
262	CHS Milton	CHS Milton – Loma	9841 Hwy 66	Loma	ND	58260

Community Issues & Concerns

Over the past five years, the City of Loma suffered from the effects of flooding in 2011 and 2016 causing extensive culvert and road damage. City is looking into rip-rapping roads for water protection and additional zoning requirements. A city goal is to maintain the population and grow by incentivizing new building.

Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Mayor (no staff)*
Education & Outreach	*None – relies on county education and outreach*
Financial	*No financial capability*
Capabilities and resources in the city of Loma is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

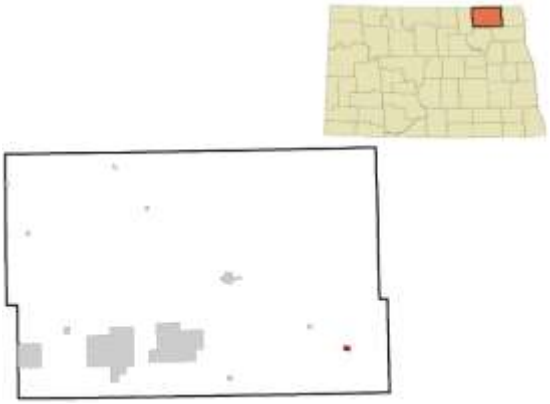
CITY OF MILTON

Google, Map data, ©2017

Community Characteristics

Population: 58
Area: 0.51 sq. miles
Elevation: 1,588 ft
Founded: 1887

NFIP Participant: No
FIRM Date: N/A
Housing Units: 39
Median Age: 50.6



Community Summary

The city of Milton is located in southeast Cavalier County. The current estimated population is 56 people, down 2 from the 2010 census. Its population has slowly declined since the height of 410 in 1910. Since 2013, the city has added a storage facility at the Cenex Harvest States station. There is no new construction or development anticipated in Milton.

Hazard Rankings

4-18-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Winter Storm
2. Severe Summer Storm
3. Tornado
4. Flood
5. Hazardous Materials Spill
6. Drought
7. Wildfire
8. Urban Fire
9. Shortage of Critical Materials
10. Infectious Disease Outbreak
11. Terrorism
12. Erosion/Landslide

Other: N/A

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
City Hall, Fire Hall	Milton City Hall Milton Fire Hall	Government Em. Services	$640,000	304 Oakland	Milton	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
336	CHS Milton	CHS Milton – Milton	515 W Montrose Ave	Milton	ND	58260
11832	United Telephone Corp	Milton MMDS	12220 Hwy 66	Milton	ND	58260
14709	United Telephone Corp	Milton Co	11898 Hwy 66 West	Milton	ND	58260

Community Issues & Concerns

The city has recently suffered from flooding and the lift station had trouble causing the city to get pumps and back-up generators to keep the city water level down due to overland flooding and snowmelt pooling. City would like to purchase back-up generators for the lift-station and warning sirens for the city. Priorities for hazard mitigation moving forward are living snow fences on the north and west sides of town to protect from winds and snow buildup, as well as keeping local grasses mowed to prevent fires.

Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department* *Emergency Sirens*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Milton is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

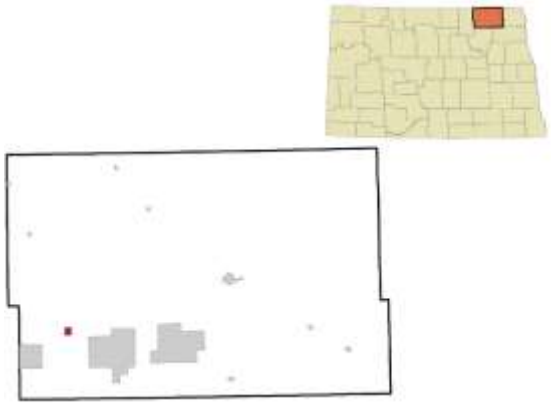
CITY OF MUNICH

Google, Map data, ©2017

Community Characteristics

Population: 210
Area: 1.44 sq. miles
Elevation: 1,598 ft
Founded: 1904

NFIP Participant: No
FIRM Date: N/A
Housing Units: 119
Median Age: 42.9



Community Summary

The city of Munich is located in southwest Cavalier County. The current estimated population is 205 people, down 5 from the 2010 census. Its population has slowly declined since the height of 310 in 1990. There is no new development anticipated in Munich, though several new homes were built in town along with a new elevator to replace the destroyed one since the previous plan update. Munich is one of the larger towns in the county and has an elementary and high school.

Hazard Rankings 8-18-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens

1. Severe Summer Storm
2. Tornado
3. Severe Winter Storm
4. Flood
5. Drought
6. Hazardous Materials Spill
7. Shortage of Critical Materials
8. Wildfire
9. Urban Fire
10. Erosion/Landslide
11. Infectious Disease Outbreak
12. Terrorism

Other: No

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Munich Fire & EMS	Munich City Fire Hall and EMS Bldg	Emergency Services	$1,665,300	505 Main & 402 4th Ave	Munich	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
968	Munich Elevator & Oil Co., Inc.	Munich Elevator & Oil Co., Inc.	403 Pacific Avenue	Munich	ND	58352
1480	United Telephone Corp	Munich Co.	8651 Hwy 20	Munich	ND	58249

Community Issues & Concerns

Munich has suffered from three different types of disasters since 2013: A large fire that burned down the town elevator in 2012, a windstorm in 2016 that damages several homes, and several flood events. The city is looking to install a city pump station to alleviate re-occuring spring flooding and pooling around town, as well as replacing the city generator, tornado siren, and improving ditching for drainage. The city is currently in the process of developing zoning ordinances for future building.

Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department* *Emergency Sirens* *Ambulance Service*
Education & Outreach	*Public information through Munich School* *Relies on primary hazard and emergency outreach from county*
Financial	*Limited – tax revenue low*

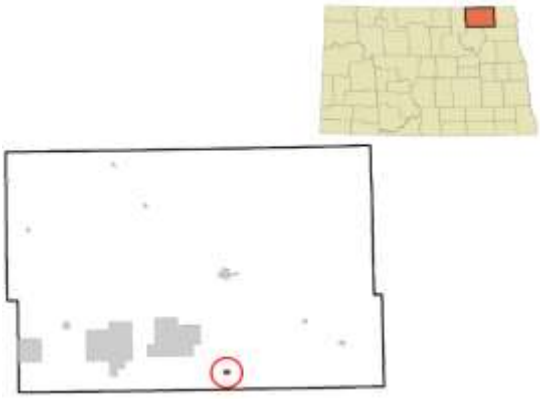
Capabilities and resources in the city of Munich is limited by population, funding, and staff. There is currently a limited ability to expand or improve on the above capabilities. Work can be done with the city commission on zoning and building codes to guide future building or development. Also local education campaigns can be started through the school officials to help prepare the community.

CITY OF NEKOMA

Google, Map data, ©2017

Community Characteristics

Population: 50
Area: 0.36 sq. miles
Elevation: 1,631 ft
Founded: 1905
NFIP Participant: No
FIRM Date: N/A
Housing Units: 26
Median Age: 57.2



Community Summary

The city of Nekoma is located in southern Cavalier County. The current estimated population is 48 people, down 2 from the 2010 census. Its population has slowly declined since the height of 191 in 1930. The local elevator more than doubled its storage capacity from 900 thousand to 2.4 million bushels by adding several new storage bins. A unique facility nearby is the Stanley R. Mickelsen Safegard Complex, which was a part of the US anti-ballistic missile program in the cold war era. It is a pyramid structure that can be seen for miles around *(see photo on next*

page) and provided launch control of the Spartan and Sprint anti-ballistic missiles. The complex is no longer in operation.

Hazard Rankings

4-11-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Tornado
2. Severe Summer Storm
3. Severe Winter Storm
4. Urban Fire
5. Hazardous Materials Spill
6. Infectious Disease Outbreak

Other: No

7. Wildfire
8. Drought
9. Shortage of Critical Materials
10. Flood
11. Terrorism
12. Erosion/Landslide

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Nekoma Fire Hall	Nekoma Fire	Emergency Services	$329,300	213 Main	Nekoma	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
Ukn	Osnabrock Farmers Elevator	Nekoma Station	103 Dakota St	Nekoma	ND	58355

Community Issues & Concerns

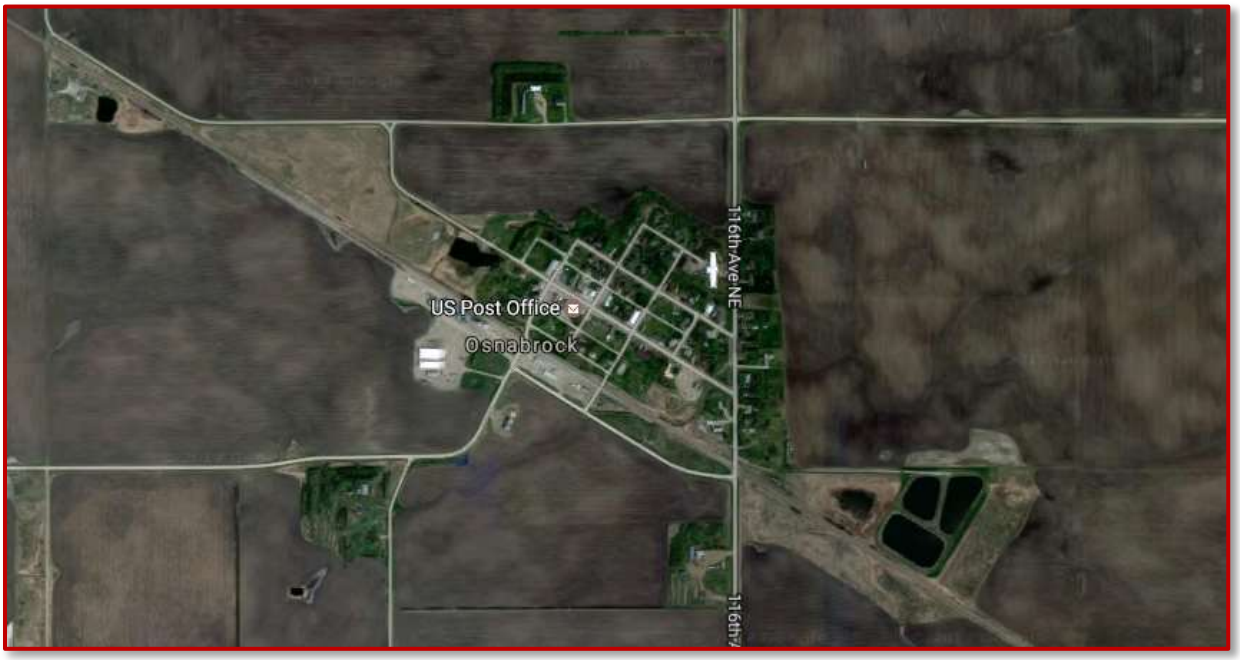
Nekoma has been spared any significant disaster events the past five years. The city has added several new homes and building additions. The city is prioritizing the installation of a city siren and backup generators for the electrical system, as well as updating city ordinances for zoning and approval/denial of building permits.

Stanley R. Mickelson Safeguard Complex, 2017

Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department* *Emergency Sirens*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Nekoma is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

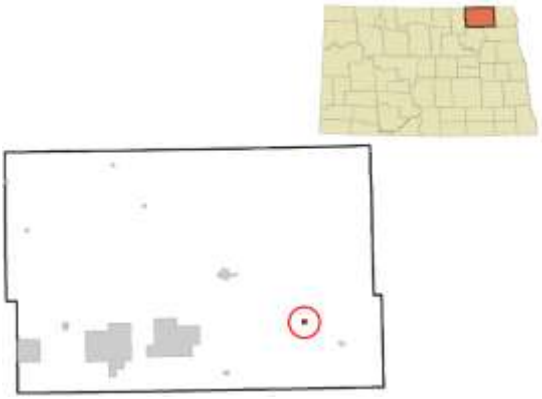
CITY OF OSNABROCK



Google, Map data, ©2017

Community Characteristics

Population: 134
Area: 0.30 sq. miles
Elevation: 1,621 ft
Founded: 1887
NFIP Participant: No
FIRM Date: N/A
Housing Units: 80
Median Age: 60.1



Community Summary

The city of Osnabrock is located in southeastern Cavalier County. The current estimated population is 119 people, down 15 from the 2010 census. Its population has slowly declined since the height of 310 in 1920. There is no new construction or development anticipated in Osnabrock.

Hazard Rankings

4-20-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Severe Winter Storm
2. Severe Summer Storm
3. Tornado
4. Urban Fire
5. Hazardous Materials Spill
6. Wildfire
7. Drought
8. Infectious Disease Outbreak
9. Shortage of Critical Materials
10. Flood
11. Terrorism
12. Erosion/Landslide

Other: N/A

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Osnabrock Fire Hall	Nekoma Fire	Emergency Services	$870,000	440 4th Ave	Osnabrock	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
3899	Erling's Oil Co.	Osnabrock Bulk Plant	201 Yellow Brick Road	Osnabrock	ND	58269
13329	Langdon Wind, LLC	Langdon Wind Energy Center	10812 Hwy 66 NE	Osnabrock	ND	58269

Community Issues & Concerns

Osnabrock suffered from excessive rainfall and flooding in 2016 which cause a major strain on the city lift station and lagoon system. The city has updated its warning sirens and purchased new lift station pumps to alleviate some hazard concerns. Currently Osnabrock wants to purchase a city owned tractor/snow blower for faster cleaning and pumping after storms.

Capability Assessment

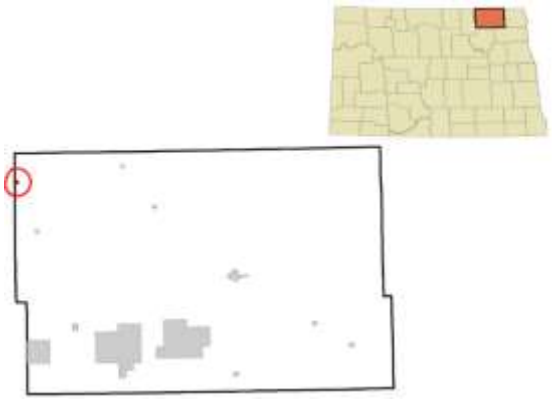
Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department* *Emergency Sirens*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Osnabrock is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

CITY OF SARLES

Google, Map data, ©2017

Community Characteristics

Population: 28
Area: 0.22 sq. miles
Elevation: 1,585 ft
Founded: 1905
NFIP Participant: No
FIRM Date: N/A
Housing Units: 25
Median Age: 64.6



Community Summary

The city of Sarles is located in extreme northwest Cavalier County. The current estimated population is 27 people, down 1 from the 2010 census. Its population has slowly declined since the height of 383 in 1930. There is no new construction or development anticipated in Sarles.

Hazard Rankings

4-12-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Flood
2. Severe Summer Storm
3. Severe Winter Storm
4. Shortage of Critical Materials
5. Urban Fire
6. Tornado
7. Wildfire
8. Terrorism
9. Hazardous Materials Spill
10. Erosion/Landslide
11. Infectious Disease Outbreak
12. Drought

Other: No

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Sarles Fire Hall	Sarles Fire	Emergency Services	$304,000	351 Main St	Sarles	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
15009	US Customs and Border Protection	Sarles Land Port of Entry	10949 Hwy 20	Sarles	ND	58372
268	CHS Milton	CHS Milton – Sarles	333 Railroad St	Sarles	ND	58372

Community Issues & Concerns

Sarles had significant tree and roof damage from a 2016 storm that rolled through with severe straight-line winds. The city has cleared out from around all city culverts in an effort to relieve flooding, as well as mowed several additional strips around city for increased fire protection, and has a priority over the next several years to build a community center which can also serve as a shelter in the event of a tornado or long-term power outage situation. The city has mitigation goals of enhancing flood protection, fire protection, and community sheltering capabilities.

Capability Assessment

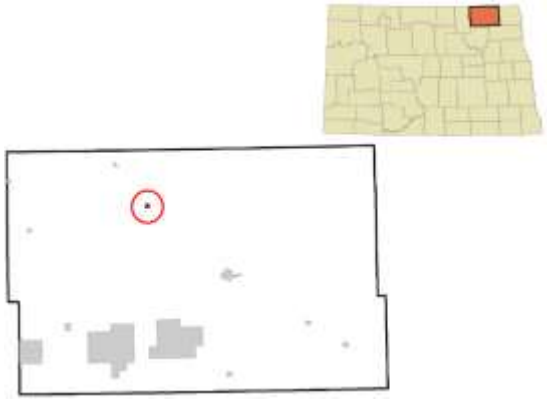
Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Sarles is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

CITY OF WALES

Google, Map data, ©2017

Community Characteristics

Population: 31
Area: 0.23 sq. miles
Elevation: 1,568 ft
Founded: 1897
NFIP Participant: No
FIRM Date: N/A
Housing Units: 25
Median Age: 32.2



Community Summary

The city of Wales is located in north central Cavalier County. The current estimated population is 30 people, down 1 from the 2010 census. Its population has slowly declined since the height of 383 in 1930. The city fire department built a new building on main street in 2012. There is no new construction or development anticipated in Wales.

Hazard Rankings

7-21-2017

These hazard rankings are derived from city specific feedback collected from the "City Hazard Mitigation Questionnaire" completed by city leaders and citizens.

1. Flood
2. Tornado
3. Infectious Disease Outbreak
4. Severe Summer Storm
5. Severe Winter Storm
6. Wildfire
7. Hazardous Materials Spill
8. Erosion/Landslide
9. Drought
10. Shortage of Critical Materials
11. Urban Fire
12. Terrorism

Other: Standing water, blocked culverts

Critical Facilities

Name	Description	Occupancy	Value	Address	City	State
Wales Fire Department	Wales Fire Hall	Emergency Services	$355,000	321 2nd Ave	Wales	ND

Tier II Facilities

ID #	Company	Facility	Address	City	State	Zip Code
153	Downs Oil Company	Downs Oil Co	9574 Cty 13	Wales	ND	58281
15093	Gavilon Fertilizer, LLC	Gavilon-Wales Farmers Elevator	221 Great Northern St	Wales	ND	58281
1494	United Telephone Mutual Aid Corp	Wales Co	350 3rd Ave	Wales	ND	58281

Community Issues & Concerns

The city has recently suffered from frost boils on city streets and pooling/flooding issues due to lack of runoff. This has lead to several severe incidents including a responding fire truck getting stuck leaving town, hampering response. The city has been forced to limit truck travel and other heavy equipment passage as a result of these issues. The city has identified improving drainage and increasing control of surface water as a major priority now and into the future. The city has identified deepening/reshaping ditches, clearing culverts, redirecting water from the city, building up the level of city streets. Since the previous plan, the city has installed a tornado warning siren for community alerting.

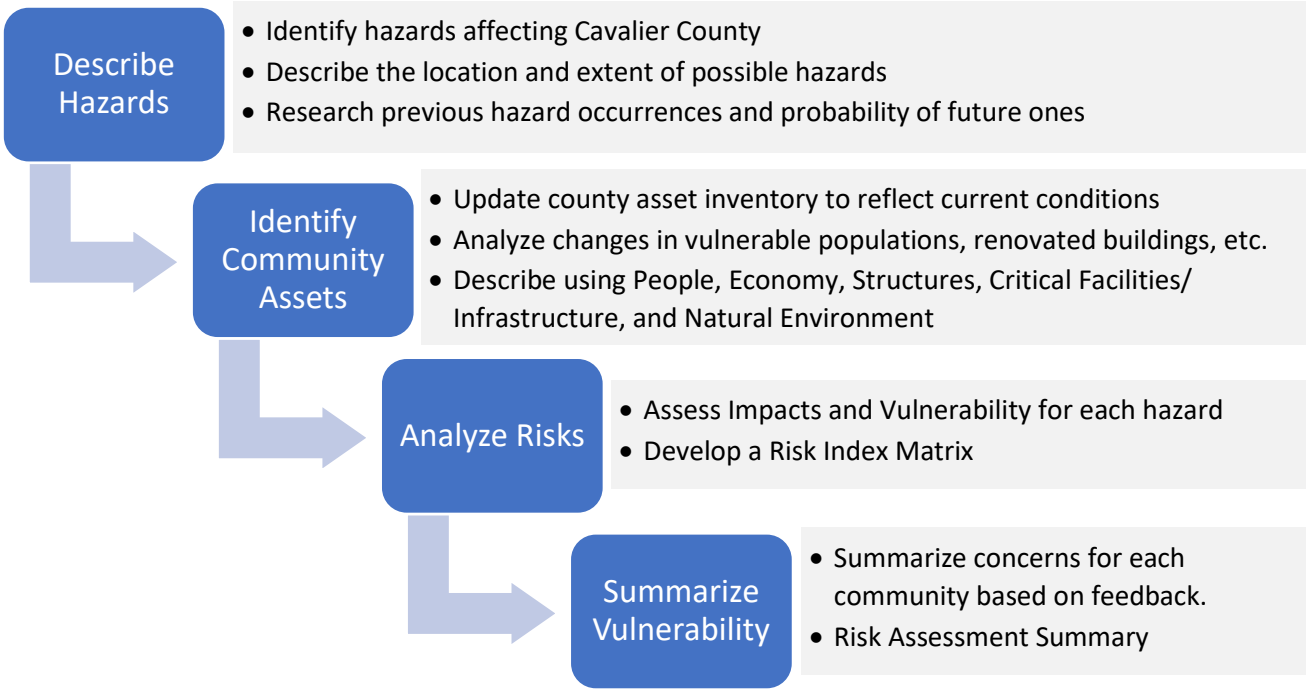
Capability Assessment

Category	Capabilities
Planning & Regulatory	*None – relies on county plans and regulations*
Administrative & Technical	*City Council (no staff)* *Fire Department*
Education & Outreach	*None – relies on county education and outreach*
Financial	*Limited – tax revenue low*
Capabilities and resources in the city of Wales is limited by population, funding, and staff. There is currently no ability to expand or improve on the above capabilities.	

SECTION III: HAZARD IDENTIFICATION

The Cavalier County Hazard Mitigation Planning Team conducted a complete county risk assessment to determine the potential impacts of natural, technological, and human-caused hazards on the community. This helped in developing mitigation priorities, inform decision-making, and lay a foundation for the mitigation strategies to reduce future losses. The planning team decided to focus on both technological and human-caused disasters, along with natural disasters in this plan.

The team followed a four-step approach to assessing risk:



The best predictor of future hazards are past ones. This section highlights the past major events that have occurred in Cavalier County and details each of the 12 hazards the planning team identified as being the primary threats to the county. Also included is a breakdown of the major presidential disaster declarations for Cavalier County and what previous hazard mitigation funding has been spend on.

Each hazard is defined, threat to Cavalier County described, what risks exist to the community, the brief/summarized history of each hazard, and how each jurisdiction ranked those hazards, with appropriate additional information detailing the hazards likelihood of occurring in the county.

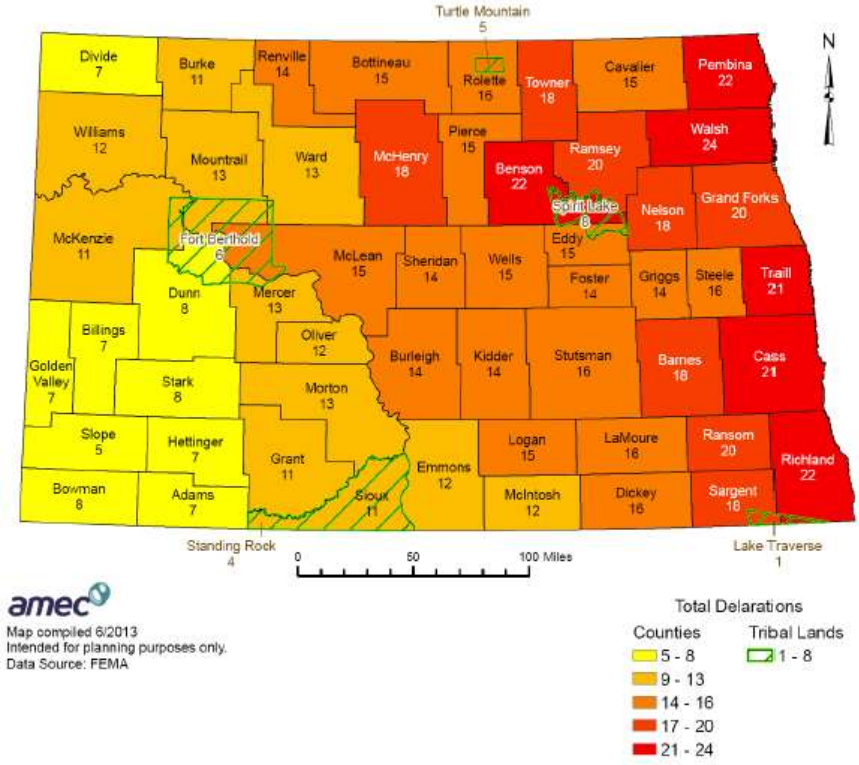
III. A. Presidential Disaster Declaration History

Cavalier County has had 23 Presidentially Declared Disasters since 1953. Below is a table listing those disaster declarations with associated FEMA Disaster Number and total damages associated with that disaster statewide.

Year	Hazard	Disaster #	Damages (Total)
1969	Flooding	DR-256	N/A
1970	Severe Storms, Flooding	DR-287	N/A
1974	Heavy Rains, Snowmelt, Flooding	DR-434	N/A
1979	Severe Storms, Snowmelt, Flooding	DR-581	N/A
1993	Severe Storms, Flooding	DR-1001	N/A
1995	Severe Storms, Flooding	DR-1050	N/A
1996	Severe Storms, Flooding, Ice Jams	DR-1118	N/A
1997	Severe Flooding, Severe Winter Storms, Snowmelt, Spring Rains,	DR-1174	N/A
1997	Severe Winter Storms, Blizzard Conditions	DR-1157	N/A
1999	Severe Storms, Flooding, Snow, Ice, Ground Saturation, Landslides, Mudslides	DR-1279	$48,334,834
2000	Severe Storms, Flooding, Ground Saturation	DR-1334	$39,699,756
2000	Severe Winter Storms, Tornadoes	DR-1353	$817,522
2001	Severe Storms, Flooding, Ground Saturation	DR-1376	$23,459,883
2004	Severe Storms, Flooding, Ground Saturation	DR-1515	$12,621,672
2005	Hurricane Katrina Evacuation	DR-3247	$24,233
2005	Severe Storms, Flooding, Ground Saturation	DR-1597	$14,394,156
2006	Severe Storms, Flooding, Ground Saturation	DR-1645	$7,378,304
2007	Severe Storms, Flooding	DR-1713	$2,939,821
2009	Severe Storms, Flooding	DR-1829	*$3.28 per capita damage indicator*
2011	Flooding	DR-1981	$43,547,540 - *$126.31 per capita*
2013	Flooding	DR-4118	$4,968,353 - *$15.55 per capita*
2013	Severe Storms, Flooding	DR-4128	$7,022,318 - *$19.08 per capita*
2017	Flooding	DR-4323	$3,253,554 - *$264.19 per capita*

FEMA Data Visualization: https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties, July 15, 2017

A.1 North Dakota Presidential Disasters and Emergency Declarations 1989-2013



A.2 Historical hazard mitigation projects in Cavalier County (HMGP and PDM)

Year	Project Description	Sub-Grantee	Project Cost
1993	Langdon Diversion Project: Channelization	City of Langdon	$109,989
2000	Utility Protective Measures: Burying overhead electrical lines.	Cavalier Rural Electrical COOP, Inc.	$121,296
2009	Update to Multi-Hazard Mitigation Plan	Cavalier County	$2,017
2016	Update to Multi-Hazard Mitigation Plan	Cavalier County Emergency Management	$26,750

**HMGP data downloaded from https://www.fema.gov/media-library/assets/documents /28323 and PDM data downloaded from http://www.fema.gov/media-library/assets/documents/103341*

III. B. Hazard Identification

The Planning Team used the information gathered from survey's, public meetings, phone conversations with stakeholders, and the State of North Dakota Enhanced Multi-hazard Mitigation Plan to identify hazards in Cavalier County and which ones to address in this updated plan.

The sources used to derive this information came from a number of organizations including but not limited to the North Dakota Department of Emergency Services, the Federal Emergency Management Agency (FEMA), the National Weather Service, NOAA, SHELDUS, reviewing historical newspapers, photos, and books/stories along with interviewing local experts. Most

importantly, the citizens of Cavalier County voiced their opinions on what hazards were most likely to affect them and their communities in public meetings, city questionnaires, and with phone calls with the county Emergency Manager. It was extremely important for the planning team to contact and do site surveys of cities to get an idea of exactly what hazards have affected them and what the jurisdictions have/can do in the future to prevent damages resulting from those hazards.

After much discussion and deliberation, the Planning Team decided to deviate from the hazards identified in the 2013 plan; which were aligned directly with the state's Hazard Mitigation Plan except for Windstorms. The new hazards focused on in this plan are more realistic and suitable to Cavalier County. Below is a comparison of the old and new hazards (alphabetized, not prioritized).

Old Plan (2011)	
1	Disease
2	Dam Failure
3	Drought
4	Flood
5	Geologic Hazards
6	Hazardous Materials
7	Homeland Security
8	Shortage or Outage of Critical Materials or Infrastructure
9	Summer Storm
10	Transportation Incident
11	Urban Fire Structure Collapse
12	Wild Land Fire
13	Winter Storm

New Plan (2018)	
1	Drought
2	Erosion/Landslide
3	Flood
4	Hazardous Materials Spill
5	Infectious Disease Outbreak
6	Severe Summer Storm
7	Severe Winter Storm
8	Shortage of Critical Materials
9	Terrorism
10	Tornado
11	Urban Fire
12	Wildfire

Disease was changed to 'Infectious Disease Outbreak" to make the hazard more specific. Dam Failure was seen as more of a technological hazard, not natural hazard, so it was specifically dropped out, though considerations for dam failure are still mentioned in the 'flooding' section of the hazard identification. Geologic Hazards, which previously covered earthquakes, landslides, erosion, and volcanos was simplified into one hazard "Erosion/Landslide", as earthquakes and volcanoes do not occur in the county. Homeland Security was redefined more specifically as Terrorism, along with Shortage or Outage of Critical Materials or Infrastructure to Shortage of Critical Materials. There was some discussion as to leave that hazard in or not, but it was decided that a shortage of certain services or goods would have a large impact on Cavalier County. Small changes in names from Summer Storm, Transportation Incident, Urban Fire Structure Collapse, Wildland Fire, and Winter Storm were made for clarification purposes.

III. B.1 Drought

Taken from weatherwizkids.com

Definition: *A deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. Drought is a temporary aberration from normal climatic conditions and can vary significantly from one region to another.*

For historical Drought information and occurrences in Cavalier County, see **Appendix B**

Threat

All areas of Cavalier County are as susceptible to a drought occurring as others. Droughts are difficult to prepare for because they are generally a slow onset and slow offset type of hazard. Droughts are fairly unpredictable and can occur with as little as four to six inch precipitation deficits. It is possible to study the tree rings and other various historical knowledge to determine when droughts have occurred and when they may happen again. Climatologists and forecasters cannot predict droughts but do know that drier than normal conditions alternate with wetter than normal conditions. The threat to cropland and water supplies may be critical if the drought lasts long enough and is severe.

Risks

Business interruptions, increased fire potential, increased public safety use, loss of potable water, livestock injury/death, property and crop damage, loss of primary economic drivers, economic loss. *(List is not comprehensive)*

History

Events	Most Recent	Damages	Deaths	Injuries
5 Drought	**10/2/12**	**$0**	**0**	**0**

Defining drought is subjective to its impacts, and for the purposes of this plan, we will look at droughts impacts on life safety; although it can also have a detrimental impact on crops depending on the season, which will have an enormous impact on the local and regional economy. The table below lists the previous drought events that have occurred in Cavalier County.

Date	Narrative	Damages:
1929-1940	Dust Bowl of the 1930's	N/a
1958-1961	Preceded by several dry years	N/a
1976-1977	Dry period over 2 years	N/a
1980-1981	Dry period over 2 years	N/a
1988-1992	Hottest months on records, severe farming issues, $89,285 crop damages	June 1988: $89,285.71
2003	Moderate drought conditions, crop damages	N/a

2006	Moderate-Severe drought conditions, crop damages	N/a
2009	Extremely Dry conditions following spring flooding	N/a
2010	Dry conditions impacting NW part of county	N/a

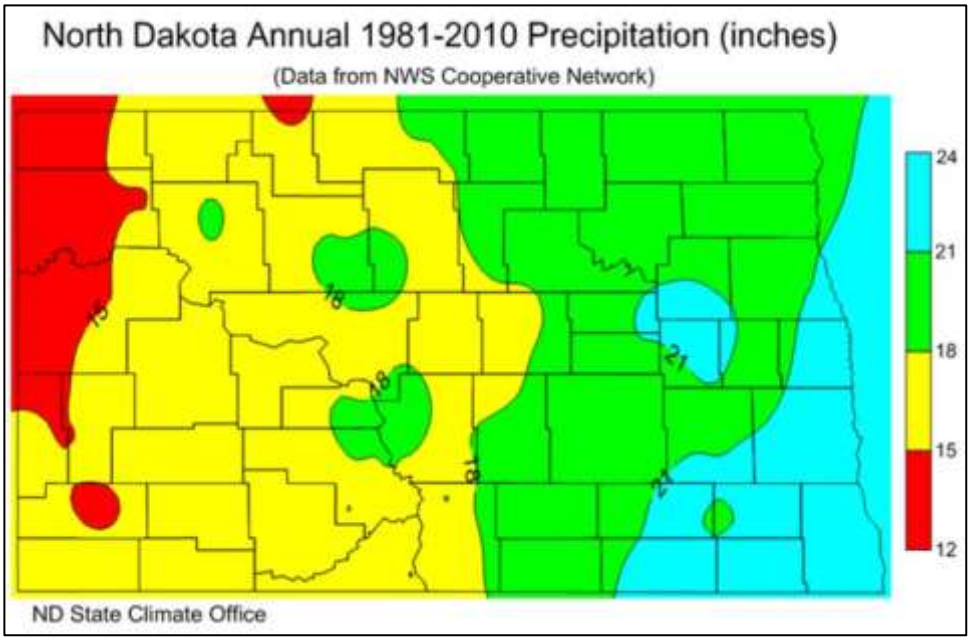
Sources: 2013 Cavalier County MHMP, Spatial Hazard Events and Losses Database for the United States (SHELDUS)

In 2017, the State of North Dakota suffered from a severe drought from spring until the fall, causing widespread crop damage and feed shortages. Conditions were severe enough for Governor Doug Burgum to request a Presidential Disaster Declaration request, which was denied. Cavalier County never exceeded the 'moderate drought' category (D1), being the worst on June 13th, 2017. Conditions were dry, but not such to severely impact Cavalier County directly.

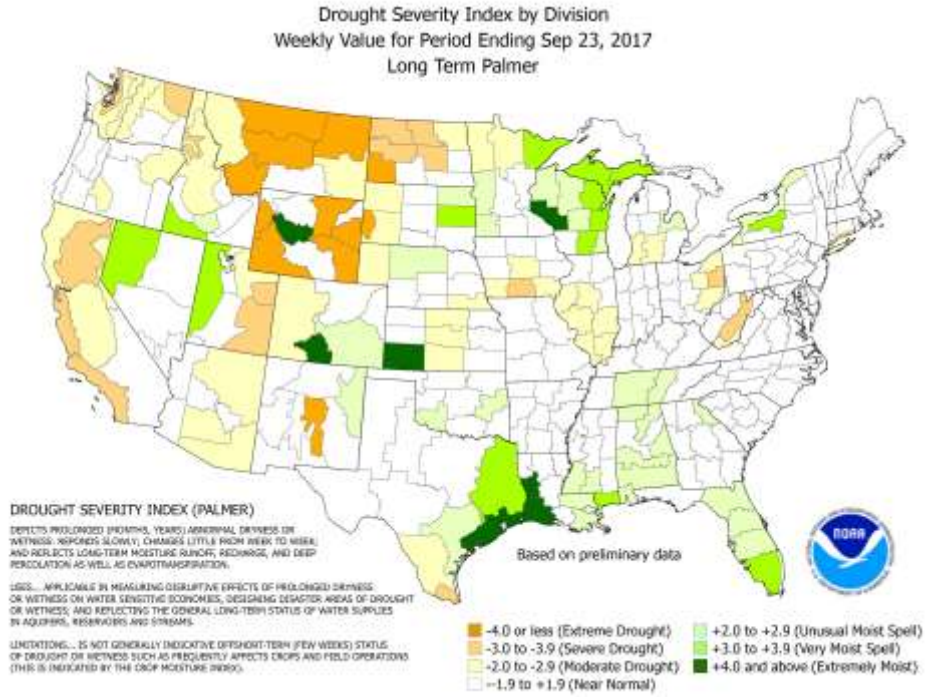
Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Likely	**1 – 10 Years**	Occasional occurrence with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01
Drought has historically occurred at least once every 10 year on average. The official National Centers for Environmental Information Storm Events Database lists just 5 events since 1950, but additional drought incidents were indicated by the previous plan and by historical records. The paleoclimatic data suggests that droughts in the 1930's and 1950's have occurred several times a century for the last 3-400 years. Droughts and their impacts can range from negligible to catastrophic depending on the exact location and duration. It is not unusual for the Cavalier County receive a D0 or D1 (abnormally dry – moderate drought) from the United States Drought Monitor. The area has sufficiently prepared for moderate to severe droughts, but impacts may still be felt on economic factors if conditions are prolonged.		

Average Monthly Precipitation	
Based on station in Langdon	
Jan	0.42"
Feb	0.39"
Mar	0.61"
Apr	1.00"
May	2.36"
Jun	3.33"
Jul	3.18"
Aug	2.73"
Sep	1.66"
Oct	1.38"
Nov	0.66"
Dec	0.39"
Total:	**18.11"**



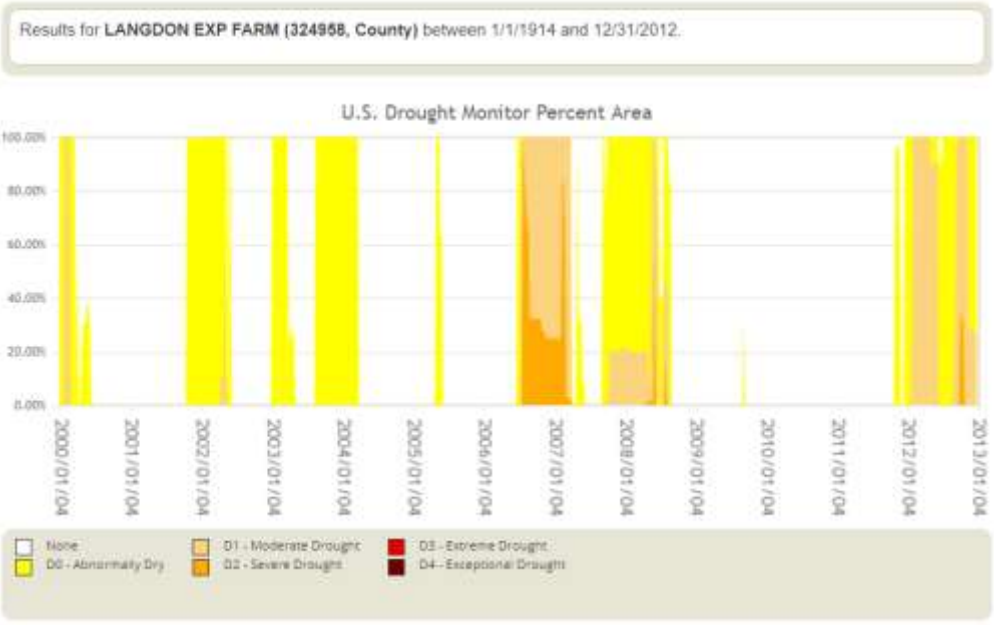
2017 Drought Severity Index (Palmer):



Taken from: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif

*For updated conditions, please visit the U.S. Drought Monitor at droughtmonitor.unl.edu

The following graph indicates the various drought categories the station in Langdon has experienced from 2000 to 2013; there was no newer data than that, but it gives a good indication of the cyclical movement of droughts. Generally Cavalier County has been in D0 "Abnormally Dry" conditions if it does reach drought status.



Taken from: http://droughtatlas.unl.edu/Data.aspx

City Water Sources

City/Uninc.	Source	Served by
Alsen	City of Devils Lake	Northeast Regional Water District (NRWD)/ Individual Wells
Calio	City of Devils Lake	NRWD/Individual Wells
Calvin	City of Devils Lake	NRWD/Individual Wells
Hannah	Rural Water	Individual Wells
Langdon	City of Devils Lake	NRWD
Loma	City of Devils Lake	NRWD/Individual Wells
Milton	City of Devils Lake	NRWD
Munich	City of Devils Lake	NRWD/Individual Wells
Nekoma	City of Devils Lake *(Starting in 2018)*	NRWD
Osnabrock	City of Devils Lake *(Starting in 2018)*	NRWD
Sarles	City of Devils Lake *(Starting in 2019)*	NRWD/Individual Wells
Wales	City of Devils Lake	NRWD/Individual Wells

Sources: North Dakota State Water Commission, 2017-2019 Water Development Report, Northeast Regional Water District)

Drought Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see Drought as a "Moderate" risk. Also included is a vulnerability summary and analysis for drought in each jurisdiction.

Jurisdiction	Ranking	Risk	Vulnerability Summary
Alsen	**5**	Moderate	Reliable water source (2), same as county
Calio	**12**	Low	Reliable water source (2), same as county
Calvin	**8**	Moderate	Reliable water source (2), same as county
Hannah	**6**	Moderate	Somewhat reliable water source (1), same as county
Langdon	**7**	Moderate	Reliable water source (1), same as county
Loma	**8**	Moderate	Reliable water source (2), same as county
Milton	**6**	Moderate	Reliable water source (1), same as county
Munich	**5**	Moderate	Reliable water source (2), same as county
Nekoma	**8**	Moderate	Reliable water source (1), same as county
Osnabrock	**7**	Moderate	Reliable water source (1), same as county
Sarles	**12**	Low	Reliable water source (2), same as county
Wales	**9**	Low Concern	Reliable water source (2), same as county

The entire county is served by the Northeast Regional Water District, which pulls its main water supply from Devils Lake, 70 miles to the south. The lake is a very reliable and large body of water that has been getting steadily larger over the past 30 years, even through minor droughts. Half of the cities in the county also have access to individual wells that tap into large

aquifers on the western (Munich Aquifer) and eastern (Pembina Delta Aquifer) sides of the county, making them even less susceptible to drought.

Generally, no one jurisdiction is more susceptible to drought than another; only Hannah relies solely on wells/aquifers which may pose an issue in an extremely severe drought. The city of Langdon is the only city in the county with a water tower for extra water storage. While the seriousness of drought is seen as a low-risk hazard to many of the jurisdictions, the impact of a high or catastrophic magnitude drought could impact the economic bedrock of Cavalier County. According to the 2012 Census of Agriculture, Cavalier County has 667 farms comprising 940,331 acres. The market value of the crops that these farms grow and harvest is $334.5 million dollars, the primary economic driver in the county. According to the North Dakota State Water Commission, there are no active water permits being used for irrigation, which makes manual drought-relief difficult. The North Dakota Department of Emergency Services says that from 2003 to 2012, Cavalier County suffered from $674,484 crop losses due to drought, which is the 8th lowest county in the entire state in that time period.

III. C.2 Erosion / Landslide

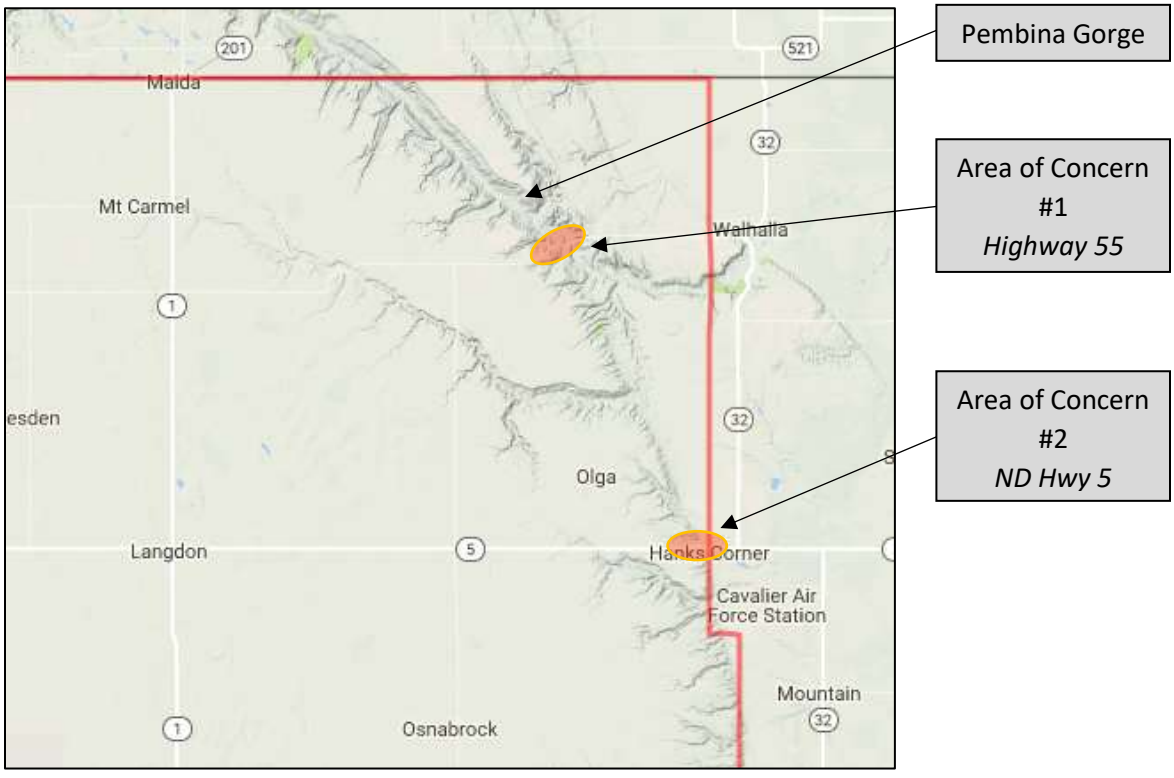
Erosion along Hwy 55 – Cavalier County

Definition: *Erosion's and landslides is the movement of rock, soil, artificial fill, or a combination thereof in a downward or outward direction. These are generally caused by saturated soils or heavy rainfall/snowmelt in combination with a downhill slope. Causative factors include construction, saturation, earthquakes, loss of vegetation along steep banks of slopes, dams, lakes, reservoirs, canals, and rivers among others.*

Threat: The threat of significant landslides or erosion issues is low across all of Cavalier County. The risk is a little higher in the Pembina Gorge area in the northeast area of the county including ND State Highway 66, a half mile east of Milton, ND State Highway 5 through the Pembina escarpment at Hanks corner, and Cavalier County Road 55, between Vang and Walhalla. An erosion issue on Highway 55 directly effects a potential emergency response in the northeast section of the county beyond the gorge area. Ditch and riverbank slumping in various ditches, creeks, coulees and other waterways around the county cannot be ruled out, but is not considered a serious threat with any significant consequences.

Risks: Closed roads, business interruption, delayed emergency response, downed power lines, hazmat spills, increased public safety usage, property damage. *(List is not comprehensive)*

Pembina Gorge Map:



History

There has been no history of significant soil erosion or landslides in Cavalier County. For a detailed topographic map of the gorge, visit https://www.anyplaceamerica.com/directory/nd/cavalier-county-38019/. According to the USA Landslide Susceptibility Map, no area in Cavalier County is susceptible to significant landslides[3].

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Possible	**10 – 100 Years**	Rare occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001
There has never been a recorded history of any landslides in Cavalier County. However the Mt. Carmel Dam (earthen embankment) did experience some erosion in 2003 around the spillway. Much of the county is flat and could not incur severe landslides or erosion. The sole possibility is in the Pembina Gorge, where the erosion of the hillsides and cliffs is a constant geologic feature. Generally, the more frequent events have low impact, and the high impact events occur less frequently. Future occurrences possible, but would be rare and likely small in magnitude and localized.		

Erosion/Landslide Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see Erosion/Landslide as a "Low Risk" hazard. Also included is a vulnerability summary and analysis for erosion/landslide in each jurisdiction.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**11**	Low	No significant vulnerability
Calio	**2**	High	No significant vulnerability
Calvin	**11**	Low	No significant vulnerability
Hannah	**11**	Low	No significant vulnerability
Langdon	**11**	Low	No significant vulnerability
Loma	**10**	Low	No significant vulnerability
Milton	**12**	Low	Highway 66 east of Milton could be impacted
Munich	**10**	Low	No significant vulnerability
Nekoma	**12**	Low	No significant vulnerability
Osnabrock	**12**	Low	No significant vulnerability
Sarles	**10**	Low	No significant vulnerability
Wales	**8**	Moderate	No significant vulnerability

With no record of landslides or significant erosion having happened in Cavalier County, and no cities existing on hillsides or near creeks, there is a very low vulnerability to landslides for all

[3] USA Landslide Susceptibility, ArcGIS 2013, http://www.arcgis.com/home/webmap/viewer.html?webmap=cc5e9da58860460188705c545e86c871

cities and townships. There are no homes or critical infrastructure near the area's of concern along the Pembina Gorge or anywhere else in Cavalier County. There is a moderate risk to two roads (Highway 55 and Highway 5) that may be impacted by undercutting or burying following erosion or a landslide, but neither is a primary thoroughfare and consequences would only be felt in the event of total collapse or obstruction in addition to an emergency across the gorge, extending first responder time.

C.2.1 Dam Failure

Dams are structures that retain or detain water behind a large structural or natural barrier. With large amounts of water being held behind the dam, the potential for large flooding events exists. Dams can fail due to either water heights or flows above capacity behind the dam, or due to deficiencies in the structure or design of the dam. Dams require constant monitoring and maintenances to ensure integrity and protection of downstream life and property. Below is a list of all the dams in Cavalier County considered 'high-hazard', meaning there is the potential for the loss of many lives if it fails. Medium and low hazard dams have less impact on areas where a failure may occur.

There are 44 dams and retention structures in Cavalier County, 5 being high/significant hazard. There are eight dikes, two diversions, and one pond. The 39 low-hazard dams are for agricultural use and would affect only small areas of farmland if they were to fail. These dams are usually used for cattle water or fish and wildlife reclamation. Only one Dam, Mt. Carmel, is actually owned by the Cavalier County Water Board, the other four are owned by Cavalier or Walsh Counties due to the higher need/impacts downstream. Many of the other dams in the county have extremely small pool volumes and none are in proximity to critical infrastructure or homes. The high hazard dams are listed in the table below.

List of High-Hazard Dams in Cavalier County

Name	Year Built	Owner	River	Purpose	Volume (ac-ft)
Senator Young Dam	1961	Pembina County Water Board	Tongue	Flood Control	5,971
	Impacts: 4 homes in Pembina County, County Road 45 and Border Ave NE. No impacts in Cavalier County. No critical infrastructure. (Apprx 50 people). Drains an area of 53.8 square miles.				
Mt. Carmel Dam	1971	Cavalier County Water Board	Little South Pembina	Recreation	10,707
	Impacts: 1 vacation home, roads throughout the Pembina Gorge. No Critical infrastructure. (Apprx 10 people). Drains an area of 72 square miles.				
Bourbanis Dam	1957	Pembina County Water Board	Tongue-TR	Flood Control	1,502
	Impacts: Agricultural land only, no population, homes or critical infrastructure.				

	(Apprx 0 people)				
Middle Br. Park River #10 – Melstad Dam	1971	Walsh County Water Board	Middle Branch	Flood Control	2,111
	Impacts: 7 homes in Pembina, 8 homes in Walsh, some rural roads. No Critical infrastructure. (Apprx. 125 people)				
Middle Br. Park River #9 – Union Dam	1970	Walsh County Water Board	Middle Branch	Flood Control	2,467
	Area's of Inundation: Agricultural land only, no population, homes or critical infrastructure. (Apprx. 0 people)				

Information taken from: http://www.swc.nd.gov/info_edu/map_data_resources/structures/
Cavalier County Water Board, Pembina County Water Board

History of Dam Failure and Erosion

March 29, 2003: A partial failure at Mt. Carmel Dam was called into the Sheriff's Office by a student out taking pictures for a school project. It was determined after officials inspected the site that water was flowing around the spillway and significant erosion had occurred. Only one resident downstream in the county would be impacted and that citizen choose to evacuate their home. The Cavalier County Commission and Water Resource Board, along with the ND State Water Commission constructed an earthen cofferdam for immediate relief and no major failure happened. It was determined that frost-susceptible fill was used to construct the dam, more insulation was needed to prevent freezing soils underneath. The dam was ultimately repaired and improved by 2005. The only resident in danger, was a mobile home; which was removed from the hazard area at the time and has not been replaced.

Ongoing: Soils along Highway 55 in the Pembina Gorge are destabilizing and causing damage. Thusfar, it has cost the county $1,608,303.88 to mitigate erosion issues along the highway, including the replacement of the historical Brickmine Bridge at a cost of $1,019,069.45.

2003: Mt Carmel Dam Erosion/Failure

2017: Hwy 55 roadside erosion

II. C.3 Flood

Source: agweb.com – Rural Cavalier Co

Definition: *A flood is an overflow of water onto land that is not normally covered by water. Floods are a natural phenomenon occurring after heavy rains or prolonged periods of wetness, but are frequently exacerbated by human-caused changes in the natural landscape. A Flash Flood is a sudden onrush of water caused by either heavy rain or a dam failure.*

For historical flood information and occurrences in Cavalier County, see **Appendix B**

Threat: The probability of flooding exists across the county and in every city. Floods in the county have been persistent due to the relatively flat topography of the area, but the problems have been controllable, usually limited to overland flooding across county roads from field to field. The largest river in the county, the Pembina River, snakes its way from Canada into the northeast section of the county, before heading east into Pembina County and eventually the Red River. The river is in a deep gorge, limiting its destructive potential. The county is really the beginning watershed for four major stream basins (Devils Lake, Park River, Pembina River, Tongue River). This is somewhat unique in the area and prevents the possibility of catastrophic flooding within Cavalier County, unlike other area communities. The primary threat in Cavalier County is the lack of efficient water runoff and high-water tables leading to saturated ground.

Risks: Blocked roads, business interruptions, delayed emergency response, localized evacuation, street flooding, structure flooding, hazmat release, increased fire potential, increased public safety usage, loss of potable water, loss of power, property damage, school closures, sewer backup, livestock injury/death, loss of economic drivers.

History:

Events	Most Recent	Damages	Deaths	Injuries
Flood - 17	**4/01/2017**	**$1,292,000**	**1**	**1**
Flash Flood - 7	**6/18/2009**	**$27,500**	**0**	**0**

Unlike many counties in the state, Cavalier has never had many issues with severe flooding or actual structure/property damage resulting from flood events. The undulating hills and gorges in the county work to drain lands fairly quickly after heavy rains or melting snow, and few homes are in any danger of rising rivers; the primary danger coming in the form of overland flooding, and even that is usually localized. In 2009 and 2011, several homes experienced flooded basements as a result of the high water table, and there were some flooded roads in lower lying areas. In 2017, the county did record almost $1.3 million in damages from heavy snow and a quick spring thaw. Almost all the damage was to county and township culvert or roadway washouts and embankment failures. The county applied for Hazard Mitigation grant

money to increase the diameter on several culverts, repair roads to pre-disaster conditions, and increase the ability for these areas to handle large water flows. Primary damaged sites was the gravel road going over the Pembina River east of the Mt. Carmel Dam, Hwy 20 and 81st St NE, 106th St. NE over the creek, and 123rd Ave NE over the creek. Continued improvements will alleviate future concerns at these areas.

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Likely	**1 – 10 Years**	Occasional occurrence with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01
Historically, floods are a fairly common occurrence across the county. There have been 17 official flood events with 7 flash floods. The most recent flood in 2017 caused over $1 million in damages. They occur on average, once every 2-4 years, but have been more prevalent since the early 1990's as the area has been experiencing a meteorological wet-cycle. With water tables high, the overall probability of flooding is likely, with magnitude and severity varying depending on location and amount, but generally moderate to low.		

National Flood Insurance Program (NFIP)

Currently, only the City of Langdon and Cavalier County participate in the NFIP. The only mapped area of the county is the city of Langdon. More information can be found on the NFIP in the Mitigation Section. The FIRM maps are located in Appendix E.

**FEMA is actively engaged with Cavalier County in the assessment and development of new/updated maps at the time of this plan update.*

Repetitive Losses

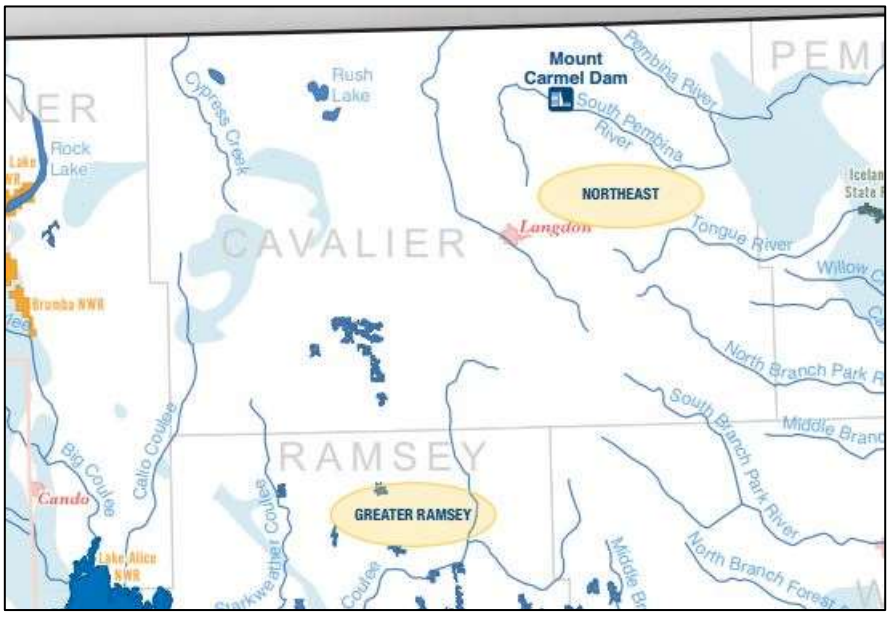
Repetitive flood damages that have occurred in the past have been addressed appropriately where it has occurred and there are currently no repetitive loss properties in the county . Three homes in the county have been impacted by overland flooding, two of them building permanent ring-dikes around their properties. The State Water Commission has no record of repetitive loss in Cavalier County, but lists both the City of Langdon and City of Osnabrock in the BCX Claims sheet as potential areas of concern.

As a part of a 2017 Hazard Mitigation Grant, Cavalier County solicited the services of a GIS specialist to map out all county roads, with overlays of FEMA Floodplain maps, effectively creating 'hotspots' for overland and road flooding, and where potential issues may arise in times of high water. This is intended for future hazard mitigation planning and highway department prioritization and will be used beginning in 2018; maps will be added to this plan as appropriate. The project is expected to be completed by March, 2018.

C.3.1 Hydrography

Four watersheds are located in Cavalier County: Devils Lake Watershed, Park Watershed, Lower Red Watershed, and Pembina Watershed. The primary county drainage enters the Pembina

river and drains to the east. The southwest fifth of the county (Munich area) drains slowly into the closed basin Devils Lake Basin via coulees, creeks, and drainage ditches. The primary rivers flowing through Cavalier County are Cypress Creek, Pembina River, South Pembina River, Tongue River, North Branch of the Park River, South Branch of the Park River, as well as the Starkweather, Calio, and Edmore Coulee's leading to Devils Lake. The county is the beginning of several streams and tributaries, decreasing the chances of any major flooding events.



Source: ND State Water Commission

To search specific drain permits, visit the state water commission website: http://www.swc.nd.gov/info_edu/map_data_resources/drains/

Water Management Projects

Cavalier County is actively involved in mitigation efforts with the State Water Commission on a series of project to improve drainage for better water management. See table below.

Project	Sponsor	SWC Grant	Local Match	Total Cost
Cypress III Drainage Improvement	Cavalier WRD	$58,500	$71,500	$130,000
Roseau Drain	Cavalier WRD	$222,750	$272,250	$495,000

Source: 2017-2019 NDSWC Water Development Report

Flood Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see Flooding as a "High" hazard. Also included is a vulnerability summary and analysis for flooding in each jurisdiction.

Jurisdiction	Ranking	Risk	Vulnerability Summary
Alsen	**3**	High	Previous damage to roads and lift station in 2011/2016, lift station is vulnerable to flooding.
Calio	**2**	High	Previous city road washouts, poor city-wide drainage
Calvin	**2**	High	Vulnerable streets, poor buildup and maintenance
Hannah	**3**	High	Clogged drains and ditches, water tends to pool in town.
Langdon	**12**	Low	City has effectively mitigated flooding, no river runs through town, and city pump stations are appropriate for potential events.
Loma	**2**	High	Perennial culvert/road damage, poor rip-rap/gravel situation
Milton	**4**	High	Troubles with lift station, no backup power.
Munich	**4**	High	No pump station to drain NW side of town, poor drainage on east and south end of town.
Nekoma	**10**	Low	Good drainage, no homes or critical infrastructure at risk
Osnabrock	**10**	Low	2016 flooding caused major strains on liftstation and lagoon, purchased new pumps afterwards. No forseen issues.
Sarles	**1**	High	Poor city drainage, blocked culverts,
Wales	**1**	High	No control of surface water run off, many spring issues with flooding. Streets boils/heaves, poor maintenance. Poor run-off throughout city. Drains, Culverts, ditches are blocked.

Unlike many areas in North Dakota, Cavalier County has experienced fewer devastating floods to property. This is due to the fact that only one true river traverses the county, the Pembina, which is settled in a gorge on the very northeast portion of the county, limiting the potential for riverine flooding. A series of 10 tributaries begin as creeks in Cavalier County, limiting the drainage basins and potential for riverine flooding, and flow out of the county. Overland flooding is still an issue for many area's of the county when heavy rains or a fast snowmelt occurs, including vulnerable rural roads in low-lying areas. It is a pot-hole region with many low lying area's in fields that fill during wet times. The primary vulnerability in Cavalier County is the flat topography which doesn't allow water to move away from cities fast. Many cities indicated poor drainage and a need to clear out , this is a primary concern and is reflected in the mitigation action chart. This was indicated as a springtime problem in most all cities except for Langdon, Nekoma, and Osnabrock. No cities have significant property or critical infrastructure at risk to flooding, but basements are vulnerable, and streets/gravel roads are susceptible to washouts and heaving.

Flooding regularly affects the agricultural areas of Cavalier County, with raising low-spots that affect crop yields and the economic driver of the county in worst case scenarios. Many farmers have crop insurance which helps alleviate many losses. Road and culvert washouts are the most common effects from flooding in the county, which was the main cause of the $1.2 million dollar flooding in 2017 along a series of several stretches of vulnerable roadway. From 2003 to 2012, Cavalier County suffered over $16 million in estimated crop losses due to flooding, which was the second highest to only Cass County.

III. C.4 Hazardous Materials Spill

Taken from harlemroscoefire.com

Definition: *The term 'hazardous materials" covers a wide array of substances from relatively innocuous substances (hair spray ,etc) to highly toxic and poisonous materials (Anhydrous Ammonia, etc). It is defined as any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment either by itself or through interaction with other factors.*

For historical hazardous materials spill information and occurrences in Cavalier County, see **Appendix B**.

Threat: Cavalier County is generally at equal risk across jurisdictions for a hazardous materials spill or release. Populations close to major thoroughfares, railroad tracks, or hazmat storage facilities has a higher probability of experiencing a spill or release. Cavalier County has very little in the way of oil being transported through the county through rail, but the Keystone Pipeline runs from north to south along the Cavalier/Pembina county border which is a major oil transporter in the region, so the primary threat comes from tanker trucks traversing the county and anhydrous ammonia storage tanks. There are also a WBI Energy natural gas pipeline running to Langdon and in the southeastern portion of the county. The BNSF and NPR railroads that run through the county do not carry oil, but may carry anhydrous ammonia.

Risks: Roads may be closed, businesses may be interrupted, delayed emergency response, full or partial evacuation, increased fire/explosion potential, hazmat release, increased public safety usage, loss of drinking water/medical facilities, power, potential mass fatalities, property damage, environmental damage, school closure, livestock injury/death.

History since 1975:

Events	Most Recent	Total Spill Qty	Deaths	Injuries
Spills - 18	**6/23/2015**	**19,732 Gallons**	**0**	**0**

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Possible	**10 – 100 Years**	Rare occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001
While small hazardous materials spills and releases happen annually, it is rare for a large quantities of life threatening materials to be released. The worst spill in Cavalier County happened in 1975 when 7,000 gallons of diesel fuel was released. With no significant history of spills or releases, the probability of occurrence is possible every 10 years, but not likely. The magnitude will depend on the type of substance released and the amount, which can vary widely. There have been 18 recorded spills since 1975.		

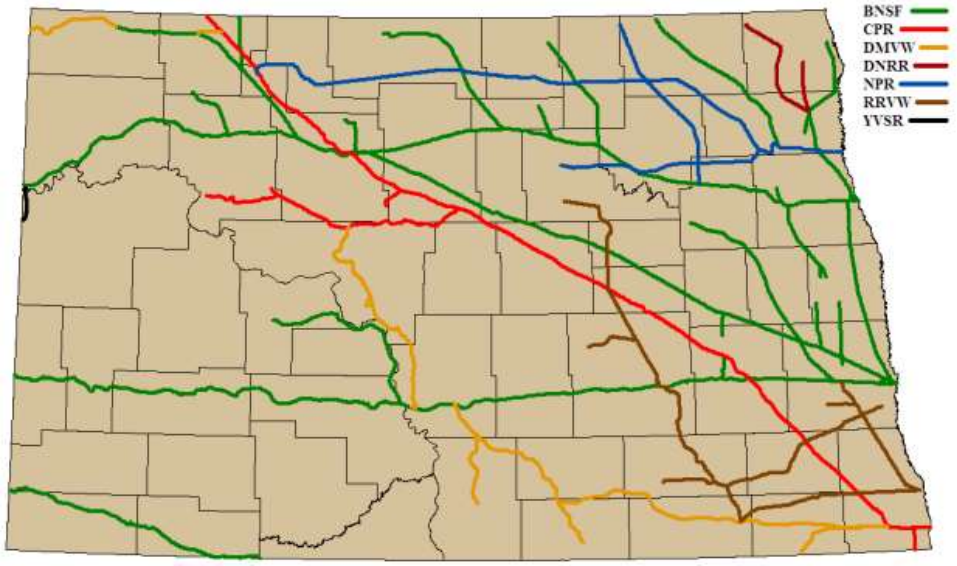
The North Dakota Department of Health, Environmental Health Section, registers hazmat spills whenever an environmental incident report is filed. The following table is a list of all Cavalier County incidents in the states database:

Hazardous Materials Spills

Incident ID	Date Reported	Date of Incident	TwnRngSec	Material	Volume (Gallons)
EIR400	11/18/1975	11/17/1975	15906015	Diesel Fuel	7,000
EIR410	4/18/1975	4/18/1975	16106023	Gasoline	2,700
EIR349	10/2/1980	10/1/1980	16305620	Diesel Fuel	2,500
EIR205	5/20/1994	5/20/1995	16105717	Fertilizer	2,000
EIR64	7/16/2001	7/14/2001	16105919	Ronilan EG	200
EIR69	8/6/2001	8/6/2001	16106023	Diesel Fuel	N/a
EIR843	5/15/2006	5/15/2006	16106015	Sonalan HFP	60
EIR633	9/25/2003	9/24/2003	16106021	Liquid Nitrogen	700
EIR772	6/20/2005	6/19/2005	15906119	#2 Diesel Fuel	2,500
EIR784	7/15/2005	7/14/2005	16106019	Thiophanate Methyl	N/a
EIR1464	6/17/2011	6/17/2011	16106015	Trophy Gold	32
EIR1728	7/6/2012	7/6/2012	15905911	Non-PCB Mineral Oil	100
EIR1762	8/27/2012	8/25/2012	16105914	Transformer Oil	180
EIR1865	1/30/2013	7/2/2012	15906405	Petroleum Products	N/a
EIR2029	8/21/2013	8/21/2013	16006133	Anhydrous Ammonia	700 lbs
EIR1917	5/7/2013	5/7/2013	16006319	#2 Dyed Diesel Fuel	1,000
EIR2164	1/6/2014	1/6/2014	15906405	Petroleum	N/a
EIR3785	6/23/2015	6/23/2015	15905706	Anhydrous Ammonia	30 lbs

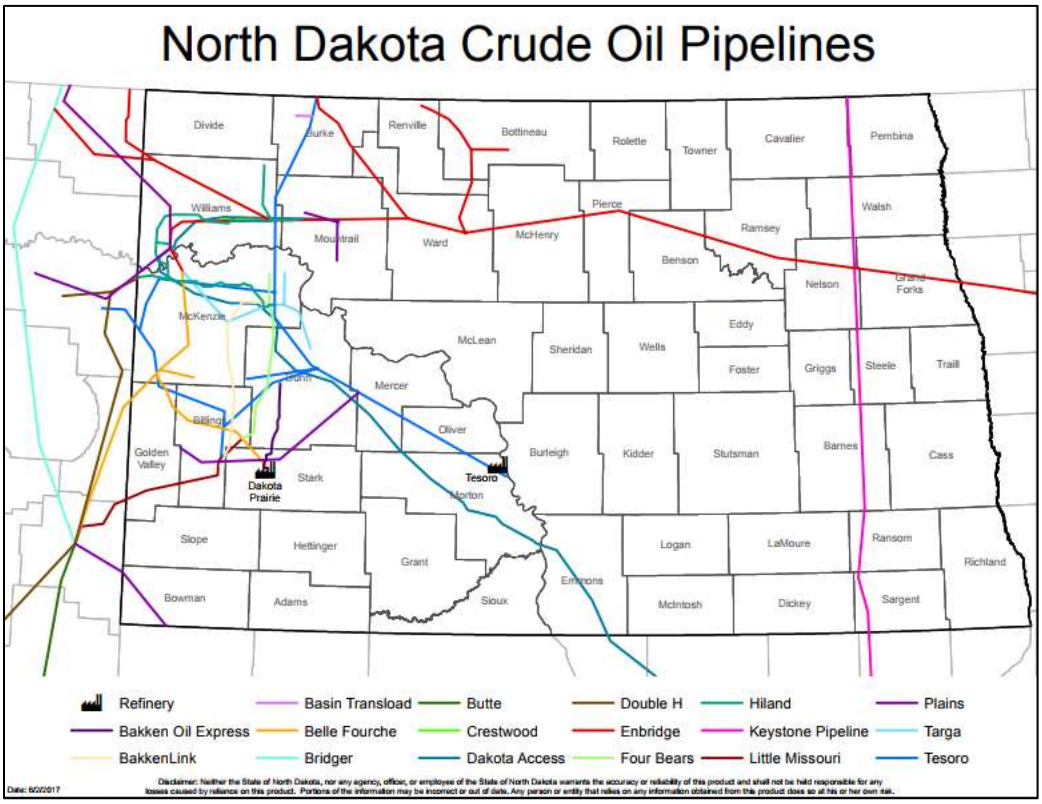
Data taken from the ND Department of Health: http://www.ndhealth.gov/ehs/foia/spills/defaultArc.aspx

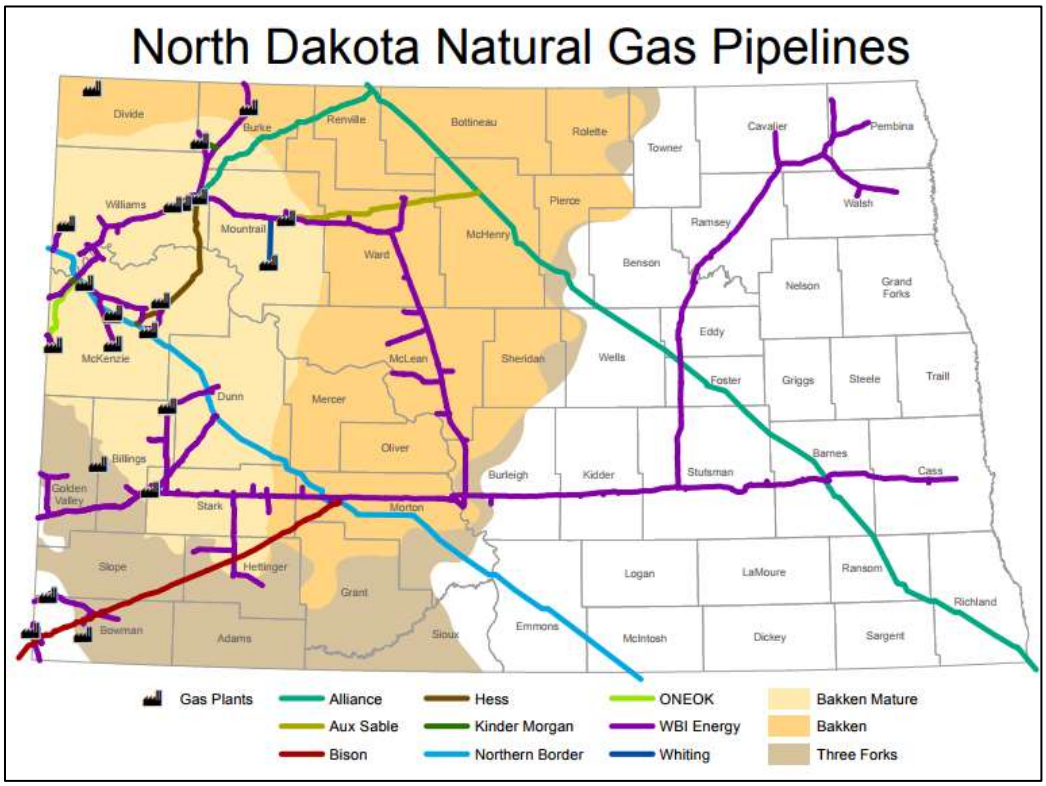
Railroads:



In a joint commodity flow study for materials travelling through Cavalier and Pembina Counties in 2009, it was determined that Cavalier had 787,000 gallons of hazardous substances travelling on the roadways through the county. That study was conducted from March 11th to May 31st, from 9am to 5pm during the day. The hazardous materials carried ranged from anhydrous ammonia and fuels, to farm pesticides and herbicides. Many of the substances were found to be extremely hazardous substances (EHS), posing a significant hazard to life safety were they to somehow be released.

Pipelines:





Maps provided by the ND Pipeline Authority, https://northdakotapipelines.com/maps/

Hazardous Materials Spill Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see a Hazardous Materials Spill as a "Moderate" risk hazard. Most cities have large amounts of Anhydrous Ammonia in storage and is a factor in nearly every city within the county with the exception of Calio, which is reflected in the risk and vulnerability table below.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**4**	High	(1 Tier II Site) – Same as county
Calio	**10**	Low	(No Tier II Sites) – Very low vulnerability and risk
Calvin	**3**	High	(2 Tier II Sites) – Same as county
Hannah	**7**	Moderate	(1 Tier II Site) – Same as county
Langdon	**5**	Moderate	(10 Tier II Sites) – Critical infrastructure and 1,878 residents. Close to first responders.
Loma	**6**	Moderate	(1 Tier II Site) - Same as county
Milton	**5**	Moderate	(3 Tier II Sites) – School and 210 residents
Munich	**6**	Moderate	(2 Tier II Sites) – Same as county
Nekoma	**5**	Moderate	(1 Tier II Site) – Same as county
Osnabrock	**5**	Moderate	(2 Tier II Sites) – Same as county

Sarles	**9**	Low	(2 Tier II Sites) – Same as county
Wales	**7**	Moderate	(3 Tier II Sites) – Same as county

The primary vulnerabilities to Cavalier County would be the tipping of a semi-tanker on a street or highway, or the emission of anhydrous ammonia from the many tanks around the county into the environment or water supply. Usually the impact to citizens is greater than the impact to structures as a result of a hazardous materials release. In Cavalier, the primary hazardous material that exists in almost every jurisdiction is Anhydrous Ammonia. The railroads transecting Cavalier carry mostly grain, though anhydrous ammonia is a major bulk good moving in. The city of Langdon is most at risk of a hazardous materials spill, with the primary county Highway (5) dissecting town and 10 Tier II facilities located in city limits. This vulnerability is tampered a little with the fire department and hospital nearby for quick response, but several critical facilities are located in the county seat including the hospital, airport, radio station, and primary business center. Were a major release to happen and Sheltering-In-Place activated, it could significantly impact lives and the economy.

There is a WBI Energy gas pipeline that services Langdon, and Keystone Crude oil pipeline that runs along the eastern border of the county. In total, the county has 42 miles of gas transmission pipeline miles, and 7 miles of liquid pipelines (NDDES). Most HazMat events are localized and affect only the immediate area, they are also usually quickly contained and cleaned. It is hard to measure true susceptibility and estimate losses when released can occur virtually anywhere, at anytime, with any possible quantity of any possible substance.

III. C.5 Infectious Disease Outbreak

Taken from yourgenome.org

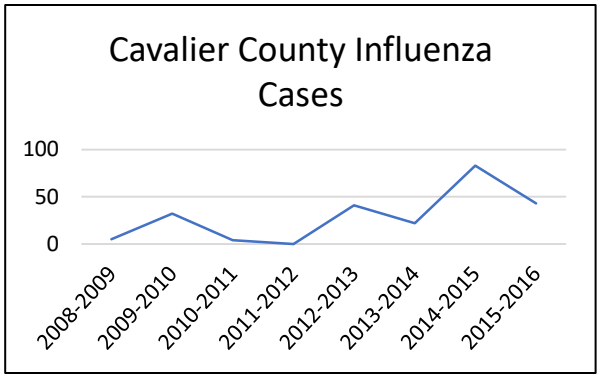
Definition: *Infectious diseases are disorders caused by organisms (bacteria, viruses, fungi or parasites). Some infectious diseases can be passed from person to person, some from bites from insects or animals, and others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment. Signs and symptoms vary depending on the organism causing the infection and will differ in length and severity.*

Threat: Cavalier County is generally at equal risk across jurisdictions for a threat from an infectious disease epidemic or pandemic. The City of Langdon is the most well-prepared to handle patients with a large regional hospital nearby, other residents will have to be transported to the city. Also areas with a greater population density, able to carry a virus or biological agent from person to person easier are at a slightly higher risk than more rural citizens.

Risks: Business interruptions, delayed emergency response, loss of economic drivers, increased public safety use, loss of medical facilities, mass casualties, school closure.

History: Cavalier County has been fortunate in that it has only experiences a handful of major disease outbreaks since it was founded. The Spanish Flu following World War I killed about 2,700 North Dakotans, infecting over 6,000. More recent, the area has suffered from outbreaks of West Nile Virus and H1N1 in 2009; fortunately neither of these incidents has been spared any severe consequences of those outbreaks. This number of limited historical events makes future occurrences difficult to accurately predict. The highest probability disease outbreak would be the annual influenza outbreak. The table below highlights the

Year	Cavalier Cases	% of Population	ND Cases
2008-09	5	0.13%	1,755
2009-10	32	0.80%	3,259
2010-11	4	0.10%	2,089
2011-12	0	0.00%	1,487
2012-13	41	1.00%	4,833
2013-14	22	0.55%	2,922
2014-15	83	2.08%	6,443
2015-16	43	1.08%	1,942



Data retrieved from http://www.ndflu.com/DataStats/HistoricalData.aspx

Both animals and plants can also be affected by infectious diseases such as Wheat Stem Rust, Emerald Ash borer, fungal diseases and mad cow disease. Farmers are more equipped to

handle these issues with herbicides and fungicides and can treat many animal diseases with antibiotics, but nevertheless, a significant economic disruption could occur if a serious disease hit the crops or cattle industry in Cavalier County.

Many formerly serious diseases are now preventable through routine vaccinations/immunizations, such as tetanus, polio, and diphtheria. This can save lives and money and help prevent serious epidemics from occurring. The North Dakota Department of Health tracks immunizations of Kindergarteners just entering school, and the 2016-2017 rates for Cavalier County hit an all-time high of 100% for Polio, DTaP, MMR, HepB, and Varicella.

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Possible	**10 – 100 Years**	Rare occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001
Only a couple true infectious disease outbreaks have occurred in Cavalier County over the past century. One was the Spanish Flu in 1918 that killed 2,700 North Dakotans, with West Nile and H1N1 being more recent examples of outbreaks, albeit they were of smaller magnitude. Overall, there is a possibility of an infectious disease outbreak, but given the history, it would be rare.		

Infectious Disease Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local officials and citizens are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see Infectious Disease as a "Low" risk hazard. Also included in the table is a vulnerability summary followed by an overall summary of vulnerability.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**10**	Low	Same as County
Calio	**12**	Low	High elderly population (average age: 74)
Calvin	**10**	Low	Same as County
Hannah	**10**	Low	Same as County
Langdon	**6**	Moderate	Langdon School (177 students), DayCare Center (86 children), Headstart, St. Alphonsus (85 students), Kalix (7 patients), Misc Daycares (60 children), Hospital (20 beds), Maple Manor Care Center (35 Residents)
Loma	**9**	Low	Same as County
Milton	**10**	Low	Same as County
Munich	**11**	Low	Munich School (84 students)
Nekoma	**6**	Moderate	Same as County
Osnabrock	**8**	Moderate	Communicty Living Center (38 residents)
Sarles	**11**	Low	Same as County

Wales	**3**	High	Same as County

The primary effect of communicable diseases is the human impact, physical buildings and critical infrastructure would not be affected in most cases unless accessibility or functionality becomes an issue if quarantine's or a significant portion of the population become incapacitated. Clean up costs from infected facilities, or infected employees could delay first responder services and ambulance/hospital services could quickly become overwhelmed.

Using the CDC guidelines of a 35% infection rate with a 20% mortality rate after infection, as can be the case in serious influenza pandemic's, approximately 1,340 residents of Cavalier County would be infected with about 268 deaths resulting from the infection in extreme circumstances.

Diseases can spread quickly in facilities that house vulnerable populations such as children and the elderly, as in schools, day-care centers, hospitals and elderly care facilities. Langdon has the highest concentration of vulnerable populations at nearly 500. The cities of Calio and Osnabrock both have high concentrations of elderly, including a 40 bed living center in Osnabrock which increases their vulnerability to infectious disease. The remaining area's of the county are at average to below-average susceptibility to infectious disease. The small rural areas and cities in Cavalier County lack of large clusters of people, lower the chances of becoming infected or spreading the disease.

II. C.6 Severe Summer Storms

Source: Karen Kempert – Cavalier County

Definition: *Severe summer storms are classified by the National Weather Service as such if the storm has the potential for wind gusts over 58 mph, hail at least ¾" diameter, or can produce a tornado. These storms are generally relatively localized but can produce heavy rainfall, hail, lightning, and straight-line winds as the primary threats. They occur due to temperature imbalances in the atmosphere with warm moist ground temperatures as a catalyst for development.*

For historical severe summer storms Information and occurrences in Cavalier County, see **Appendix B**.

Threat: The threat of Severe Summer Storm is equal across all jurisdictions in Cavalier County. Severe thunderstorms can occur at any time of the day or night, but are most common near dusk due to daytime heading and on humid days. Severe Summer Storm is unique in that the hazard has several different sub-categories of events. The planning team focused on hail, lightning, and straight-line winds as the primary threats under this category. Severe Summer storms can also cause flash flooding and tornadoes, but those are covered under 'Flooding' and 'Tornadoes' sections respectively.

Risks: Blocked roads, building collapse, business interruptions, delayed emergency response, downed trees and power lines, evacuations, explosions, street flooding, structure flooding, release of hazardous materials, increased fire potential, loss of drinking water/power/medical facilities, potential for mass fatalities, property damage, school closure, sewer backup, livestock injury/death, loss of economic drivers.

History:

Events	Most Recent	Damages	Deaths	Injuries
Hail - 193	**6/9/2017**	**$151,000**	**0**	**0**
Lightning - 2	**5/23/2007**	**$55,000**	**0**	**0**
Wind - 101	**6/9/2017**	**$3,003,000**	**0**	**2**

There have been many instances of severe thunderstorms in Cavalier County with associated hazards. Usually every summer (May-Aug) several hail producing storms with associated high winds and lightning traverse at least some part of the county. This hazard was ranked as the highest probability hazard to occur by local residents and citizens.

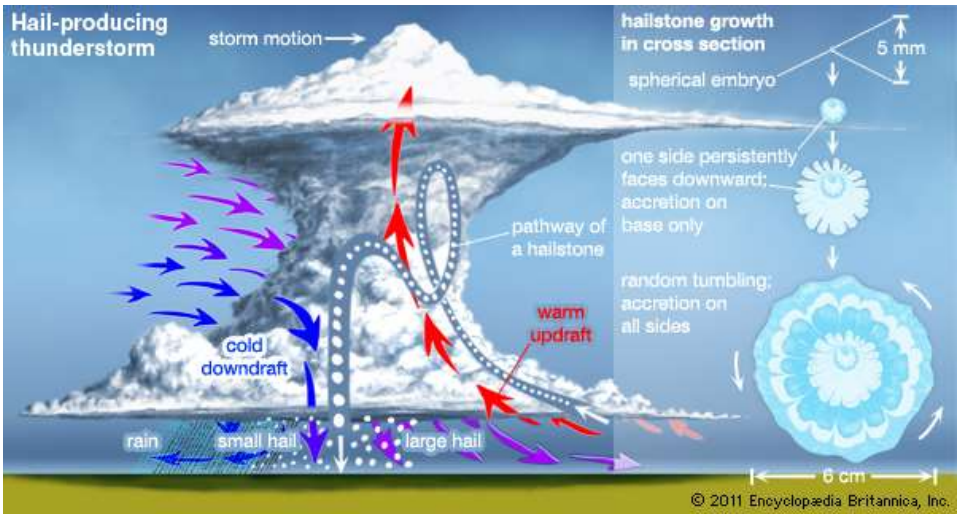
- *The strongest non-tornadic wind gust in Cavalier County was 110mph on 6/19/2005.*
- *The largest hail stone to fall in the county was 4.5" wide and fell on 7/19/2003 in Langdon.*

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Highly Likely	**1+ / Year**	Frequent events with a well-documented history of occurrence. Annual probability that is greater than 0.1
Severe summer storms are a regular occurrence on the high plains and in Cavalier County. The county usually sees multiple strong storm systems producing hail, high winds, and Lightning in a given year; usually occurring during the hot and humid months of May through September. With nearly 300 events since 1950, it is safe to assume these will happen at least once every year, with an average of two to four events per summer. The magnitude will usually be 35-60mph wind gusts, with penny to quarter sized hail and numerous lighting strikes and heavy, localized rain on an average storm, though certain conditions may promote smaller or larger severe summer activity.		

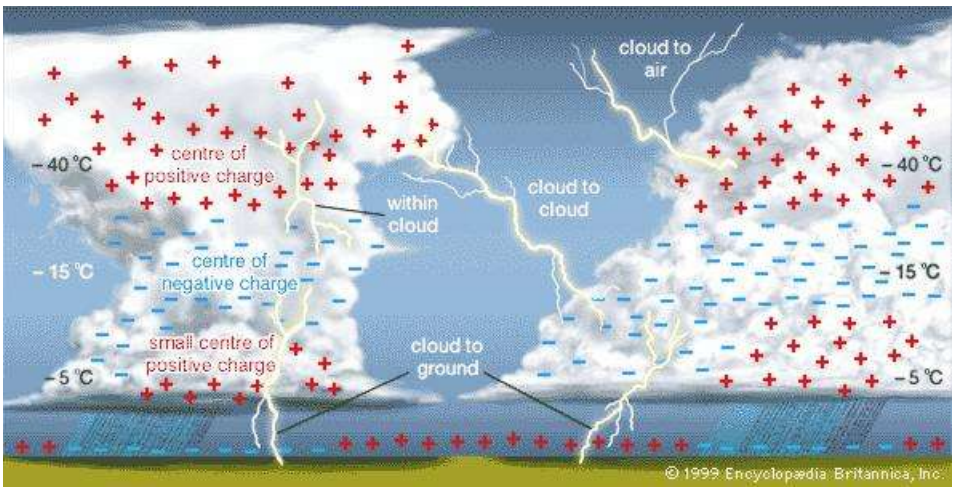
C.6.1 Hail

Hail can form in strong thunderstorms and is caused by strong updrafts of warm moist air, carrying water droplets upward until they freeze solid and are carried downward by cold downdrafts which fall as hail stones. Some hail may be picked up multiple times in other updrafts adding a layer of ice each time, the more this happens, the large the hail. Hail can be very dangerous and can be as small as peas, or as large as softballs. The graph below shows how hail develops.



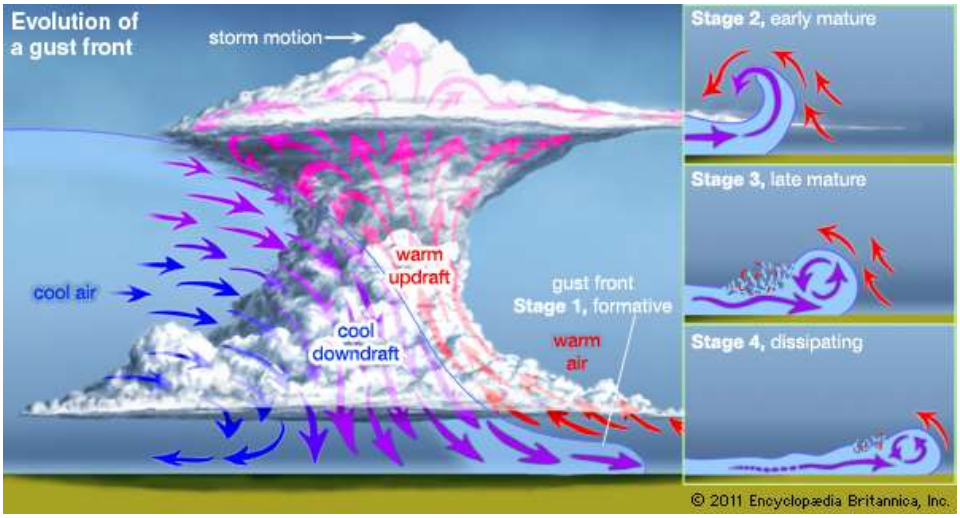
C.6.2 Lightning

Lightning and associated thunder is caused by a large difference in static electricity between clouds and the ground. The buildup of electrical charge in a thundercloud cause lighter charges (-) to form at the top and heavier (+) particles on the bottom, this in combination with various ground charges will cause cloud-to-cloud and cloud-to-ground lightning to ignite when particles are great enough. The graphic below demonstrates how lightning forms.



C.6.3 Wind

Severe Storms are often accompanied with strong downburst or straight-line winds. These are usually caused by a warm front moving across a warm/humid mass of air and associated outflows generated by a storm downdraft in supercells. Generally speaking, damaging winds are considered by the National Weather Service as being over 52 miles per hour.



Severe Summer Storms Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally most cities in Cavalier County see Severe Summer Storms as a "High" risk hazard. The locals combined the hail, wind, and lightning threats for this hazard. Also included in this table is a vulnerability summary of each jurisdiction.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**2**	High	No city sirens, limited protection from wind with few tree

			rows, no storm shelter
Calio	**1**	High	No city sirens, High elderly population, no storm shelter
Calvin	**6**	Moderate	No city sirens, limited protection from wind with few tree rows, no storm shelter
Hannah	**1**	High	No city sirens, prolonged first responder time (~35 min), no storm shelter
Langdon	**2**	High	Courthouse basement open for shelter, many homes have basements for citizens, Hospital/Airport/Radio Station critical infrastructure are at risk. Mobile home, schools, and elderly care facilities are at risk. City has sirens.
Loma	**3**	High	No city sirens, prolonged first responder time (~20 min)
Milton	**2**	High	Has city sirens and city shelter,
Munich	**1**	High	Has city sirens, City school,
Nekoma	**2**	High	Has city sirens, mobile homes at risk
Osnabrock	**2**	High	Has city sirens, Community Care Center with at-risk residents
Sarles	**2**	High	No city sirens, prolonged first responder (~45 min to Langdon, ~40 min to Rolla)
Wales	**4**	High	No city sirens, mobile homes at risk, prolonged first responder time (~30 min)

The entire county is equally at risk from severe summer storms occurring. County-wide, a vast majority of homes have a basement that can be used for sheltering in an event. In Langdon, the county courthouse basement is open to any residents or visitors who are seeking safe shelter. In larger community events, city staff or the county emergency manager will identify a suitable shelter in the event of a severe storm and put up signage for attendee's directing them to the shelter location.

Several mobile homes on the SW side of Langdon are at a higher risk of storms as they have no foundation and no basement for sheltering. The other cities in the county have very few mobile homes. Above ground infrastructure, namely overhead power lines, communications towers, and structures are very susceptible to high winds and severe summer storms which can damage property and disrupt services. These services can include but are not limited to electricity, telephone, and internet. Ottertail Power and Cavalier Rural Electric Co-Op are the two electric providers in the county. Crops can be also be majorly affected, particularly wheat, by strong winds and hail, affecting farmers and the local economy if storms are strong enough.

Vulnerable populations (children, disabled, elderly) can be more at risk than other citizens based on their limited ability to travel, physical limitations, or inability to comprehend situations. Jurisdictions with vulnerable populations include Calio where a high number of elderly live, Osnabrock's Community Living Center, Munich's elementary school, and Langdon's 7 daycares, 2 elementary schools, hospital, and elderly care center. More detail on these can be found under IV. E. Vulnerable Populations.

II. C.7 Severe Winter Storm

Source: NDDES – Rural Cavalier County

Definition: *A severe winter storm is generally characterized by a combination of one or more of the following: heavy snow, high winds, blowing snow, low temperatures, dangerous wind chills, freezing rain, sleet, ice buildup, and blizzards. These storms may be quick in duration, or last for several days causing major disruptions to community functionality.*

For historical severe winter storm information and occurrences in Cavalier County, see **Appendix B**.

Threat: All areas of Cavalier County are equally at risk for a severe winter storm. It may impact the entire county, or only an isolated area. The winter season can begin as early as October and last into May. The bulk of winter storms occur in a period from mid-November to early April. The planning team classified the following events as sub-hazards within a 'Severe Winter Storm': severe cold/wind chill, winter storm, heavy snow, ice storm, and blizzard. A Severe Winter Storm can involve one or all of these sub-hazards. On average the county receives three to four severe winter storms each year.

Risks: Blocked roads, building collapse, business interruptions, downed power lines/trees, localized evacuation, increased fire potential, increased public safety usage, loss of potable water/medical facilities/power, property damage, school closures, sewer backup, livestock injury/death, loss of economic drivers.

History:

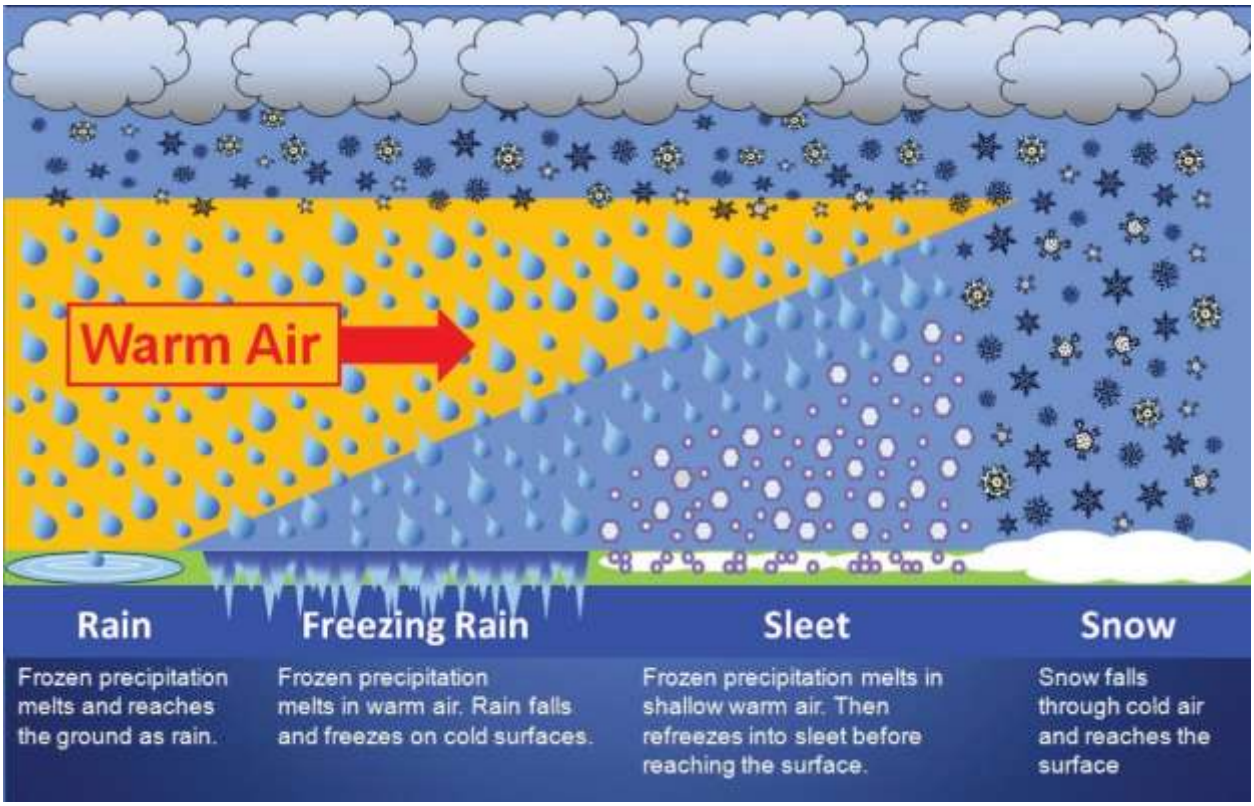
Events	Most Recent	Damages	Deaths	Injuries
Blizzard – 52	**1/12/2017**	**$6,000,000**	**0**	**0**
Extreme Cold/Wind Chill – 35	**1/12/2017**	**$0**	**0**	**0**
Heavy Snow – 13	**1/02/2015**	**$0**	**0**	**0**
Ice Storm – 6	**2/8/2009**	**$6,400,000**	**0**	**0**
Winter Storm – 36	**1/07/2017**	**$4,000**	**0**	**0**

Cavalier County is located in one of the most susceptible and harshest in the country in terms of winter weather. Some storms can bring sustained wind of 40+ mph and 10+ inches of snow creating dangerous driving and living conditions. Travel and emergency response can become paralyzed for days. On top of snow and wind, the area is one of the coldest in the country with average lows dipping to -6 in January, and the average high of just 13. Depending on the swinging temperatures of North Dakota, ice accumulation is a common issue immediately before a cold front and associated storm moves through, leaving roads covered in ice underneath a layer of snow, making them as slippery as possible. Generally speaking this hazard is one of the most probable and likely to occur according to citizens and county officials.

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Highly Likely	**1+ / Year**	Frequent events with a well-documented history of occurrence. Annual probability that is greater than 0.1
Severe winter storms occur on a regular basis throughout the winter months of October through April. There has been almost 150 occurrences of severe winter storms including extreme cold, ice storms, blizzards, and heavy snow. It is safe to assume, with a solid history of frequent events, that several variations of a winter storm will occur a few times at minimum each year. Based on the historical record, Cavalier County can expect 1-2 blizzards, 1 extreme cold events, 0-1 heavy snow events, 0-1 ice storms, 2-3 winter storms, and a combination of 4 to 8 events per year.		

The following graphic shows the types of precipitation as the temperatures get colder and colder, all of which are common during Severe Winter Storms.



Source: https://www.weather.gov/images/bmx/outreach/WWAW/precip_types.JPG

Severe Winter Storm Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see a Severe Winter Storm as a "High" risk hazard and was ranked #1 riskiest hazard by half of the cities in the county.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**1**	High	Isolated city with overhead power lines and no city plows.
Calio	**1**	High	Isolated city with overhead power lines and no city plows.
Calvin	**7**	Moderate	Isolated city with overhead power lines
Hannah	**2**	High	Isolated city with overhead power lines and no city plows.
Langdon	**1**	High	Moderate vulnerability, has both county and city plows available and areas for sheltering.
Loma	**1**	High	Isolated city with overhead power lines and no city plows.
Milton	**1**	High	Isolated city with overhead power lines and no city plows.
Munich	**3**	High	Moderate vulnerability due to availability of emergency plow.
Nekoma	**3**	High	Isolated city with overhead power lines and no city plows.
Osnabrock	**1**	High	Isolated city with overhead power lines
Sarles	**3**	High	Isolated city with overhead power lines and no city plows.
Wales	**5**	Moderate	Isolated city with overhead power lines and no city plows.

Cavalier County is most susceptible to severe winter storms when trapped inside their homes without supplies, when electricity is lost, or when travelling during inclement weather. In Cavalier County, Utility Gas and Electricity are the two most common home heating methods as depicted in the following table.

Type of Heat	% of homes (1,788)	# of homes
Utility Gas	**33.6%**	601
Bottled, Tank, or LP Gas	**18.0%**	322
Electricity	**39.7%**	709
Fuel Oil, Kerosene, etc.	**6.3%**	112
Coal or Coke	**0.0%**	0
All other fuels	**0.3%**	5
No fuel used	**2.2%**	39

Source: *US Census Bureau, 2016 American Fact Finder*

Electricity and propane are important resources for home head during severe winter storms. If electricity is lost due to a power outage, it may become life threatening as time passes. If roads are blocked and propane is not deliverable to tanks, a serious condition may arise. Not only will the decreasing inside temperatures have an effect on humans, but water pipes and lines may rupture, causing property damage and lack of potable water. Heavy snow and ice may buildup on rooftops and power lines, increasing the chances of failure and collapse, particularly on older buildings. There are pre-identified shelters in each community depending on the event that occurs, and warming houses with generators can be set up in a worst-case scenario in the cities of Langdon, Munich, and Osnabrock.

Most farmers are self-reliant and have generators and fuel enough to suffice should a winter storm power outage occur. But more urban areas such as Langdon, with a higher population, have a higher vulnerability than other smaller communities, however depending on snowfall,

people in the city may be able to move around to safe-locations better than citizens in the country. Also Langdon has two schools, an elderly care facility, hospital, and multiple daycares, increasing vulnerability even more.

A key consideration for severe winter storms is not just electricity, but also the ability for travel and snow removal in and near towns. Effective snowplow and snow removal equipment can alleviate many of the life-threatening issues surrounding severe winter storms by allowing restricted travel for first responders, and any citizens trapped on the roads or in homes. The following table highlights the snow removal capability of each jurisdiction, which in effect, decreases vulnerability to severe winter storms. It must be noted, that while many cities in Cavalier County do not own plows for city use, the County Highway department allows cities to borrow equipment in emergency situations to clear roads. Most cities contract with a local farmer to blow/plow city streets.

City	Equipment Source	Nearest Location
Alsen	None (County Highway)	Langdon Shop
Calio	None (County Highway)	Munich Shop
Calvin	None (County Highway)	Sarles Shop
Hannah	City Plow	City Garage
Langdon	City Public Works	City Garage
Loma	None (County Highway)	Langdon Shop
Milton	City Plow	City Shop
Munich	City Plow (County Highway)	Munich Shop
Nekoma	City Plow	City Shop
Osnabrock	City Plow and County Highway	Osnabrock Shop
Sarles	None (County Highway)	Sarles Shop
Wales	None (County Highway)	Langdon Shop

Source: *Cavalier County Highway Department, Emergency Management*

The table below highlights the vulnerability of Cavalier County to Severe Winter Weather using damage, exposure, and insurance payment data.

Item	Value
Property Damage	$414,000 *(Avr. $31,846/yr)*
Total Building Exposure	$674,153
Livestock Exposure	$2,419,000
Crop Exposure	$252,192,000
Crop Insurance Payments (2003-2012)	$39,497
Crop Losses (2003-2012)	$44,397 *(Avr. $4,438/yr)*

Source: *ND Dept. of Emergency Services*

II. C.8 Shortage of Critical Material

Taken from balancingtoday.com

Definition: *Occurs when demand for a product exceeds the supply. A shortage of critical materials may include a wide variety of resources such as building supplies, energy, transportation, food, or medical services/supplies.*

There has been no significant shortage of critical material in Cavalier County in recent history.

Threat: Any catastrophic disaster or prolonged weather system puts a strain on the local supplies and materials, possibly running them completely out, causing a secondary disaster. A critical material can be defined as any life-sustaining or necessary amenity that would make survival challenging without. This can come in the form of fuel, food, water, electricity (heat/AC), lack of medical supplies, and lack of shelter. This threat is increased in smaller community surrounding Langdon that already lack supply centers (grocery, fuel, etc) limiting their ability to obtain them in a large event that wipes out roads or makes travel difficult.

Risks: Business interruptions, delayed emergency response, increased public safety usage, loss of potable water/power, property damage, school closure, sewer backup, livestock injury/death, loss of economic drivers.

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Unlikely	**100 Years or more**	Extremely rare, with no documented history of occurrences or events. Annual probability of less than 0.001
The probability of Cavalier County experiencing a shortage or outage of any critical material is unlikely and would be extremely rare. There have been no documented cases of a significant shortage or outage of critical materials for an extended period of time. With advancements in technology, transportation, and other living situations, the probability of the county or certain cities running out of crucial supplies for an extended period of time is unlikely. However, certain large and relentless blizzard conditions or the like may result in the inability to get food, water, heating fuels, antibiotics, or other supplies, particularly in the more remote cities and farms. The magnitude of any occurrence would likely be small/localized and short lived.		

Shortage of Critical Material Risk and Vulnerability Assessment by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. The local citizens and officials are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a “Hazard Mitigation Questionnaire” from each city. Generally, most cities in Cavalier County see a Shortage of Critical Material as a “Moderate-Low” risk. hazard. Also included is a vulnerability summary for each jurisdiction.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**7**	Moderate	Not more or less vulnerable than county
Calio	**5**	Moderate	Not more or less vulnerable than county
Calvin	**9**	Low	Not more or less vulnerable than county
Hannah	**8**	Moderate	Not more or less vulnerable than county
Langdon	**8**	Moderate	Less vulnerable due to larger immediate availability of supplies. Also, additional help is likely to focus on the population center of Langdon, before smaller cities in the county.
Loma	**12**	Low	Not more or less vulnerable than county
Milton	**9**	Low	Not more or less vulnerable than county
Munich	**7**	Moderate	Less vulnerable due to town has a grocery store, gas station, and other immediate supplies and citizens
Nekoma	**9**	Low	Not more or less vulnerable than county
Osnabrock	**9**	Low	Not more or less vulnerable than county
Sarles	**4**	High	Not more or less vulnerable than county
Wales	**10**	Low	Not more or less vulnerable than county

While Cavalier County has a rare chance of experiencing a significant shortage or outage of critical material, its remote location and distance from large populations centers and materials makes it more vulnerable to the effects of an event. The city of Langdon has a grocery store, hardware stores, supply shops, gas stations, and multiple shelters. Munich also has a grocery store and gas station for supplies and a community center. Outside of those locations, critical materials and assistance is a long distance away, and in the event of a winter storm or similar event, it may take days to get materials to those cities and farms in need. If the primary supply centers in the county run out of critical supplies, while the county is in the midst of another hazard event (like a snowstorm), the compounding issues may cause serious shortage and outage concerns.

Shortages or outages of critical materials such as electricity, heat and transportation fuels, medical supplies, food, water, or shelter can be a cascading effect from a specific hazard event or can be caused by human error, supply/demand issues, conflicts or embargoes. In many cases, short power outages or lack of certain supplies may happen, but assistance and replenishment is usually quick and similar supplies are generally nearby and available.

II. C.9 Terrorism

Taken from bloximages.com

Definition: *Any intentional, human-caused incident, domestic or international, that may cause mass casualties, property and economic losses. This may include civil unrest/riots, lone shooters/gunmen, IED and bomb attacks, and large scale weapon usage. Targets can be anything ranging from schools, government, workplace, transportation, and industry to power grids, telecommunication, energy, and water/food supplies.*

There has never been a terrorist event or civil unrest occurrence in Cavalier County.

Threat: The primary terrorism threat in Cavalier County would be an active-shooter or workplace violence-type incident. There are few large high-value targets for possible terrorist groups within the county so that risk is slightly lower than other hazards. However, there is also the possibility of civil-unrest or protests as cavalier county has a pipeline and other controversial products running through the county. The Canadian border also opens up the possibility of smugglers or other transfers of weaponry through perceived unguarded port of entry's. There is always a constant threat on the computer and communications networks which are susceptible to hacking and attacks.

Risks: Blocked roads, building collapse, business interruptions, delayed emergency response, downed power lines, evacuations, hazmat release, increased fire potential, increased public safety usage, loss of potable water/medical facilities/power, potential for mass casualties, livestock injury/death, property damage, loss of primary economic drivers, school closure.

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Unlikely	**100 Years or more**	Extremely rare, with no documented history of occurrences or events. Annual probability of less than 0.001
There has been no recorded occurrence of terrorism or other Homeland Security related incident in Cavalier County. This leads to an extremely rare chance of an incident occurring in any given year of with less than a 1% chance of occurring in a given year. The magnitude of a terrorism event varies greatly depending on the type of attack, location, and mechanism used, but would likely be geographically isolated, with limited effects on a room, building or block of town.		

Terrorism can take many forms and involve the use of multiple different mechanisms. The six forms of terrorism are chemical, biological, radiological, nuclear, explosive, and cyber. Civil disobedience, including riots and violent demonstrations, can also be loosely tied to terrorism, and are for the purposes of this plan. Generally, all these forms are driven by an individual or extremist group that prioritize high visibility locations, critical facilities, high impact targets, potential threat elements, high populations, government centers, or community events.

Terrorism Risk and Vulnerability Analysis by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. They are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Every city in the county except Sarles ranked 'Terrorism' as a Low risk hazard. Also included is a vulnerability summary of each jurisdiction.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**12**	Low	Not more or less vulnerable than county
Calio	**12**	Low	Not more or less vulnerable than county
Calvin	**12**	Low	Not more or less vulnerable than county
Hannah	**12**	Low	Not more or less vulnerable than county
Langdon	**9**	Low	More vulnerable due to county government center, annual large festivals and activities, and population concentration; increased ability to disrupt a larger population
Loma	**11**	Low	Not more or less vulnerable than county
Milton	**11**	Low	Not more or less vulnerable than county
Munich	**12**	Low	Not more or less vulnerable than county
Nekoma	**11**	Low	Not more or less vulnerable than county
Osnabrock	**11**	Low	Not more or less vulnerable than county
Sarles	**8**	Moderate	Not more or less vulnerable than county
Wales	**12**	Low	Not more or less vulnerable than county

It is difficult to determine who and what is vulnerable to terrorism or homeland security incidents. Generally, perpetrators are either looking to get revenge on an individual or agency/business or looking to cause as much damage or deaths as possible. With this in mind, it was determined Langdon, as the government center and primary economical and population hub in the county, has the highest vulnerability to terrorism, but is still fairly low. The other cities in the county and rural areas with few people and businesses have a **low** vulnerability to terrorism, and it is a low concern level for most jurisdictions. Any type of terrorism may negatively affect the local economy through fear or lasting emotional effects. According to the state Tornado and Fire Fund for vandalism and theft at state, county, or local agencies, Cavalier has had $110 in local government and $1,676 in school claims paid since 1989.

The planning team identified the following list as the primary potential terrorism possibilities within Cavalier County:

- Isolated Workplace Violence (e.g. disgruntled employee, parent)
- Active shooter situations (school, churches, business, government center)
- Small explosive device (school, government center, special events)
- Cyber-Security attack (911 services, phone system, internet, banking)

II. C.10 Tornado

Source: Edi Ann Otto – Langdon, ND

Definition: *A tornado is a violently rotating column of air, usually associated with a severe thunderstorm, with circulation reaching the ground. It usually starts as a small funnel cloud and is accompanied by loud roaring noises. On a local scale, tornados are the most destructive of all atmospheric phenomena. Generally, tornadoes move from the west to the east (SW to NE) and are on the ground for less than 10 minutes and follow the parent thunderstorm.*

For historical tornado information and occurrences in Cavalier County, see **Appendix B**.

Threat: The entire county is at equal risk of a tornado occurring as well as potential consequences. Most tornado's take place around dusk as large super-cell thunderstorms arise. Tornados can pack winds up to 300mph and can usually move at a speed of 30mph, hitting anything in their way and travelling over any terrain. Flying debris and destructive winds are the primary threats involved in a tornado.

Risks: Blocked roads, building collapse, business interruptions, delayed emergency response, downed trees and power lines, release of hazardous materials, increased fire potential, increased public safety usage, loss of drinking water/medical facilities/power, property/crop damage, mass casualty potential, school closure, sewer backup, livestock injury/death, loss of economic drivers.

History:

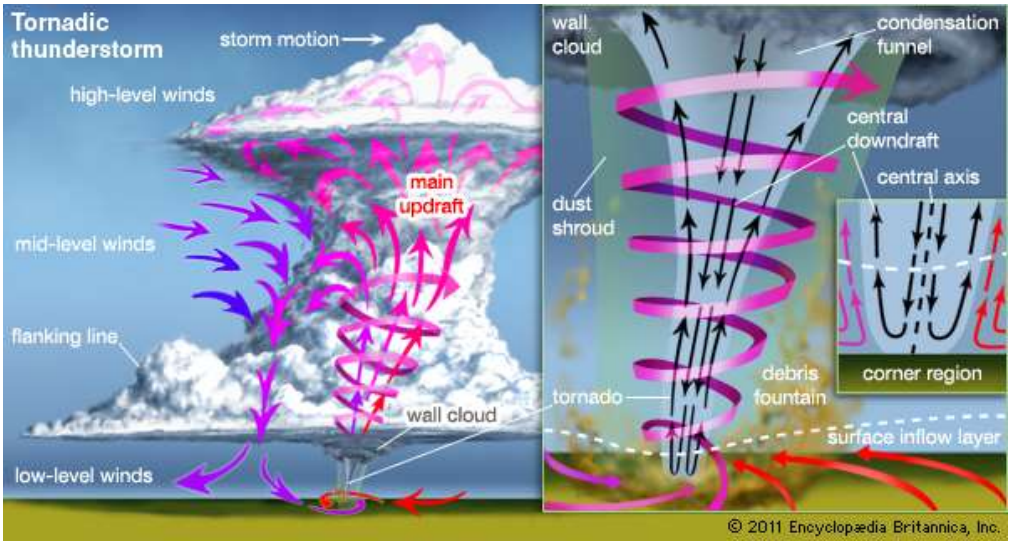
Events	Most Recent	Damages	Deaths	Injuries
Tornado – 37	**6/9/2017**	**$2,823,000**	**1**	**1**

Cavalier has experienced 37 tornadoes since 1950, the largest being an F-2 on the Fujita Scale totaling nearly $3 million in damages. The F-2 tornado that hit Hay Township on June 24, 1966 remains the only disaster in the County to kill someone and is one of only 11 counties in the state where a tornado has ended fatally (NWS, Bismarck).

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Likely	**1 – 10 Years**	Occasional occurrence with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01
There have been 37 tornado events since 1950, and can expect an average of 1 tornado every 2 years (0.5/year). This gives the county a 'likely' probability with occasional occurrences over time. It is not uncommon for multiple tornado events to occur in a year, or potential tornadic storm threats multiple times per summer. Most tornados occur between the months of April and September and have been averaged an EF1 magnitude with minor damages. Very few strong tornadoes occur in Cavalier County.		

The following graphic shows how a tornado forms during a severe thunderstorm and what meteorological forces are involved.



Tornado Risk and Vulnerability Assessment by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. Local citizens and officials are the ones who know the area and know what each community is susceptible to based on historical events and community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally, most cities in Cavalier County see Tornado as a "High" risk hazard and were ranked in the top 4 in most cities. Also included is a vulnerability summary for each jurisdiction.

Jurisdiction	Ranking	Concern	Vulnerability Summary
Alsen	**6**	Moderate	No city sirens, no storm shelter and limited protection available in town.
Calio	**5**	Moderate	No city sirens, High elderly population, no storm shelter
Calvin	**1**	High	No city sirens, limited protection from wind with few tree rows, no storm shelter
Hannah	**4**	High	No city sirens, prolonged first responder time (~35 min), no storm shelter
Langdon	**3**	High	Courthouse basement open for shelter, many homes have basements for citizens, Hospital/Airport/Radio Station critical infrastructure are at risk. Mobile home, schools, and elderly care facilities are at risk. City has sirens.
Loma	**4**	High	No city sirens, prolonged first responder time (~20 min)
Milton	**3**	High	Has city sirens and city shelter,
Munich	**2**	High	Has city sirens, City school with vulnerable populations
Nekoma	**1**	High	Has city sirens, mobile homes at risk
Osnabrock	**3**	High	Has city sirens, Community Care Center with at-risk residents

Sarles	**6**	Moderate	No city sirens, prolonged first responder (~45 min to Langdon, ~40 min to Rolla)
Wales	**2**	High	No city sirens, mobile homes at risk, prolonged first responder time (~30 min)

All of Cavalier County is at risk from tornadoes and does not vary geographically. The cities with warning sirens (Langdon, Munich, Milton, Osnabrock, and Nekoma) have increased capacity to warn residents about a possible tornado or severe thunderstorm cell. Also the cities of Langdon and Munich have designated storm shelters, but almost all homes in the county have a basement, decreasing vulnerability substantially. The US Census 2012-2016 American Community Survey estimates around 127 mobile homes (5.5% of county housing), but the planning team feels this number is grossly over-estimated and outdated for 2018. Most residents of mobile homes have been targeted by educational campaigns through the county Emergency Management Department regarding local storm shelters and areas of safety. Severe weather radios are also important in communicating life-saving information to residents, and through a grant in 2016, the County was able to hand out over 100 weather radio's to residents and businesses.

The structures most vulnerable to tornadoes and strong winds are mobile homes, sheds, storage buildings, barns, and any other large buildings that do not have basements or are not secured to a solid foundation. Projectiles from tornadoes/strong winds can also damage siding, roofs, and windows, making many storefronts susceptible to damage. The townships population is mainly farmers, who are deemed to be self-sufficient should a tornado be nearby, or power was to be lost. Most of the county residents, living their lives in tornado alley, have practiced drills in school, and have identified areas of shelter and safety in or near their homes already.

II. C.11 Urban Fire

Taken from lintvwane.com

Definition: *An urban fire is any fire that occurs within a city, town, or building outside of the natural environment. These fires are generally caused by human activity of some type including: electrical wiring, heating devices, arson, smoking materials, fuel systems, sparks, and spills. If left uncontained, they can quickly spread from building to building causing collapse and become harder to contain.*

Threat: Fires can start nearly anywhere and by various different means. Older buildings primarily made of wood and without sufficient protection are most at risk along with abandoned homes and businesses. If uncontained, the fire may spread from one building to another, destroying several homes or even blocks downtown. The primary threat apart from destruction of the building, is the severe threat on life.

Risks: Blocked roads, building collapse, business interruption, delayed emergency response, downed power lines and trees, localized evacuation, explosions, release of hazardous materials, increased fire potential, increased public safety usage, loss of potable water/medical facilities/power, mass casualty potential, property damage, sewer backup, loss of economic drivers.

History:

Date	City	Description
July, 1912	**Dresden**	Fire destroyed nearly every business in town and a shift in the breeze saved the residential portion of town. 8 businesses gone; damages: $60,000 ($1,511,136 in 2017 dollars) (Ancestry.com)
May, 1917	**Sarles**	High School burned down
March, 1989	**Langdon**	Former ASCS Building burned down
April, 1994	**Langdon**	State Farm Insurance building burned down
Nov, 2003	**Langdon**	Quilt Shop, Tanning Salon, Travel Agency, Massage Therapy housed in one building burnt down.
Dec, 2003	**Langdon**	Main Street Motel burned down displacing citizens and patrons
Sep, 2004	**Langdon**	Boyd Block building burned down, originally built in 1902. Fighting the fire revealed an aged city water supply. (Article Here)
Aug, 2008	**Osnabrock**	Osnabrock Elevator burned down due to an overheated bearing. 11 county disciplines responded to the blaze (Article Here)
Aug, 2012	**Munich**	Elevator burned down, 100 volunteers fought blaze. Nearby fuel and chemical tanks were quickly protected. (Article Here)
Jan, 2018	**Langdon**	Fire destroyed the historic Langdon General Store built in 1902. About 50 firefighters fought the blaze through the night. (Article Here)

Cavalier County has had several urban fire events over the past decade that have had an impact on locals and businesses, but not to the extent of a disaster per se. There have been many home fires and smaller calls that do not qualify as 'urban fire'.

Probability of Occurrence and Magnitude

Level	Occurrence Rate	Summary
Likely	**1 – 10 Years**	Occasional occurrence with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01
Urban fire happens on occasion somewhere within Cavalier County at least once every 10 years and has a 'likely' probability of occurrence in a given year. Since 2000, the area has seen six major fires, usually striking historic buildings in downtown area's or grain elevators. Historically it is important to note that many fires may have occurred and were not recorded before the 1970's when they were more common, which could affect this probability.		

Urban Fire Risk and Vulnerability Assessment by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. They are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city and the results ranged from Low to High, with an average of 6.1 or Moderate. Also included is a vulnerability analysis for each jurisdiction.

Jurisdiction	Ranking	Concern	Vulnerability
Alsen	**9**	Moderate	Moderate: Some abandoned buildings, no downtown district, no fire department
Calio	**2**	High	Moderate: Some abandoned buildings, no downtown district, no fire department
Calvin	**4**	High	Moderate: Some abandoned buildings, no downtown district
Hannah	**9**	Low	Moderate: Some abandoned buildings
Langdon	**4**	High	High: Large downtown district, back to back buildings
Loma	**5**	Moderate	Low: No downtown, no fire department,
Milton	**8**	Moderate	Moderate: small downtown, has fire department
Munich	**9**	Low	Low: No downtown, has fire department
Nekoma	**4**	High	Moderate: small downtown, has fire department
Osnabrock	**4**	High	Moderate: small downtown, has fire department

Sarles	**5**	Moderate	Low: No downtown, has fire department
Wales	**11**	Low	Low: No downtown, has fire department

Describing vulnerability to urban fires is difficult to determine in Cavalier County. There are very few remaining 'downtown districts' where previous fires have started in one building and spread throughout an entire city. Also, many of the smaller communities in the county have a fire department, which decreases the vulnerability of a devastating urban fire. Fire protection in Cavalier County is above average. Single home fires and single building fires are relatively common, but random structure collapse and large, out of control fires, are not.

Depending on the time and location, a major structure fire, particularly in downtown Langdon, could result in the loss of life, building occupants, and cripple the local economy were it to spread. Most historic buildings do not have sprinkler systems or adequate fire protection, in fact this just happened at the conclusion of this planning process as the historic downtown Langdon Store building, built in 1902, caught fire and was completely destroyed and torn down.

In Langdon, the fire department, search and rescue building, hospital, 911/dispatch/ courthouse, are all critical facilities that could be affected with a large enough fire. The other cities and towns do not have critical infrastructure close to potential hazard areas.

Many communities have farms and homes, in both the city and rural areas, which have been abandoned and fallen into disrepair. These buildings have a higher risk of fire, but many would likely be left to burn, controlled, if a fire does occur. Generally, the county has a moderate vulnerability to urban fire due to the sheer number of potential buildings that could be ignited.

II. C.12 Wildfire

Definition: *A wildfire is fire that occurs in the natural/rural environment and can be caused either naturally or by human activity. These fires generally use the natural environment for fuel supplies (unlike Urban Fires) and can spread through grasslands, ditches, forests, and fields.*

Taken from thedenverchannel.com

For historical wildfire information and occurrences in Cavalier County, **see appendix B.**

Threat: Cavalier County lies in the northern plains and does not have large timberland or forests to provide substance for large wildfires. There is the possibility for large grassfires as well as field and ditch fires that can spread rapidly if conditions are right. Expansive fires can strain local fire departments and can quickly get out of control in high winds and dry conditions, usually occurring in the summer. These fires are usually caused by farm machinery in fields or vehicle travel near ditches. Vulnerability to these fires is equal across the county and has not changed in the past 5 years.

Risks: Business Interruptions, delayed emergency response, downed power lines and trees, localized evacuations, explosions, hazmat release, increased fire potential, increased medical surge, increased public safety usage, localized loss of power, property damage, livestock injury/death, loss of economic drivers.

History:

Events	Most Recent	Damages	Deaths	Injuries
Wildfire – 1	**10/24/2011**	**$0**	**0**	**0**

The only official wildfire in Cavalier County occurred in 2011, five miles north of Loma on a dry and windy day, causing a fire vortex/tornado; damage from this event was localized and minor. Through additional research, a fire did occur in 2008 along the western edge of the Pembina Gorge which spread with west winds from Cavalier to Pembina Counties. Generally, the county has a low-risk of severe wildfires due to the lack of trees. Grassland and field fires are more common, but rarely extend beyond the local fire department capabilities. Other anecdotal wildfire events likely happened, but were quickly contained and not reported nor became part of the official record.

Probability of Occurrence and Magnitude

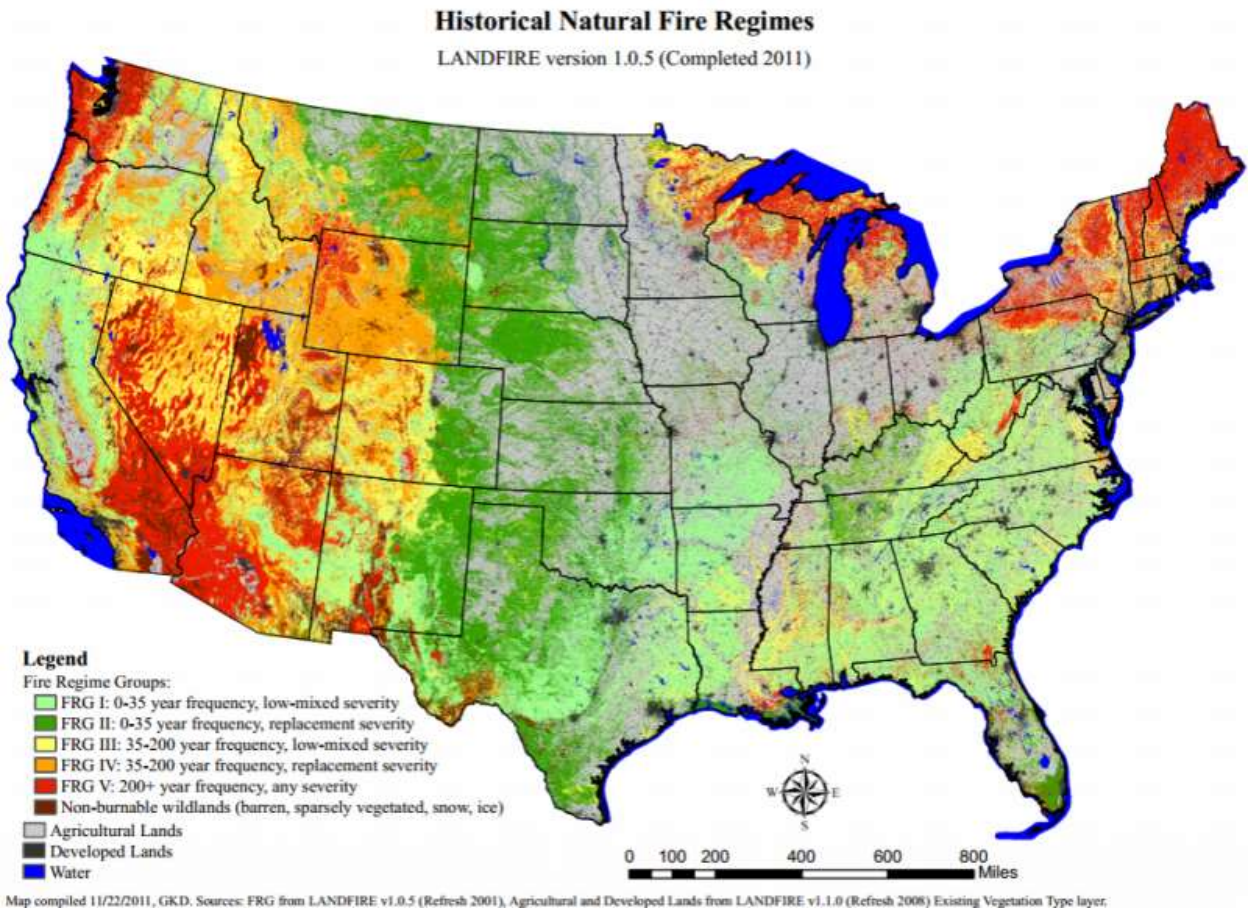
Level	Occurrence Rate	Summary
Possible	**10 – 100 Years**	Rare occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001
There is no significant history of wildfires in Cavalier county, and future occurrences would be rare, having just a 1%-10% chance every decade. Several incidents have been researched and documented since the county's inception, but none have been disastrous or beyond the county's capabilities. Future		

occurrences will likely be isolated and small, there is simply not enough fuel in the area for fires to gain momentum, save the Pembina Gorge which could see slightly larger fires due to vegetation cover.

Typical causes of Wildfires:

1. Lightning Strikes
2. Arson
3. Uncontrolled Burns
4. Sparks from farm machinery or vehicles

Currently there are no communities in Cavalier County, or North Dakota, that participate in the National Fire Protection Agencies *Firewise USA* program.[4] This is due to the lack of wildfire risk on the high plains.



Wildfire Risk and Vulnerability Assessment by Jurisdiction

The ranking of concern for each hazard was left up to the individuals living in each community. They are the ones who know the area and know what each community is susceptible to based on community assets. These rankings were taken from a "Hazard Mitigation Questionnaire" from each city. Generally most cities in Cavalier County see Wildfire as a Moderate hazard.

[4] http://nfpa.maps.arcgis.com/apps/Viewer/index.html?appid=c4a788340df748f18d98d8363145bb67

Jurisdiction	Ranking	Risk	Vunerability Summary
Alsen	**8**	Moderate	No fire department, Slough on NW side of town
Calio	**5**	Moderate	No fire department, sloughs around town
Calvin	**5**	Moderate	Has fire department, no substantial grassy/woody areas
Hannah	**5**	Moderate	Has fire department, no substantial grassy/woody areas
Langdon	**10**	Low	Has fire department, no substantial grassy/woody areas
Loma	**7**	Moderate	Grain elevator has chance of fire
Milton	**7**	Moderate	Has fire department, creekbad on east side of town
Munich	**8**	Moderate	Has fire department, no substantial grassy/woody areas
Nekoma	**7**	Moderate	Has fire department, no substantial grassy/woody areas
Osnabrock	**6**	Moderate	Has fire department, no substantial grassy/woody areas
Sarles	**7**	Moderate	Has fire department, no substantial grassy/woody areas
Wales	**6**	Moderate	Has fire department, no substantial grassy/woody areas

A key factor in vulnerability to wildfire is the proximity of homes and property to large grasslands or forest. Also affecting vulnerability is the locations of fire departments with firefighting equipment. Cavalier County is home to 9 fire departments, only Alsen, Calio, and Loma do not have a fire department in town; substantial services for how small some communities in the county are. Luckily, no critical infrastructure or homes are located in wildfire prone areas, save from power lines running through ditches and across grassy areas. The most likely scenario for a wildfire in Cavalier County is a burn in the Pembina Gorge that has more grasses and trees to use for fuel. The fire would likely run the gorge, but stay relatively contained in the lower areas. The other possibility is a field fire or grassland fire that races through dry sloughs or leftover cropland. Each city in the county is butted up against either low slough area's or cropland. Usually fields are tilled and any leftover crops are buried under soil. Also many cities actively maintain a defensible space of mowed areas so populations being affected by this type of fire is unlikely and would be manageable. According to

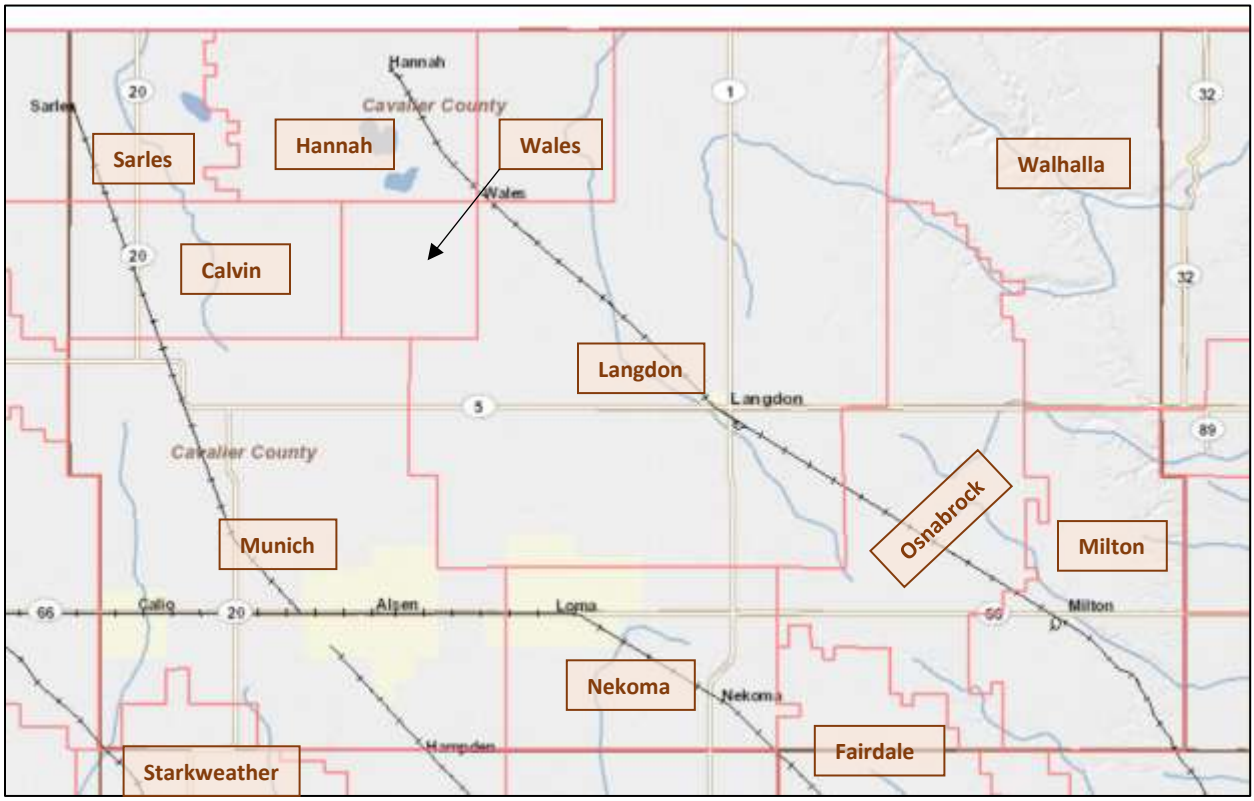
Fire districts that serve Cavalier County

Fire District	Service Area	Volunteers
Calvin	Calvin	10
Fairdale *(Walsh)*	SW Cavalier County (Rural)	20
Hannah	Hannah	10
Langdon	Langdon	30
Milton	Milton	20
Munich	Munich, Alsen, Calio	30
Nekoma	Nekoma, Loma	19
Osnabrock	Osnabrock	25
Sarles	Sarles	20
Starkweather *(Ramsey)*	SW Cavalier County (Rural)	12
Walhalla *(Pembina)*	NE Cavalier County (Rural)	25
Wales	Wales	15

Source: Cavalier County Emergency Management, www.firedepartment.net, 2018

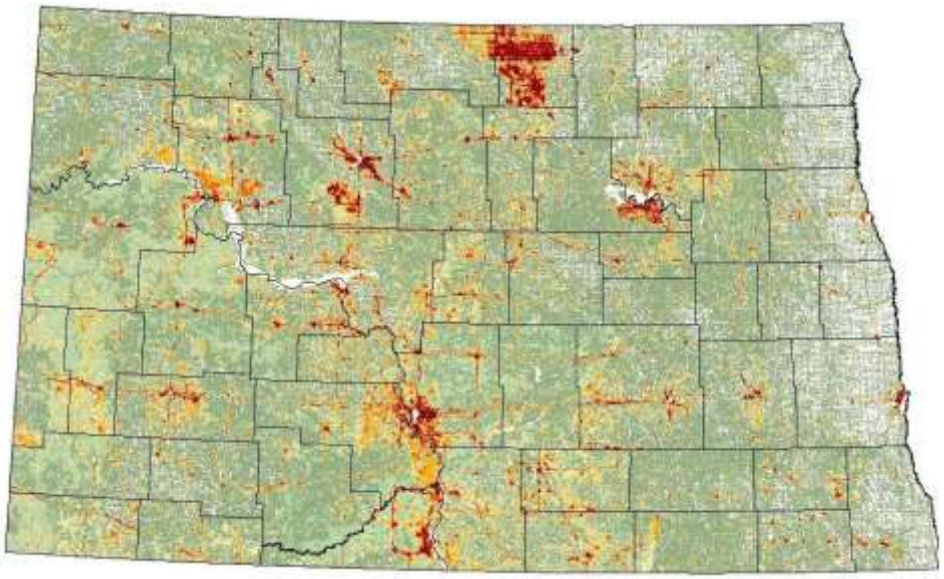
Cavalier County Fire

Districts



Source: North Dakota GIS Hub Explorer, 2018

North Dakota Fire Risk Index



Source: *West Wide Wildfire Risk Assessment, 2013*

SECTION IV: RISK ASSESSMENT

Based on the hazard mitigation questionnaires that were returned by each jurisdiction, the following hazard risk assessment matrix was developed using hazards, and their perceived impact prioritized by each community.

IV. A. Cavalier County Combined Risk

The following matrix was developed through discussions with community and jurisdictional stakeholders, as well as completed 'City Hazard Mitigation Questionnaire which can be found in Appendix D. This matrix involves the 12 identified hazards that affect the county and how each community views the risk of each hazard on their jurisdiction.

Cavalier County Community Risk Matrix

	Drought	Erosion/Landslide	Flood	Hazardous Materials Spill	Infectious Disease Outbreak	Severe Summer Storm	Severe Winter Storm	Shortage of Critical Materials	Terrorism	Tornado	Urban Fire	Wildfire
Alsen	5	11	3	4	10	2	1	7	12	6	9	8
Calio	12	2	2	10	12	1	1	5	12	5	2	5
Calvin	8	11	2	3	10	6	7	9	12	1	4	5
Hannah	6	11	3	7	10	1	2	8	12	4	9	5
Langdon	7	11	12	5	6	2	1	8	9	3	4	10
Loma	8	10	2	6	9	3	1	12	11	4	5	7
Milton	6	12	4	5	10	2	1	9	11	3	8	7
Munich	5	10	4	6	11	1	3	7	12	2	9	8
Nekoma	8	12	10	5	6	2	3	9	11	1	4	7
Osnabrock	7	12	10	5	8	2	1	9	11	3	4	6
Sarles	12	10	1	9	11	2	3	4	8	6	5	7
Wales	9	8	1	7	3	4	5	10	12	2	11	6
Total:	7.8	10.0	4.5	6.0	8.8	2.3	2.4	8.1	11.1	3.3	6.2	6.8

Legend		
	High Risk	1-4
	Medium Risk	5-8
	Low Risk	9-12

Cavalier County Hazard Risk Ranking

Through analyzing the previous Hazard Mitigation Plan, the 2014 Cavalier County THIRA, planning team discussions, and jurisdictional feedback, the following table was agreed upon as accurately describing the risk of each hazard on Cavalier County.

Rank	Hazard	Score	Risk
1.	Severe Summer Storm	2.3	High Risk
2.	Severe Winter Storm	2.4	High Risk
3.	Tornado	3.3	High Risk
4.	Flood	4.5	High Risk
5.	Hazardous Materials Spill	6.0	Moderate Risk
6.	Urban Fire	6.2	Moderate Risk
7.	Wildfire	6.8	Moderate Risk
8.	Drought	7.8	Moderate Risk
9.	Shortage of Critical Materials	8.1	Low Risk
10.	Infectious Disease Outbreak	8.8	Low Risk
11.	Erosion / Landslide	10.0	Low Risk
12.	Terrorism	11.1	Low Risk

Probability of Occurrence and Magnitude Ranking System

To rank each hazard and determine the probability of occurrence for each hazard, the following table highlights the ranking system and categories used by the team.

Ranking	Description / Degree of Risk and Probability	Occurrence Rate
Unlikely	Extremely rare with no documented history of occurrences or events. Annual probability of less than 0.001	Every 100 years or more
Possible	Rare occurrences with at least one documented or anecdotal historic event. Annual probability of between 0.01 and 0.001.	Every 10 to 100 years
Likely	Occasional occurrences with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01.	Every 1 to 10 years
Highly Likely	Frequent events with a well-documented history of occurrence. Annual probability that is greater than 0.1.	Annually or more

IV. B. Plans and Programs in Place

When trying to effectively implement hazard mitigation projects and reduce risk and vulnerability in a community, it is vital to have an understanding of what types of plans and programs are already in place and being implemented on the local level. This can help inform our decision making and be incorporated into the Multi-Hazard Mitigation Plan. The following is

a list of some Cavalier County plans, programs, outreach strategies, and certifications considered in this plan.

Planning and Regulatory

Plans/Programs	*Yes/No*	*Comments*
Acquisition of land for open space and public recreation uses	No	
Burning permits/restrictions	Yes	When appropriate via county board
Capital Improvements Plan	No	
Community Wildfire Protection Plan	No	
Comprehensive/Master/Strategic Plan	Yes	Updated in 2016
Continuity of Operations Plan	Yes	Within EOP
County Culvert Policy (more information)	Yes	Passed in 2017, county cost shares 70% on a culvert up to 40' in length
Database of dry hydrants/well access	No	
Economic Development Plan	Yes	City of Langdon
Emergency Operations Plan	Yes	County-Wide
FireWise Program	No	
Flood Insurance Rate Maps	Yes	Langdon Only
Floodplain Ordinances	No	
Housing Study	Yes	September 2011 (regional)
Mass Notification System	Yes	Everbridge
Natural Hazard specific Ordinances (stormwater, steep slope, wildfire)	No	
NOAA Weather Radios	Yes	Cache in office, hand out when needed
Preparedness Month Activities (Sept)	Yes	Through Emergency Management program
School closing policy/communications plan in event of inclement weather	Yes	School dependent
Severe Weather Awareness Week	Yes	Through Emergency Management program
SKYWARN Program	Yes	Weather Spotters in county
Storm Shelters (List of all locations)	Yes	In EOP
Storm-water Management Plan	No	
Subdivision Ordinances	No	
THIRA	Yes	Through step 2
Transportation Plan	No	
Warning Sirens (List of all locations)	Yes	Located in EOP
Water Conservation/Drought Plan	No	
Water Management Plan	Yes	Cavalier County Water Board
Wellhead Protection Plan	No	
Winter Weather Awareness Week	Yes	Through Emergency Management Program
Zoning Ordinances	Yes	County-wide (Adopted in 2017)

Administrative and Technical

Plans/Programs	*Yes/No*	*Comments*
Local Emergency Planning Committee	Yes	Bi-Annual Meeting

Maintenance Programs to reduce risk	No	Within normal maintenance protocol
Mitigation Planning Committee	No	Responsibility of the LEPC
Mutual Aid Agreements	Yes	Fire, S&R, Law Enforcement
Planning Commission	Yes	Local Emergency Planning Commission
Staff	***Yes/No***	***Comments***
Chief Building Official	Yes	Terry Girodat
Civil Engineer	Yes	Terry Johnston (County Highway)
Community Planner	No	County Commission (Planning & Zoning)
Emergency Manager	Yes	Karen Kempert
Floodplain Administrator	Yes (2)	Karen Kempert (Cavalier County) Connie Schrader (City of Langdon)
GIS Coordinator	No	Contracted out
Soil Conservation	Yes	Brenyn Hardy (USDA)
Water Resource Board	Yes	Larry Gellner (County Water Resource Board)
Zoning Official	No	County Commission (Planning & Zoning)
Technical	***Yes/No***	***Comments***
Hazard Data and information	Yes	In Mitigation Plan
HAZUS Analysis	No	
Warning Systems/Services	Yes	Langdon, Munich,

Education & Outreach

Plans/Programs	***Yes/No***	***Comments***
Firewise Communities Certification	No	Not eligible
Local Citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs, etc?	Yes	Local Emergency Planning Committee (county) No Volunteer groups
Natural Disaster or safety related school programs	No	Neither Munich or Langdon has safety programs at their schools
Ongoing public education or information program (e.g. fire safety, household preparedness, environmental education, etc)	Yes	Seasonal preparedness campaigns through outreach by Emergency Manager (social media, classroom visits, meeting presentations, etc)
Public-private partnership initiatives addressing disaster-related issues	No	Not formal
StormReady Nation Certification	Yes	Weather-Ready Nation Ambassador (NOAA/NWS)

Financial

Cavalier County's overall financial capability relies on tax revenues and successful grant applications. With a small tax base of under 4,000 residents, the county needs to be fiscally conservative to ensure operability; this also means as the population declines, the county receives less financial support each year. Financial support for emergency management, preparedness, and related resources and equipment is limited due to these financial constraints, but is appropriate for an effective program.

IV. C. Asset Inventory

The following essential facility dataset was identified through research using local, state, and federal resources. This list includes critical infrastructure and essential facilities in addition to Tier II facilities for reference.

Infrastructure Type	# of Facilities	Locations
Agriculture and Food	**14**	Hannah, Langdon, Munich, Mt. Carmel, Osnabrock
Banking and Finance	**5**	Langdon, Munich, Osnabrock
Chemical and Hazardous Materials	**28**	Across County
Commercial Facilities	**101**	49 Service, 33 Retail, 19 Restaurant (CCJDA)
Communications	**3**	Langdon, Rural Langdon
Dams (High Hazard)	**5**	East Alma Twp, Montrose Twp, Mt. Carmel, South Olga Twp,
Defense (Military)	**0**	
Education	**4**	Langdon, Munich
Emergency Services	**11**	Calvin, Hannah, Langdon Milton, Munich, Nekoma, Sarles, Osnabrock, Wales
Energy	**1**	Langdon
Government	**2**	Langdon
Healthcare and Public Health	**3**	Langdon, Munich
Information Technol.	**1**	DCN through United Communications
Manufacturing	**5**	Langdon, Munich, Osnabrock
National Monuments	**0**	
Nuclear	**0**	
Postal and Shipping	**5**	Hannah, Langdon, Munich, Sarles, Osnabrock
Transportation	**6**	Langdon, Munich, Osnabrock
Water	**1**	Langdon

IV. D. Future Development

The past couple decades have seen very little in the way of any significant new development in Cavalier County. The population trend is decreasing and every city in the county is slowly losing residents over time, so there is no anticipation for any sizeable development outside the occasional new home or building constructed. Commercial land use and settlement patterns have also remained constant and unchanging in the past decade, with similar trends to continue. Local jurisdictions however will continue to include development considerations in hazard mitigation projects and future zoning/code enforcement that may influence development.

The emergency management director will work to keep the jurisdictions covered by the Multi-Hazard Mitigation Plan engaged and informed during the plan's cycle by keeping leaders actively involved in the monitoring, evaluation, and update of the MHMP and local mitigation projects. The director will also keep local governments informed through continued planning

and project implementations, including educational outreach, especially if future development may happen.

IV. E. Vulnerable Populations

In planning for hazards, it is important to consider citizens and residents within Cavalier County that may be more susceptible to harm from hazard events and incorporate them into existing and future plans. Vulnerable populations usually suffer one or more disadvantages compared to the general population and primarily include the young, elderly, handicapped/disabled, minorities, low income and homeless, along with other smaller sects of the population.

Cavalier County has few areas that are more vulnerable to hazards than others, though several facilities within the county should be identified as possible areas of concern. The table below is a compilation of the planning team's analysis of vulnerable areas and facilities within the county:

Name	Location	Type of Facility	Vulnerability
Maple Manor Care Center	1116, 9th Ave Langdon	Assisted Living	Elderly, dependent on assistance
Osnabrock Community Living Center	326 Rainbow Rd, Osnabrock	Assisted Living	Elderly, dependent on assistance
Cavalier County Memorial Hospital	909 2nd St Langdon	Hospital / Clinic	Palliative Care, Infirm,
Langdon Day Care Center	1215 7th St Langdon	Day Care Center	Young Children. (86 child capacity)
Cavalier County Headstart / Langdon Elementary School	721 11th Ave Langdon	Preschool / Elementary	Young Children
6 Private Child Care Centers	Located in Langdon	Day Care Center	Young Children. (All facilities have between a 9 and 12 child capacity)
St. Alphonsus Elementary	209 10th Ave Langdon	Elementary School	Young Children
City of Calio	Calio	City	High Elderly Population, Average age is 73.7 years old.
Munich School	410 7th Ave Munich	Elementary School	Young Children
Kalix Residence	Langdon	Special Needs Home	Special Needs (kalixnd.org)

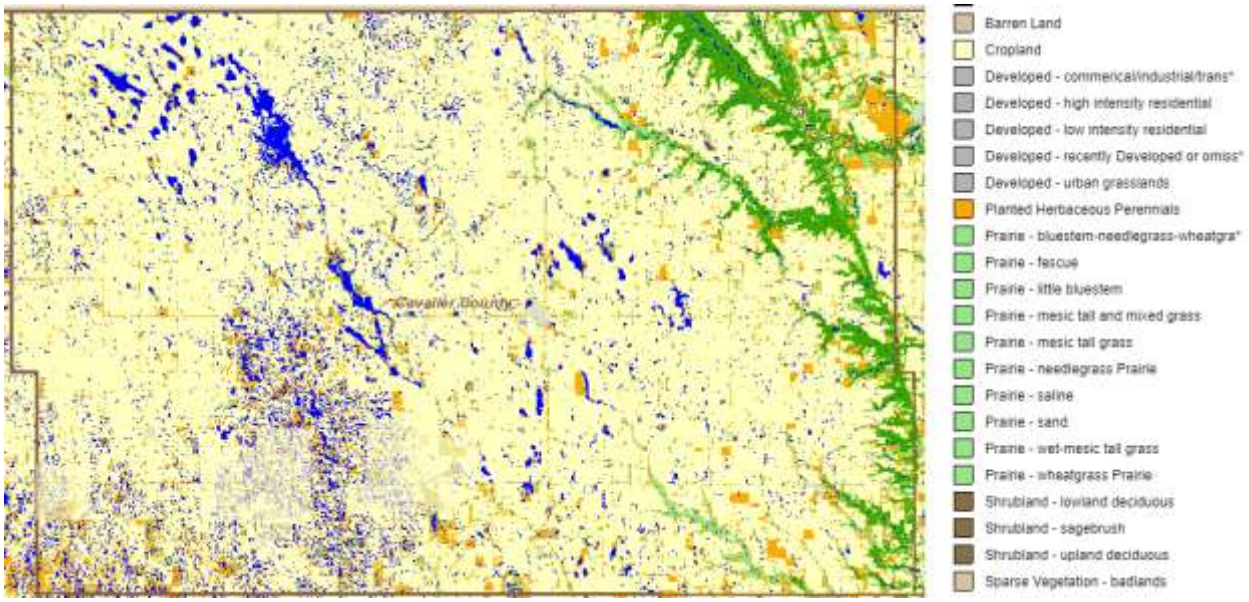
This list is not meant to be comprehensive, singular or small areas of any part of the county may be vulnerable in their own way due to a variety of reasons.

IV. F. Impacts on Agriculture

The Cavalier County economy is heavily dependent on the agriculture industry in nearly every facet of life. In fact, Cavalier County has 940,331 acres of farmland and 667 farms within the county producing a market value of $334,532,000 or $501,548 per farm which is the 8th most in

North Dakota.[5] This is an important consideration when planning for hazards and their impacts on communities. While heavy emphasis is duly put on citizens and infrastructure, any major damage to the open fields of crops can do major damage to the economic function of any of the 12 cities in Cavalier County. Large wind storms and hail storms can severely damage wheat and bean fields, as can prolonged standing water, excessive heat and excessive cold. Protecting fields from overland flooding and drainage issues is a top priority for many of the citizens and active mitigation projects such as field tiling, culvert opening, mowing, and other forms of maintenance are ongoing, usually done by the farmer themselves with little or no assistance from state or federal programs. Some of these considerations were not specifically spelled out in this plan, but should nevertheless be identified and considered in future mitigation projects and planning. The map below highlights the land use in the county.

[5] 2012 Census of Agriculture, USDA, (Website Link)


Cavalier County
Barren Land
Cropland
Developed - commerical/industrial/trans*
Developed - high intensity residential
Developed - low intensity residential
Developed - recently Developed or omisc*
Developed - urban grasslands
Planted Herbaceous Perennials
Prairie - bluestem-needlegrass-wheatgra*
Prairie - fescue
Prairie - little bluestem
Prairie - mesic tall and mixed grass
Prairie - mesic tall grass
Prairie - needlegrass Prairie
Prairie - saline
Prairie - sand
Prairie - wet-mesic tall grass
Prairie - wheatgrass Prairie
Shrubland - lowland deciduous
Shrubland - sagebrush
Shrubland - upland deciduous
Sparse Vegetation - badlands

SECTION V: MITIGATION STRATEGY

The goal of mitigation is to protect lives and property by reducing the future impacts of hazards which can include property damage, disruption to local and regional economy, the amount of public and private funds spent to assist with recovery. With appropriate mitigation, communities can reduce their vulnerability while building more disaster-resistant communities. The Cavalier County Mitigation Actions are based on previous hazard occurrences and the risk assessment provided in Section IV.

V. A. Community Capability Assessments

Identifying community characteristics, vulnerabilities, and hazard risk is the most important part of this plan. The capability assessment identifies the hazards at highest risk to the individual communities, regulations, policies, and procedures that contribute to the lessening of disaster damages. The assessment also provided some information on the types of mitigation actions it was participating in, and potential future projects that can effectively reduce the impact of future hazards. As part of the Cavalier County MHMP update, each city within the county was asked to fill out a "City Hazard Mitigation Questionnaire" to report on their current ranked hazards, mitigation capabilities, and program gaps. Appendix D lists all 12 reports from each city in Cavalier County.

A.1 National Flood Insurance Program (NFIP)

The NFIP is a federal program designed to mitigate future flood losses for private and public structures nationwide through community-enforced building and zoning ordinances. The program was also designed to provide access to federally-supported, affordable flood insurance protection and promote homeowners obtaining general risk insurance.[6] Participation in the NFIP is based on an agreement between local communities and the federal government that states that the community is adopting and enforcing a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), which the federal government will make flood insurance available within the community as a financial protection against flood losses.

In Cavalier County, only **Cavalier County** and the **City of Langdon** are currently participating in the NFIP. (https://www.fema.gov/cis/ND.html)

CID	Community	County	Initial FHBM	Initial FIRM	Current Eff. Date	Reg-Emerg Date
385413	**Cavalier County**	Cavalier County	----	----	01/01/2005	03/15/2010
380025	**City of**	Cavalier	06/28/1974	08/05/1986	05/05/2003	08/05/1986

[6] https://www.fema.gov/national-flood-insurance-program, Accessed on Oct 1, 2017.

	Langdon	County				

As of March, 2018, the county as a whole is virtually unmapped, however FEMA plans on finishing mapping the county by the end of 2018. The City of Langdon does have a series of two flood maps (East Langdon and West Langdon) which can be found at the very end of this plan. To continue compliance with the NFIP, both the Cavalier County Floodplain Administrator and the City of Langdon Floodplain Administrator will attend at least one relevant flood/NFIP training per year and ensure NFIP ordinances are enforce where applicable and applicants maintain appropriate insurance, including any and all new regulations and requirements. A strong NFIP public outreach campaign will be a critical step, once the new maps of the county are released, to encourage additional participants into the program.

Repetitive Loss Properties

Repetitive Loss (RL) properties are defined as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period since 1978.[7] The National Flood Insurance Fund has paid almost $3.5 billion dollars on claims for RL properties and is the largest draw out of the fund, making effective mitigation for these properties very important.

- There are currently **no** repetitive loss properties in Cavalier County.

*For more information on flooding, see *Section III. C.3: Flood.*

V. B. Mitigation Goals

It has been determined through public meetings, feedback from surveys, and planning team discussions that the following goals should be adopted for this plan period (2017-2022). This is a reduction from the six that were highlighted in the 2013 plan after appropriate actions were taken for some of those goals. The plan goals describe the overall direction that Cavalier County agencies, departments, organizations, and citizens should focus on to work toward mitigating risk from all threats and hazards faced.

1. **Reducing deaths, injuries, property loss, and economic disruption due to all types of hazards affecting Cavalier County.**
2. **Enhance the understanding of hazard mitigation to the general public and officials and its use throughout the county.**
3. **Increase public awareness of hazards and appropriate mitigation/response actions.**

[7] https://www.fema.gov/txt/rebuild/repetitive_loss_faqs.txt, Accessed on Oct 2, 2017.

4. **Continue to enhance public-private partnership to relay the importance and need of services to citizens before, during, and after a disaster.**

Differences from the previous plan include the addition of Goals 1 and 4. The planning team kept goals 1, 2, and 6 from the old plan (now goals 1, 2, and 3). Goals 3 and 4 relating to specific disasters and reducing the impacts of flooding on people and property were deemed to narrow for the update and can be rolled into the overarching Goal 1 of this plan. We honed in from four pages of goal statements to four tightly worded sentences to help focus our mitigation goals and objectives, and the overall purpose of the plan.

V. C. Mitigation Actions and Project Strategies

The mitigation actions in this plan are summarized into 5 main strategy types. The first four are described by FEMA in both the Local Mitigation Planning Handbook (2013) and the Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013). Also included in this plan is a fifth strategy for mitigation actions was identified through the planning process as being important for projects that do not directly align with the other four. The fifth strategy is currently being employed for new hazard mitigation plans by the State of Minnesota which the planning team found suitable for Cavalier County purposes. These mitigation strategies are found in the table below:

Strategy	Description	Examples
Local Planning and Regulations	Government, administrative, or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses.	• Zoning • Capital improvement programs • Building codes • Open space preservation • Regulations • Emergency Planning
Structure and Infrastructure Projects	Actions that involve the construction of structures to reduce the impact of a hazard, such as dams, levees, floodwalls, retaining walls, safe rooms, tornado shelters; and actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.	• Dam construction • Levee construction • Floodwalls • Retaining walls • Tornado shelters • Elevation changes • Storm shutters
Natural Systems Protection	Actions that preserve or restore the functions of natural systems in addition to minimizing hazard losses.	• Sediment and erosion control • Stream corridor restoration • Watershed management • Wetland restoration • Aquifer Storage

Education and Awareness Programs	Actions that inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.	• Outreach programs • Reals estate disclosure • Hazard information centers • Adult and school-age education programs
Mitigation Preparedness and Response Support	This is an additional mitigation strategy with the intent of covering preparation and actions that protect life and property during a natural disaster but can be viewed as mitigation.	• Warning systems • Emergency response services • Evaluation of county mitigation • Working with key partners

C.1 Project Ranking and Prioritization

After developing a list of mitigation actions for Cavalier County and its jurisdictions, it was important to analyze which ones should be prioritized first and which are the most important. In review, the planning team used the FEMA evaluation criteria (STAPLEE) which includes the following information:

Socially Acceptable

Will the proposed action adversely affect one segment of the population?

Technically Feasible

Does it solve the problem or only a symptom? How effective is the action in avoiding or reducing future losses?

Administratively Possible

Can the community provide the necessary support? (Staff, experts, time, funding)

Politically Acceptable

Is there public and official support for the project to ensure its success?

Legal

Does the community have authority to implement the proposed action? Will there be any legal consequences or community liability?

Environmentally Sound

How will the action impact the environment? (land, water, endangered species?)

Economical

Are there current funding sources that can be used to implement the action? Does the cost seem reasonable for the protection it will provide? What is the future burden on the local tax base?

The Master Mitigation Actions Chart found in the next section details each of the mitigation actions identified in this plan. Each action identifies the hazard, mitigation strategy category, actions needed to address it, the status of the action whether it is 'on-going' or 'new', the priority ranking, timeline for implementation, the jurisdictions who will implement this action, the responsible party to carry through the implementation, and comments on how the project will be implemented and potential funding streams to make it happen. The planning team felt that continuing to narrow down projects into a listed ranking would be counter-productive in the local jurisdictions efforts to become more resilient to the effects of hazards.

Criteria for Mitigation Action Priority Ranking

Ranking	Criteria
High Priority	• Methods for reducing risk from the hazard are technically reliable. • The County has experience in implementing mitigation measures. • Mitigation measures are eligible under federal grant programs. • There are multiple mitigation measures for the hazard. • The mitigation measures are cost-effective. • The mitigation measures protect lives and property permanently or for a long time. • There is no significant impact to the environment, nature, or wildlife.
Moderate Priority	• Mitigation methods are established. • The County has limited experiences with these kinds of measures. • Some mitigation measures are eligible for federal grants. • There is a limited range of effective mitigation measures for the hazard. • Mitigation measure are cost-effective only in limited circumstances. • Mitigation measures are effective for a reasonable period of time. • There is some impact to the environment, nature, or wildlife.
Low Priority	• Methods for reducing risk from the hazard are not well-established, not reliable, or are experimental. • The County has little or no experience with this kind of measure. • Mitigation measures are ineligible under federal grant programs. • There is a very limited range of mitigation measures for the hazard. • The mitigation measure has not been proved cost effective and is likely to be very expensive compared to the magnitude of the hazard. • The long-term effectiveness of the measure is relatively poor or is not known. • There is significant impact to the environment, nature, or wildlife.

C.2 Project Implementation

After the revised Cavalier County Multi-Hazard Mitigation Plan is formally adopted, it will use the priority ranking/analysis to focus on which projects to undertake. Mitigation projects that are eligible for state and federal grant programs, and when county funds are available will be considered. The Local Emergency Planning Committee (LEPC) will be the coordinating agency for all mitigation project implementation decisions. The LEPC has the capacity to organize resources, prepare grant applications, and oversee project implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that can implement activities and programs. The county Emergency Manager for mitigation project administration. A number of state and local regulations, policies, and legal documents provide a framework that helps corral Cavalier County's hazard mitigation projects. A sample of these regulations/plans is provided in Section IV. Risk Assessment under the Planning and Regulatory subset.

V. D. Master Mitigations Action Chart

The following list was developed after a comprehensive review of the 2013 plan mitigation strategies using a Past Mitigation Actions Status Review (PMAR) worksheet, applying a "Completed", "On-going/Carry Over", "Not Completed/Delete" options, which can be found in Section V. E. Also included in this list are new mitigation projects based on community feedback, surveys, in person meetings, and other community and emergency management suggestions.

Mitigation Actions in Old Plan: 28

Mitigation Actions in Revised Plan: 54

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
1	Severe Summer Storm	Education & Awareness Programs	Summer Storm Education Campaign	On-going	High	2018-2022	Cavalier County	CC Emergency Management	Work with National Weather Service Resources to develop a Summer Storm Education Campaign through social media and other outlets to educate the public on hazards and risks associated with Severe Summer Storm and preparedness actions that should be taken to reduce vulnerability.	County Budget
2	Severe Summer Storm	Education & Awareness Programs	Hold county-wide weather spotter training.	On-going	High	2018-2022	Cavalier County	CC Emergency Management	Work with the National Weather Service (Grand Forks) office to hold a county-wide Weather Spotter.	County Budget
3	All-Hazards	Local Planning & Regulations	Update the Emergency Operations Plan on an annual basis.	On-going	Moderate	2018-2022	Cavalier County	CC Emergency Management and City/County Admin	Cavalier County will work on an annual basis to update their Emergency Operations Plan with input from local jurisdictions.	County Budget

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
4	Severe Winter & Summer Weather	Mitigation Preparedness and Response Support	Identify critical facilities or infrastructure that do not have back-up power in the event of a major power outage resulting from severe winter or summer weather. *(Critical facilities may include: police/fire departments, EOC, health care facilities, lift stations, water & sewer treatment facilities, and other facilities deemed as critical, i.e. public schools and sheltering facilities).*	New	High	2018-2022	Cavalier County,	CC Emergency Management, City Admin & Public Works	Cavalier County and numerous jurisdictions have identified a need for back-up power for lift stations, government buildings or other critical facilities or infrastructure. Several lift stations do not have adequate backup power and may need generators purchased.	County/City budgets
5	Flood	Mitigation Preparedness and Response Support	Purchase and install generators or related equipment (e.g., adopt wiring, generator hook-ups) for identified critical facilities and lift station pumps that require back-up power.	On-going	High	2018-2022	Cavalier County, Milton Osnabrock	CC Emergency Management and City Admin.	Cavalier County, local city governments, and schools will evaluate feasibility to purchase and install generators for key facilities.	County/City Budgets **Possible FEMA HMA 5% Initiative Funding for Generators**
6	Urban Fire/ Structure Collapse & Wildland Fire	Education & Awareness Programs	Providing Fire education programs for county	On-going	High	2018-2022	Cavalier County	CC Emergency Management	Fire Departments schedule and facilitate educational programs based on community need.	County/City Budgets

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
7	Severe Winter & Summer Storms	Education & Awareness Programs	Promote the use of NOAA Weather Radios	New	Moderate	2018-2022	All Jurisdictions	CC Emergency Management	Promote the use of NOAA weather radios as a key communications resource for residents, businesses, and facilities that house vulnerable populations (i.e., nursing homes, senior centers, and day care facilities).	County Budget
8	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage Self-Sufficiency	New	High	2018-2022	All Jurisdictions	CC Emergency Management	Encourage residents to be self-sufficient during power outage events that may result from severe winter or summer storms. (Develop home survival kit, have back up power generator, etc.)	County Budget
9	Severe Winter & Summer Weather	Structure and Infrastructure Projects	Identify powerlines vulnerable to failure during severe ice storm or wind events and work with public utilities/rural electric coops to evaluate and implement mitigation projects such as above-ground improvements or burying of powerlines as needed.	New	High	2018-2022	Cavalier County Alsen, Calio, Calvin, Hannah, Langdon, Loma, Milton, Munich, Nekoma, Osnabrock, Sarles, Wales	CC Road and Electric Coops	Power lines in nearly all communities in Cavalier County are located above ground and are very susceptible to wind damage and/or ice/snow accumulation. Cavalier County and cities will work with electric coops to identify areas of concern and discuss potential measures such as Converting overhead lines to underground lines in areas that have been subject to repetitive damage. Rural electric cooperatives may be eligible to apply for FEMA HMA funding.	Electric Coop Funding, **Possible FEMA HMA funding for Infrastructure Retrofit**
10	Severe Winter & Summer Weather	Mitigation Preparedness and Response Support	Work with power companies to address mitigation of long-term power outages due to severe storms.	New	Moderate	2018-2022	Cavalier County	CC Public Works and Electric Coops	Cavalier County will work with utility providers to discuss and plan for long-term power outages and possible ways to mitigate.	Electric Coop Funding / County Budget

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
11	Severe Winter & Summer Weather	Mitigation Preparedness and Response Support	Discourage planting large trees near power lines to reduce risk of downed lines during severe winter or summer storms.	New	Moderate	2018-2022	Cavalier County	CC Highway Dept.	Cavalier County will work with public utilities to manage this effort as they are responsible for power line maintenance.	County budget
14	Severe Winter Storms	Natural Systems Protection	Promote and install strategically-located living snow fences ("LSFs") along county roadways that would benefit from them to reduce snow on the roads and improve visibility for motorists; primarily being crop strips and mowing ordinances.	New	Low	2018-2022	Cavalier County	CC Highway Dept. in cooperation with private landowners	Natural snowfences help keep the roadways clear of snow and improve visibility for motorists. They can help keep snow out of the ditch system which allows them to open up sooner in the spring - this reduces flooding potential. Primary target areas will on the north side of Hwy 5, West side of Hwy 20 and	County Budget, **Possible FEMA HMA Funding**
15	Dam Failure Drought	Structure and Infrastructure Projects	Mt Carmel Dam Repair	On-going	High	2018-2022	Cavalier County	Cavalier County WRD, and SCC.	Cavalier County has finished repairs of the Mt. Carmel dam after a 2003 emergency in which water was found flowing underneath the emergency spillway. Continue monitoring dam.	County/City budgets
16	Flood	Natural Systems Protection	Continued maintenance of NW area of Langdon City Limits	On-going	High	2018-2022	City of Langdon	Public Works Dept	Continue daily/weekly maintenance	City of Langdon Budget
17	Flood	Natural Systems Protection	Drain Clearing Program	On-going	High	2018-2022	Hannah, Milton, Munich, Nekoma, Osnabrock, Sarles, Wales	WRB Communities	Clearing snow around culverts/ ditches to get water to drain out of towns.	Current Funding

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
18	Flood	Natural Systems Protection	SW Corner Devils Lake Basin restoration to prevent flooding	On-going	High	2018-2022	Cavalier County	Joint Water Resource Districts	In progress, joint agreement with Devils Lake to clean out the Starkweather Coulee beginning at the south end and continuing north.	County Budgets
19	Flood	Natural Systems Protection	Snowflake Creek Clean-Out	On-going	High	2018-2022	Cavalier County	Joint Water Resource Districts, CC WRD	In progress, clearing out snowflake creek which impacts portions of the county annually. Half of the water is in this basin.	County Budgets
20	Flood	Education & Awareness Programs	Crop-Flood Insurance Education	On-going	Moderate	2018-2022	Cavalier County	Cavalier County Emergency Management	Public Outreach campaign to educate local area farmers on the benefits and ability to apply and receive crop-flood insurance.	County Budgets
21	Severe Winter Storm	Education & Awareness Programs	Conduct annual Winter Weather Education Campaign	On-going	High	2018-2022	Cavalier County	CC Emergency Management	Work with National Weather Service Resources to develop a Winter Education Campaign through social media and other outlets to educate the public on hazards and risks associated with Severe Summer Storm and preparedness actions that should be taken to reduce vulnerability.	County Budget
22	Infectious Disease	Education & Awareness Programs	Conduct annual Public Health Campaigns (Flu, WNV)	On-going	High	2018-2022	Cavalier County	CC Emergency Management, CC Public Health	Emergency Management and Public Health will work together to do public outreach and develop public education strategies.	County Budget
23	Infectious Disease Urban Fire Wildfire	Structure and Infrastructure Projects	Cleaunup/Demolition of abandoned structures and properties as appropriate	New	Moderate	2018-2022	City of Wales	City of Wales	The City of Wales will work with property owners to raze abandoned buildings to prevent city fires/public health incidents.	City Budget
24	Hazardous Materials Release	Local Planning & Regulation	Reverse Notification Planning – Scripting	On-going	Moderate	2018-2022	Cavalier County	CC Emergency Management	Develop pre-written public notification releases for an incident involving hazardous materials.	County Budget

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
25	All Hazards	Mitigation Preparedness and Response Support	Purchase and distribute NOAA All-Hazard Radio's	On-going	High	2018-2022	Cavalier County	CC Emergency Management	Obtaining NOAA Weather radio's through the National Weather Service and distributing to homes, businesses and areas that need one.	County Budget / NWS Cache
26	All Hazards	Education & Awareness	Mass Casualty Planning, Training, and Exercising	On-going	High	2019	Cavalier County	CC Emergency Management	Develop local exercises relating to a Mass Casualty incident resulting from a variety of hazards, including Hazardous Materials release,	**HMEP Grant** County Budget
27	Flooding	Structure & Infrastructure Projects	Identify roads in the county that are impacted by repetitive flooding and implement mitigation measures as needed. (i.e., change surface from gravel to pavement, increase culvert sizing to facilitate water flow).	New	Moderate	2018-2022	Cavalier County	CC Highway Department	Cavalier County Highway Department maintains a list of roads that have experienced repetitive loss and will implement mitigation measures as funding allows.	County Budget, **Possible FEMA HMA Funding for Localized Flood Reduction Projects**
28	Flooding	Local Planning & Regulations / Structure and Infrastructure Projects	Maintain efficient city drainage of storm water to handle high rain events and implement identified improvements where needed to decrease damage done by fast moving water.	New	Moderate	2018-2022	Cavalier County, Cities of Langdon, Munich,	CC Emergency Management in coordination with local City Admin and public works depts..	In an effort to maintain proper drainage within city limits (storm sewer/culverts and ditches), local city public works will identify areas for improvement that will decrease damage from high volume rain events.	County/City Budgets
29	Flooding	Local Planning & Regulations	Identify roads and bridges in the County that flood on a regular basis, and identify & prioritize required mitigation measures to reduce future flood damages.	New	Moderate	2018-2022	Cavalier County	CC Highway Dept., Township/City public works	Identification of flood prone roads and bridges is necessary to begin prioritizing the necessary mitigation projects prior to implementation.	County/City Budgets

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
30	Flooding	Structure and Infrastructure Projects	Implement required flood mitigation measures for roads, bridges, and culverts (i.e., raising roads, installation or modification of culverts, creation of retention areas.)	New	Moderate	2018-2022	Cavalier County	Cavalier County Highway Dept., Township/City public works	Projects will be implemented by the County and local jurisdictions as State and Federal funding becomes available to assist with the high cost of these projects.	County/City Budgets **Possible FEMA HMA funding for Localized Flood Reduction Projects**
31	Flooding	Education & Awareness Programs	Encourage all property owners in flood hazard areas to purchase flood insurance.	New	High	2018-2022	All Jurisdictions	CC Emergency Management, CC Env./Zoning Office, local city Admin & planning & zoning depts..	City of Langdon and local IC regularly promotes awareness of flood insurance for at-risk homeowners via public outreach.	County/City Budgets
32	Erosion / Landslide	Education & Awareness Programs / Natural Systems Protection	Encourage agricultural landowners to plant field windbreaks and plant cover crops in farming practices to reduce erosion.	New	Low	2018-2022	All Jurisdictions	CC SCCD in collaboration with Watershed Districts	This is an on-going program effort of the Cavalier County SCCD. SCCD provides project assistance to landowners on a regular basis on erosion control measures.	County budget
33	Wildfire	Education & Awareness Programs	Provide education to the public and private landowners on the dangers of and prevention of wildfire, particularly during periods of high-risk due to drought and high winds.	New	Moderate	2018-2022	All Jurisdictions	CC Emergency Management in collaboration with local fire departments	Grass fires in rural areas or agricultural fields are the main concern for “wildland” fires in Cavalier County. CC Emergency Management will use it’s website, Facebook/Twitter, and news releases to help raise public awareness during periods of wildfire risk.	County Budget

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
34	Flood	Mitigation Preparedness & Response Support	Identify rural areas where drainage ditches and creeks are clogged with cattails/vegetation and soil/silt increasing flooding risk to fields and property.	New	Moderate	2018-2022	All Jurisdictions	CC Weed Board, ND Game and Fish, US Fish and Wildlife	Coordinate with the Cavalier County Weed Board and the North Dakota Game and Fish Department to locate areas where drainage clearing could lead to enhanced drainage and reduced risk of flooding.	ND Game and Fish Funding, County Funding
35	Flood	Mitigation Preparedness & Response Support	Spraying/clearing cattails/vegetation and re-dredging old ditches/coulees	New	Moderate	2018-2022	Cavalier County	Landowners, CC Weed Board, ND Game and Fish,	Coordinate with the Cavalier County Weed Board and the North Dakota Game and Fish Department to spray areas that have been identified as prone to flooding due to silt/clay buildup and vegetation.	ND Game and Fish Funding, County Funding
36	Erosion/ Landslide	Structure & Infrastructure Projects	Embankment stabilization and runoff control along Hwy 55 through the Pembina Gorge.	New	High	2018-2020	Cavalier County	Cavalier County Highway Dept	Control and improve erosion issues along the highway to ensure safe travel. Adding drainage system, repairing slumps, planting additional vegetation are possible remedies.	County/City Budgets **Possible FEMA HMA funding**
37	Flood	Education & Awareness Programs	Encourage cities to participate in NFIP through community outreach.	New	High	2018-2022	All Jurisdictions	CC Emergency Management	Reach out to communities after new FEMA floodmap is released, and encourage participation in NFIP.	County/City Budgets
38	Wildfire	Natural Systems Protection	Create fire buffer by mowing city ditches and large grass field on north side of town.	New	Moderate	2018-2022	City of Sarles	City of Sarles	Mow, clean up brush and deadwood from city limit boundaries, particularly the NW side of town to create a permanent fire break.	City Budget
39	Shortage of Critical Material	Structure & Infrastructure Projects	Purchase and install generator or related equipment for Café and US Postal Service building which is a critical facility.	New	Moderate	2018-2020	City of Hannah	City of Hannah	The city of Hannah, with assistance from county EM, will evaluate feasibility to purchase and install generator for Café/USPS building in town.	City Budget

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
40	Wildfire	Natural Systems Protection	Create fire buffer along north and west sides of town where large amounts of grassland exist by mowing, maintenance, and clearing dead brush.	New	Moderate	2018-2022	City of Hannah	City of Hannah	Mow and maintain large grassland areas along Hwy 13, 1st Ave, and Town line road to create a fire break. Hannah is susceptible to grassfires with large area north of town.	City Budget
41	Infectious Disease Outbreak	Mitigation Preparedness & Response Support	Promote use of hand sanitizer, wipes, and hand washing during all public and city council meetings.	On-Going	Low	2018-2022	City of Loma	City of Loma	City will purchase soap, hand sanitizer, sanitizing wipes and hand out to all city council members and the public during meetings to mitigation potential disease spreading	City Budget
42	Flood	Structure & Infrastructure Projects	Maintain efficient city drainage of storm water and snowmelt. Install new culverts and re-sculp ditches along Highway 20 and 7th Avenue.	New	High	2018-2019	City of Munich	City of Munich	To alleviate pooling and drainage problems that damage streets and basements, the city will look at clearing out and deepening ditches leading out of town, as well as installing new culverts as appropriate.	City Budget
43	Shortage of Critical Material	Structure & Infrastructure Projects	Purchase and install permanent generator to power the lift station on 5th Street in the event of a power failure.	New	Moderate	2018-2019	City of Milton	City of Milton	The city of Milton recognizes the need for backup power for the lift station after a 2016 outage left it unusable, which caused flooding issues.	City Budget / County Budget
44	Shortage of Critical Material	Structure & Infrastructure Projects	Purchase and install permanent generator to power the lift station on Broadway in the event of a power failure.	New	Moderate	2018-2019	City of Osnabrock	City of Osnabrock	Osnabrock is looking to add a generator for the city's lift station in the event of a power outage, to avoid damaging flooding issues.	City Budget / County Budget

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
45	Shortage of Critical Material	Structure & Infrastructure Projects	Purchase and install permanent generator to power the lift station on Broadway in the event of a power failure.	New	Moderate	2018-2019	City of Alsen	City of Alsen	Alsen is looking to add a generator for the city's lift station in the event of a power outage, to avoid continued damage to city roads and streets.	City Budget / County Budget
46	Flood	Structure & Infrastructure Projects	Identify existing structures that would benefit from flood protection measures and implement projects as feasible.	New	Low	2018-2020	City of Alsen	City of Alsen Cavalier County Zoning Depart.	Through new floodplain maps and land ordinance enforcement, including new zoning regulations, encouraging owners to consider flood proofing measures.	City Budget
47	Severe Winter Storm	Natural Systems Protection	Install additional tree rows on northern and western sides of town for protection from severe winter events.	New	Low	2018-2022	City of Calio	City of Calio	The city of Calio identified the need for 'living tree fences' in the form of additional tree rows to protect the city from harsh winds and blowing and drifting snow in town.	City Budget
48	Flood	Structure & Infrastructure Projects	Improve streets throughout town by digging out, laying fabric, and then re-gravelling.	New	Moderate	2018-2022	City of Calvin	City of Calvin	Calvin is emphasizing the need to re-design roadways throughout town, particularly Grace Street and 3rd Avenue. Spring pooling and grooves creates travel issues when wet.	City Budget
49	Severe Summer Storm	Mitigation Preparedness & Response Support	Install outdoor warning siren to cover the city of Nekoma, Stanley R. Mickelsen Safeguard Complex, and immediate rural area.	New	Low	2018-2020	City of Nekoma	City of Nekoma	Outdoor warning sirens is an important tool used to notify residents to take cover in the event of dangerous high wind events. The lack of these warning sirens presents a gap in our ability to communicate with residents.	City Budget/ County Budget/ SHSP Grant

#	Hazard	Mitigation Strategy	Mitigation Action	Status	Priority Ranking	Time-frame	Jurisdictions	Responsibility	County Comments on Planning Mechanisms for Implementation	Possible Funding
50	Flood / Erosion/ Landslide	Structure & Infrastructure Projects	Evaluate and implement road improvement projects to prevent overland flooding and erosion issues based on community feedback and new mapping.	New	High	2018-2020	All Jurisdictions	Cavalier County Emergency Management, Cavalier County Highway Dept.	Floodplain remapping to be completed in 2018 will be overlaid with low road locations across the entire county. These will then be prioritized and scheduled for improvement.	County Budget/ **Possible FEMA HMA funding**
51	Flood/ Erosion/ Landslide	Structure & Infrastructure Projects	Rip-Rap 98th Ave NE and long low areas and around culverts.	New	Moderate	2018-2023	City of Loma	City of Loma	The city of Loma has experienced culvert and road damage due to flooding. Rip-raping and fortifying around these areas will alleviate possible future damages.	Private Party, City budget, County Budget
52	Flood	Structure & Infrastructure Projects	Evaluation of Upgrades to the Lagoon System	New	High	2018-2023	City of Osnabrock	City of Osnabrock	The city of Osnabrock has indicated the city Lagoon system may not be able to handle heavy rains / flooding. The city should conducts an official study of the system to determine if expansion is needed.	City Budget
53	Severe Winter Storm	Natural Systems Protection	Install additional tree rows on northern and western sides of town for protection from severe winter events.	New	Low	2018-2023	City of Milton	City of Milton	The city of Milton identified the need for 'living snow fences' in the form of additional tree rows to protect the city from harsh winds and blowing and drifting snow in town. North of Hwy 66, and along railroad tracks.	City Budget, Conservation Money
54	Flood	Structure & Infrastructure Projects	Deepening and reshaping of city ditches	New	High	2018-2023	City of Wales	City of Wales	The city routinely has issues with water pooling and flooding in town. Deepening and reshaping the streets and/or raising the roads may alleviate future damages to more significant flood events.	City Budget, County Budget

**This list was based on county-level needs and were considered mitigation items by the planning team, not all actions are, or will be considered viable by FEMA's definition.*

V. E. Past Mitigation Action Review

The following table was developed through a tool used to review the status of the hazard mitigation actions for the 2011 plan; called a 'Past Mitigation Action Review' (PMAR) worksheet. The worksheet was completed by the Emergency Manager, and appropriate jurisdictions for the new plan, with relevant comments on the reason for the status if changed. The status designations are:

- Ongoing/Carry Over – Actions from the last plan that require continuing application
- Completed – Actions from the last plan that have been effectively implemented
- Not Completed (Delete) – Actions from the last plan that are no longer deemed appropriate or suitable

Completed PMAR Worksheet for the 2011 MHMP mitigation actions **Completed on 2-6-17**

Hazard	Past Mitigation Action (# in old plan)	Status	Comment on Status
Summer Storms (Includes thunderstorms, lightning, hail, wind, and tornados)	(#4) Summer Storm Education Campaign	ONGOING/CARRY OVER	Held annually in 2012, 2013, 2014, 2015, and 2016.
Summer Storms	(#5) Weather Spotter Training	ONGOING/CARRY OVER	Held in 2014
Summer Storms	(#24) Replace lift station pumps, larger more efficient. Purchase generator for lift station (Nekoma)	ONGOING/CARRY OVER	
Summer Storms	(#28) Tornado Shelter (Mt Carmel Dam)	NOT COMPLETED (DELETE)	Cost Prohibited due to EF4 & 5 above ground shelter requirements. The water table is too high around that location and contractors would have to place a system of pumps and drain tiling to keep shelter dry. Makes project economically unfeasible. Siren were placed at that location.
Summer Storms	(#30, added later) Langdon Trailer Park –	COMPLETED	Complete/Ongoing: City of Langdon has a plan in place to alert

Hazard	Past Mitigation Action (# in old plan)	Status	Comment on Status
	Storm Protection (fences), weather alerting		custom harvesters that stay there seasonably and places NOAA weather radios with them on a loaner with deposit basis.
Urban, Wildland Fire	(#25) Fire Education Programs	ONGOING/CARRY OVER	Programs held 2013, 2015, 2016
Flood	(#10) Inlet Pump at Mt Carmel Dam	NOT COMPLETED (DELETE)	City of Langdon found alternative water source
Flood	(#11) Mt Carmel Dam Repair, remediation, and maintenance	ONGOING/CARRY OVER	
Flood	(#12) Continue maintenance of NW area of Langdon City Limits	ONGOING/CARRY OVER	Yearly Continued
Flood	(#13) Drain cleaning program to prevent flooding of homes and cities	ONGOING/CARRY OVER	Yearly Continued
Flood	(#14) SW Corner Devils Lake Basin restoration prevent flooding	ONGOING/CARRY OVER	In Progress, Due to a joint agreement with Devils Lake to clean out the Starkweather Coulee beginning at the south end and continuing north.
Flood	(#15) Snowflake Creek Clean-Out	ONGOING/CARRY OVER	Ongoing/In-Progress, This project impacts portions of the county annually since over ½ of the water is in this basin.
Flood	(#16) Tiling	COMPLETED	Completed in 2014
Flood	(#17) Muhs Bridge repair or replacement	COMPLETED	Complete
Flood	(#18) Purchase load restriction signes	COMPLETED	Complete
Flood	(#19) Crop-Flood Insurance Education	ONGOING/CARRY OVER	
Flood	(#29, added later) Bridge replacement Mulberry Creek, NW at Langdon Wales Bridge	COMPLETED	Done.
Winter Storm (includes blizzard, heavy snow, and ice storms)	(#6) Winter Storm Education Campaign	ONGOING/CARRY OVER	Held annually in 2012, 2013, 2014, 2015, and 2016.
Drought	(#9) Investigate Alternative Water Source	COMPLETED	Alternate Water Source Found
Infectious Disease	(#3) Public Health Campaigns, Flu, WNV	ONGOING/CARRY	2012, 2013, 2014, 2015, 2016 annual education campaigns.

Hazard	Past Mitigation Action (# in old plan)	Status	Comment on Status
		OVER	
Hazardous Materials	(#8) Reverse Notification Planning, scripting	ONGOING/CARRY OVER	
Shortage of Critical Infrastructure	(#21) Develop Shelter Location	COMPLETED	
Homeland Security Incident	(#20) Surveillance equipment at water treatment plant	NOT COMPLETED (DELETE)	Removed

"All-Hazards" Mitigation Actions

Hazard	Past Mitigation Action	Status	Comment on Status
All Hazards	(#1) CERT Program	NOT COMPLETED (DELETE)	
All Hazards	(#2) Continuity of Operations Planning	ONGOING/CARRY OVER	Summer 2013 Meeting with chamber members
All Hazards	(#22) Shelter in Place Training	COMPLETED	2015 With Red Cross
All Hazards	(#7) Purchase and Distribute NOAA All-Hazard Radio's	ONGOING/CARRY OVER	
All Hazards	(#23) Back Up Generators	ONGOING/CARRY OVER	Courthouse Done Done Munich
All Hazards	(#26)Mass Casualty, HazMat Planning/Exercising/training	ONGOING/CARRY OVER	Pembina Gorge Schoolbus Accident exercise (2013, 2015)
All Hazards	(#27) Continuity of Operations Planning	ONGOING/CARRY OVER	

SECTION VI: PLAN DEVELOPMENT PROCESS

VI. A. Planning Process Narrative

For the update of the 2013 FEMA approved Multi-Hazard Mitigation Plan, due in 2018, Cavalier County decided to obtain the professional services of a contractor to assist in the revision and development of a new plan. After a contractor was hired, a discussion was had on the immediate need for a planning team. It was decided to follow a similar path as the last one taken, by utilizing the County Commission and the Local Emergency Planning Committee (LEPC) as the primary membership for the team. This was preferable because the membership already had experience with hazard mitigation and knew what type of information was needed in the plan. It was decided additional analysis would need to be performed monthly, which would primarily be between the contractor and the county emergency manager. Numerous emails, calls, and information exchange occurred between January and November of 2017 to ensure a smooth planning process. Additional representatives, agencies, and departments (planning team) were convened at specific intervals throughout the process including the county hazard priorities and mitigation project ideas discussion in March, and the draft plan review in November.

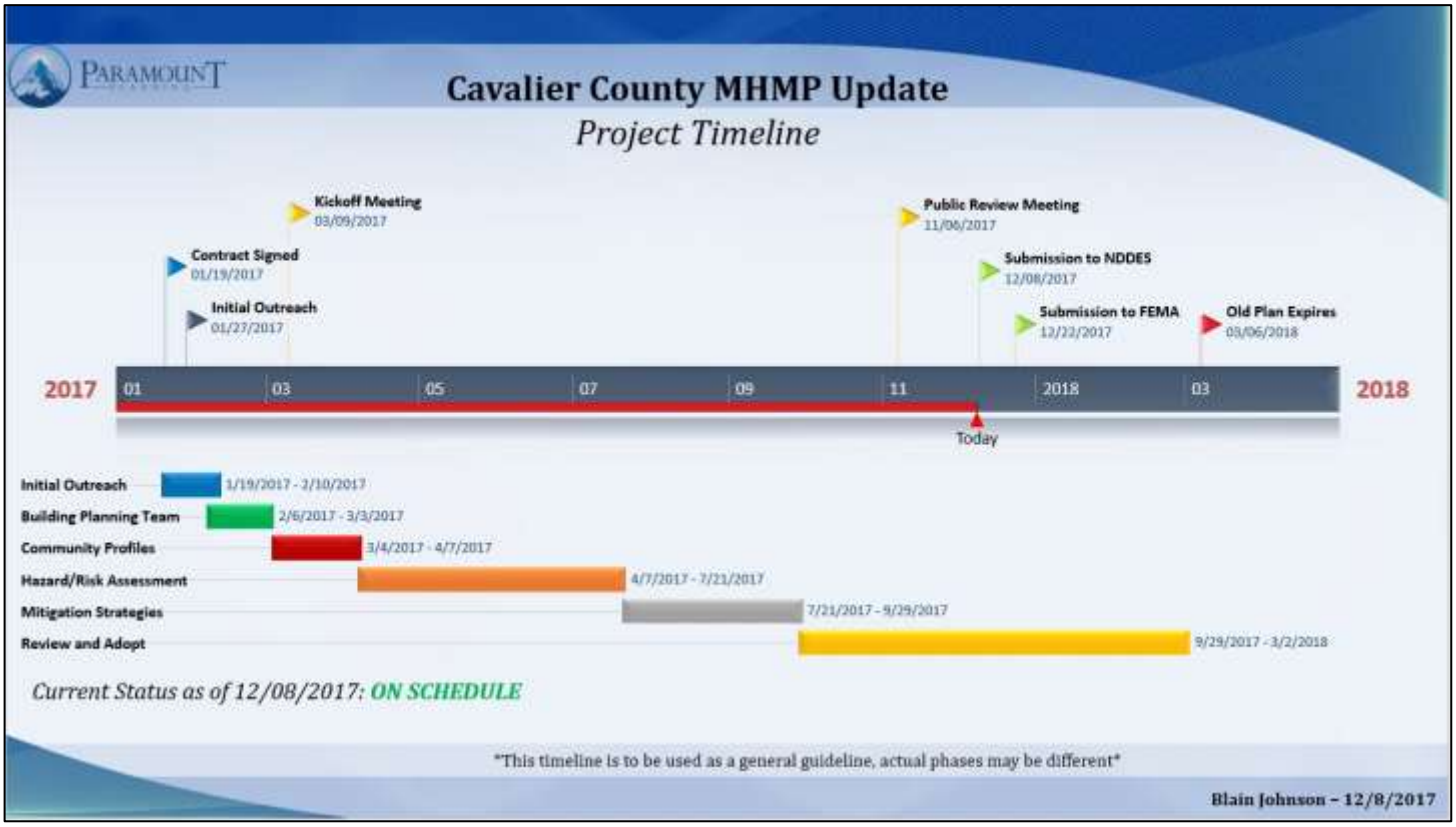
It was determined early on there may be community participation struggles as in 2011 during the last plan update and as mentioned in I.D.1. The planning team decided that two meetings would suffice for the development of this plan and anything beyond that would get to be too much according to feedback. The draft plan was set to be released in October to the emergency manager for initial feedback and changes, and then in November to appropriately account for the heavy field harvest activity that occurs in the fall.

VI. B. Timeline

The previous Cavalier County Multi-Hazard Mitigation Plan was approved on March 6th, 2013 and is due to expire on March 6th, 2018. For the new plan, Cavalier County decided to elicit the professional services of a contractor for assistance in a complete revision of the 2013 plan. Bids for a contractor were opened in early December of 2016, with a final contract being signed with Paramount Planning Group, LLC on January 19th, 2017. Below is a list of execution dates for various project goals and tasks and a description of each event.

Date	Project Item	Location
Jan 17, 2017	Contract signed between Cavalier County and Paramount Planning Group, LLC	N/a
Jan 27, 2017	***Initial Outreach Call*** with Cavalier County Emergency Management and Paramount Planning to discuss development and timeline of plan	Conference Call
Mar 3, 2017	***Planning Team Call***: Mitigation Strategies, Timelines, and Kickoff Meeting discussion	Conference Call

Mar 9, 2017	***Hazard Mitigation Plan Kickoff Meeting*** with County Commission (Public Meeting)	Langdon, ND
Mar 21-22, 2017	Small Team meeting discussing Mitigation Strategy updates	Langdon, ND
April, 2017	Completion of Outline of revised plan	N/a
May, 2017	Report	Conference Call
July, 2017	Compilation of Public Feedback, Hazard Mitigation Questionaire	
Sep, 2017	Completion of Community Characteristics, Hazard Occurrences, Mitigation Strategies	N/a
Oct 16, 2017	***Draft Plan Completed,*** sent to EM for review	Email
Oct 30, 2017	Final revisions of draft plan completed. Posted Online for public review and feedback (Open until Nov. 13th)	N/a
Nov 6, 2017	***LEPC/Public Comment Meeting*** for draft plan	Langdon, ND
Dec 8, 2017	Plan finalized and submitted to NDDES for review	Email
Feb __ , 2018	Plan submitted to FEMA for review	N/a



VI

and Wildfire. Non-Natural hazard occurrences (Disease Outbreak, Erosion/Landslide, Hazardous Materials Spills, Terrorism, and Urban Fire) are addressed under each hazard in Section III.

List of Drought events since 1950

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
7/25/2006	Cavalier County	--	0	0	$0
8/01/2006	Cavalier County	--	0	0	$0
02/13/2007	Cavalier County	--	0	0	$0
03/01/2007	Cavalier County	--	0	0	$0
10/02/2012	Cavalier County	--	0	0	$0
Totals:	5 Events	--	0 Deaths	0 Injuries	$0

For more detailed information on these drought events, please visit the NCEI at NOAA

List of Flood events since 1996

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
4/10/1996	Cavalier County	--	0	0	$0
4/10/1996	Cavalier County	--	0	0	$0
4/10/1996	Cavalier County	--	0	0	$0
6/10/2002	Cavalier County	--	0	0	$0
3/27/2004	Cavalier County	--	0	0	$340,000
4/01/2004	Cavalier County	--	0	0	$0
6/12/2005	Cavalier County	--	0	0	$0
3/31/2006	Cavalier County	--	0	0	$0
4/01/2006	Cavalier County	--	0	0	$632,000
3/22/2009	Sarles	--	0	0	$5,000
4/10/2009	Sarles	--	0	0	$5,000
4/10/2011	Sarles	--	0	0	$0
4/28/2013	Sarles	--	0	0	$5,000
5/01/2013	Sarles	--	0	0	$5,000
5/20/2013	Olga *(Unincorp)*	--	0	0	$200,000
3/30/2017	Sarles	--	0	0	$50,000
4/01/2017	Sarles	--	0	0	$50,000
Totals:	17 Events	Avr. (EF1)	1 Death	1 Injury	$1,292,000

For more detailed information on these flood events, please visit the NCEI at NOAA

List of Flash Flood events since 1996

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
7/12/1997	Wales	--	0	0	$10,000
7/11/2000	Munich	--	0	0	$0
8/31/2002	Mt. Carmel	--	0	0	$0
8/31/2002	Vang *(Unincorp)*	--	0	0	$12,500
6/11/2005	Munich	--	0	0	$0
6/18/2009	Vang *(Unincorp)*	--	0	0	$5,000

Totals:	6 Events	--	0 Deaths	0 Injuries	$27,500

For more detailed information on these flash flood events, please visit the NCEI at NOAA

List of Hail events since 1950

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
9/17/1955	LANGDON	2.75	0	0	$0
6/18/1957	LANGDON	1.75	0	0	$0
7/6/1957	LANGDON	1.75	0	0	$0
5/4/1965	MUNICH	1.75	0	0	$0
6/21/1971	ALSEN	1.75	0	0	$0
8/17/1973	WALES	0.75	0	0	$0
8/17/1973	LANGDON	1.75	0	0	$0
6/9/1976	NEKOMA	1.75	0	0	$0
7/10/1976	ALSEN	1.75	0	0	$0
7/19/1976	NE OF LANGDON	1.75	0	0	$0
7/19/1976	NORTH OLGA TWP	1	0	0	$0
5/17/1977	MAIDA	1.75	0	0	$0
8/19/1977	MAIDA	0.75	0	0	$0
8/12/1978	HANNAH	2.25	0	0	$0
8/1/1979	MUNICH	1.75	0	0	$0
8/31/1979	MUNICH	1.75	0	0	$0
9/9/1979	LANGDON	1.75	0	0	$0
5/28/1980	LANGDON	0.75	0	0	$0
6/13/1980	LANGDON	1	0	0	$0
7/20/1982	OSNABROCK	1.75	0	0	$0
7/12/1984	HANNAH	1.75	0	0	$0
7/12/1984	LANGDON	1.75	0	0	$0
7/13/1984	SE CAVALIER CO	2.75	0	0	$0
7/3/1985	MOSCOW TWP	1	0	0	$0
7/16/1985	LANGDON	0.75	0	0	$0
8/8/1985	LOMA	1.75	0	0	$0
7/3/1986	LANGDON	0.75	0	0	$0
8/5/1987	HANNAH	1.75	0	0	$0
5/28/1988	NEKOMA	0.75	0	0	$0
8/27/1990	FREMONT TWP	1.75	0	0	$0
6/13/1991	NEKOMA	0.75	0	0	$0
8/18/1994	LANGDON	2.75	0	0	$20,000
8/18/1994	NE LANGDON	1.75	0	0	$0
8/18/1994	NE LANGDON	1.75	0	0	$0
8/18/1994	MAIDA	1.75	0	0	$0
8/27/1994	MUNICH	1.75	0	0	$0
6/22/1995	ALEXANDER	0.75	0	0	$0
6/5/1996	LANGDON	0.75	0	0	$0

10/11/1997	OLGA	1.75	0	0	$0
5/14/1998	LANGDON	0.75	0	0	$0
5/14/1998	LANGDON	0.75	0	0	$0
5/27/1998	ALSEN	0.75	0	0	$0
5/27/1998	NEKOMA	0.75	0	0	$0
5/27/1998	NEKOMA	0.75	0	0	$0
5/27/1998	NEKOMA	1.75	0	0	$0
5/28/1998	HANNAH	1	0	0	$0
5/28/1998	MT CARMEL	1	0	0	$0
5/28/1998	LANGDON	1	0	0	$0
5/28/1998	MT CARMEL	0.75	0	0	$0
5/28/1998	OLGA	1.75	0	0	$0
6/24/1998	OSNABROCK	1	0	0	$0
7/18/1998	MT CARMEL	1.75	0	0	$0
8/12/1998	MILTON	0.75	0	0	$0
8/13/1998	UNION	1.75	0	0	$0
8/26/1998	MAIDA	0.75	0	0	$0
6/6/1999	OLGA	0.75	0	0	$0
6/22/1999	LANGDON	0.75	0	0	$0
6/22/1999	LANGDON	1	0	0	$0
7/12/1999	HANNAH	1	0	0	$0
7/12/1999	CALVIN	1	0	0	$1,000
7/12/1999	LANGDON	1.25	0	0	$0
7/12/1999	NEKOMA	1.75	0	0	$0
7/12/1999	NEKOMA	1.5	0	0	$0
5/6/2000	OSNABROCK	1.75	0	0	$0
6/28/2000	HANNAH	0.75	0	0	$0
6/28/2000	LOMA	0.88	0	0	$0
8/13/2000	CALVIN	0.75	0	0	$0
8/28/2000	LANGDON	0.75	0	0	$0
8/28/2000	MILTON	1	0	0	$0
6/19/2001	MUNICH	0.75	0	0	$0
6/19/2001	ALSEN	0.75	0	0	$0
6/19/2001	ALSEN	0.88	0	0	$0
6/19/2001	LOMA	0.75	0	0	$0
8/14/2001	SARLES	0.75	0	0	$0
8/14/2001	DRESDEN	0.75	0	0	$0
8/14/2001	LANGDON	0.75	0	0	$0
8/21/2001	CALVIN	0.75	0	0	$0
6/10/2002	MUNICH	0.75	0	0	$0
6/10/2002	OSNABROCK	1	0	0	$0
7/20/2002	LOMA	1	0	0	$0
7/29/2002	VANG	1	0	0	$0

7/31/2002	WALES	0.75	0	0	$0
8/23/2002	OLGA	0.75	0	0	$0
8/23/2002	OLGA	0.75	0	0	$0
8/23/2002	ALSEN	0.75	0	0	$0
8/27/2002	ALSEN	0.75	0	0	$0
8/27/2002	LANGDON	0.75	0	0	$0
8/27/2002	MAIDA	2.5	0	0	$0
8/27/2002	VANG	1.75	0	0	$0
8/27/2002	LANGDON	0.75	0	0	$0
8/27/2002	CALVIN	0.88	0	0	$0
8/27/2002	WALES	0.75	0	0	$0
8/31/2002	WALES	3	0	0	$0
8/31/2002	WALES	2	0	0	$0
8/31/2002	SARLES	1.75	0	0	$0
8/31/2002	MT CARMEL	0.88	0	0	$0
8/31/2002	LANGDON	1	0	0	$0
8/31/2002	VANG	1.75	0	0	$0
8/31/2002	VANG	1.25	0	0	$0
8/31/2002	OSNABROCK	0.88	0	0	$0
8/31/2002	OLGA	1	0	0	$0
8/31/2002	LANGDON	2.75	0	0	$0
8/31/2002	VANG	0.88	0	0	$0
8/31/2002	MILTON	0.75	0	0	$0
7/14/2003	CLYDE	0.75	0	0	$0
7/14/2003	LANGDON	0.75	0	0	$0
7/19/2003	WALES	1.75	0	0	$0
7/19/2003	DRESDEN	1	0	0	$0
7/19/2003	DRESDEN	2.5	0	0	$0
7/19/2003	LANGDON	1	0	0	$0
7/19/2003	LANGDON	2.25	0	0	$0
7/19/2003	LANGDON	1.5	0	0	$0
7/19/2003	LANGDON	4.5	0	0	$0
7/19/2003	NEKOMA	2	0	0	$0
4/20/2004	MUNICH	0.75	0	0	$0
5/19/2004	ALSEN	0.75	0	0	$0
5/19/2004	CALIO	0.75	0	0	$0
7/3/2004	VANG	0.75	0	0	$0
7/31/2004	LANGDON	0.75	0	0	$0
7/31/2004	LANGDON	0.75	0	0	$0
8/29/2004	LANGDON	0.75	0	0	$0
9/3/2004	HANNAH	0.88	0	0	$0
4/18/2005	MUNICH	0.75	0	0	$0
4/18/2005	LANGDON	0.75	0	0	$0

6/23/2005	CALIO	2	0	0	$0
6/23/2005	OSNABROCK	1	0	0	$0
7/2/2005	WALES	0.75	0	0	$0
7/10/2005	HANNAH	2	0	0	$0
9/4/2005	MUNICH	1	0	0	$0
9/4/2005	LANGDON	1	0	0	$0
9/4/2005	OLGA	0.88	0	0	$0
5/27/2006	DRESDEN	0.75	0	0	$0
5/27/2006	VANG	0.75	0	0	$0
6/30/2006	LANGDON	1	0	0	$0
6/30/2006	NEKOMA	1	0	0	$0
7/30/2006	LANGDON	0.88	0	0	$0
7/30/2006	LANGDON	1	0	0	$0
8/4/2006	HANNAH	2	0	0	$0
8/4/2006	HANNAH	0.88	0	0	$0
8/4/2006	MT CARMEL	0.75	0	0	$0
8/4/2006	LANGDON	0.75	0	0	$0
8/4/2006	VANG	1	0	0	$0
8/4/2006	LANGDON	1.25	0	0	$0
8/4/2006	WALES	0.75	0	0	$0
8/4/2006	LANGDON	2.25	0	0	$0
8/12/2006	NEKOMA	1	0	0	$0
8/20/2006	HANNAH	1.75	0	0	$0
8/20/2006	LANGDON	1	0	0	$0
8/20/2006	NEKOMA	1.75	0	0	$0
5/21/2007	CLYDE	0.75	0	0	$0
6/25/2007	CALVIN	1	0	0	$0
6/25/2007	DRESDEN	1.5	0	0	$0
6/25/2007	WALES	0.88	0	0	$0
6/25/2007	LANGDON	0.75	0	0	$0
6/25/2007	OSNABROCK	1	0	0	$0
6/26/2007	OSNABROCK	1.75	0	0	$0
7/4/2007	OLGA	1	0	0	$0
7/25/2007	ALSEN	1	0	0	$0
7/25/2007	ALSEN	0.88	0	0	$0
7/25/2007	WEAVER	1	0	0	$0
8/13/2007	WEAVER	1	0	0	$0
8/26/2007	MILTON	1.75	0	0	$0
8/26/2007	UNION	0.75	0	0	$0
8/26/2007	UNION	1.75	0	0	$0
6/21/2008	SARLES WESTON ARPT	0.88	0	0	$0
6/23/2008	SARLES	1.5	0	0	$100,000

6/23/2008	HANNAH	0.75	0	0	$0
6/23/2008	HANNAH	0.75	0	0	$0
7/7/2008	CALVIN	1.75	0	0	$30,000
7/16/2008	SARLES WESTON ARPT	0.88	0	0	$0
6/18/2009	OLGA	1	0	0	$0
7/20/2009	ALSEN	1.5	0	0	$0
7/20/2009	LANGDON	0.88	0	0	$0
6/8/2010	EASBY	0.88	0	0	$0
6/8/2010	OLGA	1.25	0	0	$0
7/3/2010	HANNAH	1.75	0	0	$0
7/31/2010	VANG	1.25	0	0	$0
7/4/2011	MUNICH	0.88	0	0	$0
7/4/2011	WEAVER	1	0	0	$0
5/1/2012	MAIDA	0.88	0	0	$0
6/7/2012	NEKOMA	0.75	0	0	$0
7/4/2012	OLGA	0.88	0	0	$0
7/5/2014	MAIDA	2.75	0	0	$0
7/5/2014	MT CARMEL	4	0	0	$0
7/5/2014	VANG	2.75	0	0	$0
7/5/2014	VANG	2.75	0	0	$0
7/6/2014	VANG	1.75	0	0	$0
7/21/2014	HOVEY MOBIL PARK	1	0	0	$0
7/21/2014	EASBY	0.75	0	0	$0
8/22/2015	OSNABROCK	1	0	0	$0
7/9/2016	CALIO	1	0	0	$0
9/4/2016	NEKOMA	1	0	0	$0
6/9/2017	OLGA	1	0	0	$0
Totals:	193 Events	--	0 Deaths	0 Injuries	$151,000

For more detailed information on these hail events, please visit the NCEI at NOAA

List of Thunderstorm Wind events since 1950

Date	Location	Wind Speed (MPH)	Deaths	Injuries	Prop. Damage
8/16/1956	Langdon	0	0	0	0
6/24/1966	Milton	0	0	0	0
7/13/1970	S of Langdon	0	0	0	0
9/5/1970	S of Alsen	0	0	0	0
7/4/1973	S of Langdon	0	0	0	0
6/11/1976	Langdon	0	0	0	0
5/25/1978	Langdon	60	0	0	0
7/4/1978	Munich	0	0	0	0
7/5/1978	Fremont Twp	0	0	0	0

7/24/1978	Langdon	0	0	0	0
7/24/1978	Easby Twp	0	0	0	0
8/1/1979	Munich	60	0	0	0
5/28/1980	Clyde *(unincorp)*	58	0	0	0
5/28/1980	Langdon	0	0	0	0
5/28/1980	Calvin	81	0	0	0
5/28/1980	Langdon	57	0	0	0
6/13/1980	Henderson Twp	99	0	0	0
6/13/1980	Langdon	81	0	0	0
7/12/1984	Wales	76	0	0	0
6/2/1986	W of Langdon	60	0	0	0
6/19/1986	S of Munich	64	0	0	0
6/19/1986	SE of Calio	58	0	0	0
6/19/1986	NW of Langdon	63	0	0	0
6/19/1986	S of Munich	70	0	0	0
7/7/1988	E of Langdon	81	0	0	0
7/18/1991	Langdon	60	0	0	0
8/27/1994	Langdon	60	0	0	0
9/10/1994	Langdon	74	0	2	10000
6/28/1996	CLYDE	81	0	0	100000
6/28/1996	WALES	81	0	0	50000
8/2/1997	MUNICH	70	0	0	0
8/2/1997	MUNICH		0	0	15000
10/8/1997	OLGA		0	0	20000
5/27/1998	NEKOMA		0	0	5000
6/6/1999	LANGDON	60	0	0	0
6/22/1999	LANGDON	60	0	0	2000
7/12/1999	HANNAH	60	0	0	0
8/12/2000	OSNABROCK		0	0	30000
8/12/2000	MILTON		0	0	500
8/28/2000	LANGDON	64	0	0	0
7/22/2001	NEKOMA		0	0	500
8/14/2001	LANGDON	58	0	0	25000
8/14/2001	OSNABROCK		0	0	75000
8/8/2002	CALIO		0	0	200
8/9/2002	LANGDON	60	0	0	0
8/31/2002	MILTON		0	0	10000
7/2/2003	CALVIN	70	0	0	0
7/2/2003	LANGDON	60	0	0	0
7/2/2003	MILTON	75	0	0	0
7/2/2003	MILTON	100	0	0	20000
7/2/2003	UNION	75	0	0	0
7/19/2003	LANGDON	60	0	0	0

6/7/2004	LANGDON	**110**	0	0	0
6/7/2004	LANGDON	**110**	0	0	0
7/3/2004	VANG	60	0	0	0
6/19/2005	LOMA	100	0	0	0
6/19/2005	NEKOMA	100	0	0	0
6/19/2005	LANGDON	90	0	0	**$2,000,000**
6/19/2005	LANGDON	86	0	0	0
6/19/2005	OSNABROCK	86	0	0	0
6/19/2005	LANGDON	**110**	0	0	0
6/19/2005	LANGDON	86	0	0	0
6/19/2005	LANGDON	86	0	0	0
6/19/2005	VANG	75	0	0	0
7/2/2005	CALVIN	69	0	0	0
7/7/2005	CALIO	60	0	0	0
7/16/2005	CALVIN	70	0	0	0
7/16/2005	HANNAH	63	0	0	0
8/4/2006	HANNAH	63	0	0	0
8/4/2006	HANNAH	63	0	0	0
8/4/2006	MT CARMEL	64	0	0	0
8/4/2006	LANGDON	81	0	0	0
8/4/2006	LANGDON	81	0	0	$15,000
8/12/2006	NEKOMA	60	0	0	0
6/23/2007	MT CARMEL	63	0	0	0
7/25/2007	LOMA	58	0	0	0
5/24/2010	LANGDON	63	0	0	0
7/26/2010	MUNICH	75	0	0	0
7/26/2010	LOMA	75	0	0	0
7/26/2010	NEKOMA	69	0	0	0
7/26/2010	EASBY	81	0	0	0
8/1/2010	MUNICH	69	0	0	0
7/20/2011	MILTON	60	0	0	0
6/7/2012	NEKOMA	58	0	0	0
7/4/2012	SARLES	58	0	0	0
7/4/2012	OLGA	58	0	0	0
7/4/2012	OLGA	75	0	0	0
8/18/2013	DRESDEN	58	0	0	0
7/11/2016	LANGDON ARPT	59	0	0	0
7/11/2016	MT CARMEL	64	0	0	0
7/19/2016	VANG	75	0	0	0
7/19/2016	OLGA	75	0	0	0
8/3/2016	MUNICH	64	0	0	0
8/3/2016	WEAVER	61	0	0	0
8/3/2016	LANGDON	64	0	0	0

8/3/2016	LANGDON	58	0	0	0
6/9/2017	SARLES WESTON ARPT	92	0	0	$100,000
6/9/2017	DRESDEN	60	0	0	0
6/9/2017	LANGDON	66	0	0	0
6/9/2017	MILTON	92	0	0	$500,000
6/9/2017	MILTON	81	0	0	$25,000
Totals:	101 Events		0 Deaths	2 Injuries	$3,003,000

For more detailed information on these wind events, please visit the NCEI at NOAA

List of Lightning events since 2000

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
8/08/2000	Cavalier County	--	0	0	$50,000
5/23/2007	Cavalier County	--	0	0	$5,000
Totals:	2 Events	--	0 Deaths	0 Injuries	$55,000

For more detailed information on these lightning events, please visit the NCEI at NOAA

List of Winter Storm events since 1996

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
11/20/1996	Cavalier County	--	0	0	$0
3/37/1998	Cavalier County	--	0	0	$0
11/18/1998	Cavalier County	--	0	0	$0
4/03/1999	Cavalier County	--	0	0	$0
11/06/2000	Cavalier County	--	0	0	$14,000
12/20/2000	Cavalier County	--	0	0	$0
12/27/2000	Cavalier County	--	0	0	$0
12/05/2001	Cavalier County	--	0	0	$0
4/01/2003	Cavalier County	--	0	0	$0
4/02/2003	Cavalier County	--	0	0	$0
1/02/2004	Cavalier County	--	0	0	$0
1/24/2004	Cavalier County	--	0	0	$0
3/01/2004	Cavalier County	--	0	0	$0
12/11/2004	Cavalier County	--	0	0	$0
12/29/2004	Cavalier County	--	0	0	$0
12/31/2004	Cavalier County	--	0	0	$0
1/01/2005	Cavalier County	--	0	0	$0
1/12/2005	Cavalier County	--	0	0	$0
10/04/2005	Cavalier County	--	0	0	$0
11/14/2005	Cavalier County	--	0	0	$0
10/30/2006	Cavalier County	--	0	0	$0
2/28/2007	Cavalier County	--	0	0	$0
3/01/2007	Cavalier County	--	0	0	$0
11/06/2008	Cavalier County	--	0	0	$0
12/19/2008	Cavalier County	--	0	0	$0

1/22/2010	Cavalier County	--	0	0	$0
12/29/2010	Cavalier County	--	0	0	$0
2/25/2012	Cavalier County	--	0	0	$0
11/10/2012	Cavalier County	--	0	0	$0
3/17/2013	Cavalier County	--	0	0	$0
4/14/2013	Cavalier County	--	0	0	$0
12/03/2013	Cavalier County	--	0	0	$0
12/16/2015	Cavalier County	--	0	0	$0
12/22/2015	Cavalier County	--	0	0	$0
12/05/2016	Cavalier County	--	0	0	$0
1/02/2017	Cavalier County	--	0	0	$0
Totals:	36 Events	--	0 Deaths	0 Injuries	$14,000

For more detailed information on these winter storm events, please visit the NCEI at NOAA

List of Heavy Snow events since 1996

Date	Location	Snowfall	Deaths	Injuries	Prop. Damage
11/06/1996	Cavalier County	13”	0	0	$0
3/26/2003	Cavalier County	6-8”	0	0	$0
4/16/2003	Cavalier County	6-8”	0	0	$0
3/01/2006	Cavalier County	8-12”	0	0	$0
12/30/2006	Cavalier County	10-12”	0	0	$0
3/15/2007	Cavalier County	6-8”	0	0	$0
12/04/2007	Cavalier County	15-20”	0	0	$0
12/23/2009	Cavalier County	12-18”	0	0	$0
11/24/2010	Cavalier County	6-7”	0	0	$0
12/15/2010	Cavalier County	12-14”	0	0	$0
12/20/2010	Cavalier County	6-8”	0	0	$0
3/03/2013	Cavalier County	8-18”	0	0	$0
1/02/2015	Cavalier County	6-10”	0	0	$0
Totals:	13 Events	--	0 Deaths	0 Injuries	$0

For more detailed information on these heavy snow events, please visit the NCEI at NOAA

List of Blizzard events since 1996

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
1/17/1996	Cavalier County	--	0	0	$0
1/17/1996	Cavalier County	--	0	0	$0
2/10/1996	Cavalier County	--	0	0	$0
2/10/1996	Cavalier County	--	0	0	$0
2/26/1996	Cavalier County	--	0	0	$0
2/27/1996	Cavalier County	--	0	0	$0
3/23/1996	Cavalier County	--	0	0	$0
3/23/1996	Cavalier County	--	0	0	$0
11/16/1996	Cavalier County	--	0	0	$0
12/17/1996	Cavalier County	--	0	0	$0
12/20/1996	Cavalier County	--	0	0	$0

1/09/1997	Cavalier County	--	0	0	$0
1/15/1997	Cavalier County	--	0	0	$0
1/21/1997	Cavalier County	--	0	0	$0
3/04/1997	Cavalier County	--	0	0	$0
4/05/1997	Cavalier County	--	0	0	$6,000,000
3/13/1998	Cavalier County	--	0	0	$0
11/10/1998	Cavalier County	--	0	0	$0
12/18/1998	Cavalier County	--	0	0	$0
4/01/1999	Cavalier County	--	0	0	$0
12/19/1999	Cavalier County	--	0	0	$0
12/16/2000	Cavalier County	--	0	0	$0
12/20/2000	Cavalier County	--	0	0	$0
10/24/2001	Cavalier County	--	0	0	$0
12/22/2001	Cavalier County	--	0	0	$0
2/11/2003	Cavalier County	--	0	0	$0
1/21/2005	Cavalier County	--	0	0	$0
10/05/2005	Cavalier County	--	0	0	$0
11/15/2005	Cavalier County	--	0	0	$0
1/24/2006	Cavalier County	--	0	0	$0
2/08/2008	Cavalier County	--	0	0	$0
12/13/2008	Cavalier County	--	0	0	$0
12/24/2009	Cavalier County	--	0	0	$0
1/25/2010	Cavalier County	--	0	0	$0
10/26/2010	Cavalier County	--	0	0	$0
3/11/2011	Cavalier County	--	0	0	$0
1/11/2013	Cavalier County	--	0	0	$0
1/19/2013	Cavalier County	--	0	0	$0
2/17/2013	Cavalier County	--	0	0	$0
3/17/2013	Cavalier County	--	0	0	$0
12/28/2013	Cavalier County	--	0	0	$0
1/03/2014	Cavalier County	--	0	0	$0
1/16/2014	Cavalier County	--	0	0	$0
1/22/2014	Cavalier County	--	0	0	$0
1/26/2014	Cavalier County	--	0	0	$0
3/31/2014	Cavalier County	--	0	0	$0
1/08/2015	Cavalier County	--	0	0	$0
2/07/2016	Cavalier County	--	0	0	$0
12/06/2016	Cavalier County	--	0	0	$0
12/07/2016	Cavalier County	--	0	0	$0
12/25/2016	Cavalier County	--	0	0	$0
1/12/2017	Cavalier County	--	0	0	$0
Totals:	52 Events	--	0 Deaths	0 Injuries	$6,000,000

For more detailed information on these blizzard events, please visit the NCEI at NOAA

List of Extreme Cold/Wind Chill events since 2007

Date	Location	Wind Chill	Deaths	Injuries	Prop. Damage
1/12/2007	Cavalier County	-40 to -50	0	0	$0
2/03/2007	Cavalier County	-40 to -55	0	0	$0
1/17/2008	Cavalier County	-40 to -50	0	0	$0
1/29/2008	Cavalier County	-40 to -50	0	0	$0
2/09/2008	Cavalier County	-40 to -50	0	0	$0
2/19/2008	Cavalier County	-40 to -50	0	0	$0
12/15/2008	Cavalier County	-40 to -50	0	0	$0
12/20/2008	Cavalier County	-40 to -50	0	0	$0
1/04/2009	Cavalier County	--	0	0	$0
3/11/2009	Cavalier County	-40	0	0	$0
12/13/2009	Cavalier County	-40 to -45	0	0	$0
12/14/2009	Cavalier County	-40 to -50	0	0	$0
1/07/2010	Cavalier County	-40 to -45	0	0	$0
2/01/2011	Cavalier County	-40 to -45	0	0	$0
2/08/2011	Cavalier County	-40 to -50	0	0	$0
1/18/2012	Cavalier County	-35 to -45	0	0	$0
1/19/2012	Cavalier County	-30 to -35	0	0	$0
2/10/2012	Cavalier County	-30 to -40	0	0	$0
2/11/2012	Cavalier County	-30 to -35	0	0	$0
1/20/2013	Cavalier County	-40 to -50	0	0	$0
1/31/2013	Cavalier County	-40 to -45	0	0	$0
2/01/2013	Cavalier County	-40	0	0	$0
12/06/2013	Cavalier County	-40 to -55	0	0	$0
12/28/2013	Cavalier County	-40 to -55	0	0	$0
1/04/2014	Cavalier County	-40 to -60	0	0	$0
1/22/2014	Cavalier County	-40 to -50	0	0	$0
1/26/2014	Cavalier County	-40 to -50	0	0	$0
2/28/2014	Cavalier County	-40 to -55	0	0	$0
3/01/2014	Cavalier County	-40 to -55	0	0	$0
1/03/2015	Cavalier County	-40 to -50	0	0	$0
1/06/2015	Cavalier County	-45	0	0	$0
2/21/2015	Cavalier County	-40 to -50	0	0	$0
1/16/2016	Cavalier County	-40 to -50	0	0	$0
12/16/2016	Cavalier County	-40 to -50	0	0	$0
01/12/2017	Cavalier County	-40 to -45	0	0	$0
Totals:	35 Events	--	0 Deaths	0 Injuries	$0

For more detailed information on these wind chill events, please visit the NCEI at NOAA

List of Ice Storm events since 1996

Date	Location	Ice	Deaths	Injuries	Prop. Damage
2/22/1996	Cavalier County	--	0	0	$0
2/22/1996	Cavalier County	--	0	0	$0
1/30/1997	Cavalier County	0.05”	0	0	$0
4/04/1997	Cavalier County	0.5 to 2”	0	0	$6,000,000
5/11/2004	Cavalier County	0.5 to 1”	0	0	$400,000

2/08/2009	Cavalier County	0.1 to 0.4”	0	0	$0
Totals:	6 Events	--	0 Deaths	0 Injuries	$6,400,000

For more detailed information on these flash flood events, please visit the NCEI at NOAA

List of Tornado events since 1950

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
6/06/1959	North Loma Twp	F2	0	0	$0
7/22/1961	Calvin	--	0	0	$0
6/24/1966	Hay Twp	F1	**1**	**1**	$25,000
6/10/1970	Clyde *(unincorp)*	F1	0	0	$2,500
8/21/1970	Waterloo Twp	F1	0	0	$250
6/21/1971	Munich	F2	0	0	$25,000
8/20/1972	Mount Carmel Twp	F0	0	0	$250
6/15/1973	Perry Twp	F1	0	0	$0
5/18/1977	Hannah	F0	0	0	$0
5/19/1977	Hannah	F0	0	0	$0
7/24/1978	Osnabrock Twp	F1	0	0	$250,000
6/24/1985	Manilla Twp	F2	0	0	$250,000
6/24/1985	Fremont Twp	F1	0	0	$250,000
6/24/1985	Hope Twp	F0	0	0	$0
5/28/1988	Montrose Twp	F0	0	0	$0
7/05/1988	Loam Twp	F0	0	0	$0
7/05/1988	Grey Twp	F0	0	0	$0
6/13/1991	Nekoma	F1	0	0	$250,000
6/20/1995	Langdon	F0	0	0	$0
8/13/2000	Milton	F0	0	0	$50,000
6/06/2003	Wales	F0	0	0	$0
7/14/2003	Langdon	F0	0	0	$0
7/14/2003	Langdon	F0	0	0	$0
7/03/2004	Vang	F1	0	0	$20,000
6/23/2005	Vang	F0	0	0	$0
6/23/2005	Loma	F0	0	0	$0
7/10/2005	Hannah	F1	0	0	$0
8/26/2007	Union	EF0	0	0	$0
7/07/2008	Calio	EF1	0	0	$100,000
7/26/2010	Alsen	EF0	0	0	$0
8/01/2010	Munich	EF1	0	0	$0
6/26/2015	Osnabrock	EF0	0	0	$0
6/27/2015	Milton	EF1	0	0	$0
6/17/2015	Union	EF1	0	0	$0
6/09/2017	Wales	EF0	0	0	$0
6/09/2017	Langdon	EF1	0	0	$100,000
6/09/2017	Easby	**EF2**	0	0	**$1,500,000**
Totals:	37 Events	Avr. (EF1)	1 Death	1 Injury	$2,823,000

For more detailed information on these tornado events, please visit the NCEI at NOAA

List of Wildfire events since 2000

Date	Location	Magnitude	Deaths	Injuries	Prop. Damage
10/24/2011	Cavalier County	--	0	0	$0
Totals:	1 Event	--	0 Deaths	0 Injuries	$0

For more detailed information on these wildfire events, please visit the NCEI at NOAA