

Trail County Mitigation Plan

December 2016

Table of Contents

Section 1: Introduction.....	13
1.1 Plan Goals and Authority.....	14
1.2 Hazard Mitigation Grant Program (HMGP).....	14
1.3 Pre-Disaster Mitigation (PDM).....	15
1.4 Flood Mitigation Assistance (FMA).....	15
1.5 Participation.....	15
 Section 2: Mitigation Plan Update	17
2.1 Planning Process	17
2.1.1 Plan Administrators.....	19
2.1.2 Emergency Manager Role and Responsibilities.....	19
2.1.3 The Mitigation Steering Committee (Note: The Local Emergency Planning Committee served as the Traill County Mitigation Plan Update Steering Committee)	19
2.1.4 Hazard Mitigation Planning Team	20
2.1.5 Participating Jurisdictions.....	21
2.1.6 Planning team/Steering Committee/Jurisdictional Meetings and Participation	22
2.1.7 Additional Key stakeholder and other participant Meetings and Participation	24
2.1.8 Partners and Stakeholders	26
2.1.9 Review and Incorporation of Existing Plans and Studies	27
2.1.10 Participation and Data Request	29
2.1.11 Summary of the Planning Process.....	29
2.2 Changes Made During this Plan Update	30
 Section 3: Community Profile	32
3.1 General Overview.....	33
3.1.1 Historical Setting	34
3.2 Climate and Precipitation	34
3.2.1 Climate and Precipitation	35
3.2.2 Geology	36
3.2.3 Geography	37
3.2.4 Hydrology.....	38
3.2.5 Surface Water	38
3.2.6 Groundwater	39
3.2.7 Lakes	41
3.2.8 Rivers.....	41
3.2.9 Watersheds.....	42
3.2.10 Wetlands.....	43
3.2.11 Soil.....	44
3.2.12 Topography.....	45

3.2.13 Land Use	46
3.3 Population and Demographics	48
3.3.1 Historic Population	48
3.3.2 Population Trends	48
3.3.3 Comparable Growth	49
3.3.4 Households	49
3.3.5 Population and Household Projections	50
3.3.6 Population by Age Groups	50
3.3.7 Special Populations	51
3.4 Cultural Conditions	53
3.4.1 Historical	53
3.4.2 Race and Ethnicity	54
3.4.3 Level of Education	54
3.4.4 Socioeconomic Conditions: Income	55
3.4.5 Employment Status	55
3.4.6 Occupation	55
3.4.7 Faith Based Community	56
3.4.8 Economic Conditions	57
3.4.9 Agriculture	57
3.4.10 Future Development	59
3.4.11 Crime	59
3.5 Critical Infrastructure	60
3.5.1 Airports	60
3.5.2 Railroads	60
3.5.3 Pipelines	63
3.5.4 Solid Waste Facilities	65
3.5.5 Transit	65
3.5.6 Transportation	65
3.5.7 Highways	65
3.5.8 Water Control Structures	67
3.5.9 Water Pollution Control Revolving Fund	67
3.5.10 Public Water Accesses	68
3.5.11 Emergency Services	68
3.5.12 Healthcare	69
3.5.13 Emergency Resources	69
3.5.14 Energy Sector	69
3.5.15 Schools	70
3.5.16 College Students	71
Section 4: Risk Assessment	72
4.1 Hazard Profile	72

4.1.1 Risk Assessment Process	73
4.1.2 Probability of Future Occurrences.....	74
4.1.3 Hazard Impact.....	76
4.1.4 Impact Magnitudes.....	77
4.2 Risk	78
4.3 Risk Findings.....	79
4.4 Flood	80
4.4.1 Flood Risk.....	81
4.4.2 Flood History in Traill County	81
4.4.3 Major Declared Disasters for Flood.....	82
4.4.4 Mitigation Actions in the Past Five Years	84
4.4.5 Vulnerability	87
4.4.6 Flood and Climate Change	93
4.4.7 Relationship to other Hazards.....	93
4.5 Severe Winter Weather	94
4.5.1 Severe Winter Weather Risk.....	96
4.5.2 Severe Winter Weather History in Traill County	96
4.5.3 Major Declared Disasters for Severe Winter Weather	96
4.5.4 Mitigation Actions in the Past Five Years	97
4.5.5 Vulnerability	101
4.5.6 Winter Storms and Climate Change.....	104
4.5.7 Relationship to other Hazards.....	104
4.6 Urban Fire/Structural Collapse	105
4.6.1 Urban Fire/Structural Collapse Risk.....	105
4.6.2 Fire History in Traill County.....	106
4.6.4 Declared Disasters for Urban Fire/Structural Collapse.....	106
4.6.5 Mitigation Actions in the Past Five Years	106
4.6.6 Vulnerability	109
4.6.7 Urban Fire/Structural Collapse and Climate Change	110
4.6.8 Relationship to other Hazards.....	110
4.7 Communicable Disease	111
4.7.2 Communicable Disease Risk	111
4.7.3 Communicable Disease History in Traill County	112
4.7.4 Presidential Declared Disasters for Communicable Disease	115
4.7.5 Mitigation Actions in the Past Five Years	115
4.7.6 Vulnerability	121
4.7.7 Infectious Disease and Climate Change	121
4.7.8 Relationship to other Hazards.....	122
4.8 Hazardous Material	123
4.8.1 Hazardous Materials Risk	123
4.8.2 Hazardous Material History in Traill County	124

4.8.3 Declared Disasters for Hazardous Material.....	124
4.8.4 Mitigation Actions in the Past Five Years	124
4.8.5 Vulnerability	128
4.8.6 Hazardous Material Release and Climate Change	128
4.8.7 Relationship to other Hazards.....	128
4.9 Severe Summer Weather	129
4.9.1 Severe Summer Weather Risk.....	130
4.9.2 Severe Summer Weather in Traill County.....	131
4.9.3 Major Declared Disasters for Severe Summer Weather	133
4.9.4 Mitigation Actions in the Past Five Years	135
4.9.5 Vulnerability	140
4.9.6 Summer Storms and Climate Change	142
4.9.7 Relationship to other Hazards.....	142
4.10 Subsidence.....	143
4.10.1 Subsidence Risk	143
4.10.2 Subsidence History in Traill County	144
4.10.3 Presidential Declared Disasters for Subsidence	144
4.10.4 Mitigation Actions in the Past Five Years.....	144
4.10.5 Vulnerability	144
4.10.6 Subsidence and Climate Change.....	144
4.10.7 Relationship to Other Hazards	144
4.11 Tornado	145
4.11.1 Tornado Risk.....	146
4.11.2 Tornado History in Traill County.....	146
4.11.3 Major Declared Disasters for Tornado	147
4.11.4 Mitigation Actions for the Past Five Years.....	148
4.11.5 Vulnerability	148
4.11.6 Tornado and Climate Change	150
4.11.7 Relationship to Other Hazards	150
4.12 Wildfires	152
4.12.1 Wildfire Risk.....	152
4.12.3 History of Wildfires/Wildland Fires in Traill County.....	153
4.12.4 Declared Disasters for Wildland Fire.....	153
4.12.5 Mitigation Actions in the Past Five Years	153
4.12.6 Vulnerability	156
4.12.7 Wildfire and Climate Change	158
4.12.8 Relationship to other Hazards.....	159
4.13 Transportation Accidents.....	160
4.13.1 Transportation Accidents History in Traill County	161
4.13.2 Transportation Incident Risk for Traill County	162
4.13.3 Mitigation Actions for Transportation Accidents in Traill County in the Past Five Years:.....	162

4.13.4 Vulnerability to Residents in Traill County	164
4.13.5 Transportation Accidents and Climate Change in Traill County	165
4.13.6 Relationship to Other Hazards in Traill County	165
4.14 Dam / Levee Failure	166
4.14.1 Dam Failure Risk in Traill County.....	166
4.14.2 Dam Failure History in Traill County:	167
4.14.3 Mitigation Actions for Dam Failure in Past Five Years in Traill County:.....	169
4.14.4 Vulnerability of Jurisdictions within Traill County.....	169
4.14.5 Dam Failure and Climate Change in Traill County	170
4.14.6 Relationship to Other Hazards in Traill County	171
4.15 Risk Assessment Summary.....	172
Section 5: Capability Assessment.....	179
5.1 What Is A Capability Assessment?.....	179
5.1.1 Conducting the Capability Assessment.....	179
5.1.2 Hazard Mitigation Plans, Policies, Programs and Ordinances	179
5.1.3 Recommendations	180
5.2 Fiscal, Technical, Administrative and Political Capabilities.....	181
5.2.1 Technical Capability	181
5.2.2 Recommendations	182
5.2.3 Fiscal Capability.....	182
5.2.4 Recommendations	182
5.3 Administrative Capability	183
5.3.1 Recommendations	183
5.4 Political Capability	183
5.4.1 Recommendations	183
5.5 Conclusions on Local Capability.....	184
5.6 Linking the Capability Assessment, the Risk Assessment, and the Mitigation Strategy	184
Section 6: Mitigation Goals, Objectives, & Strategies	186
6.1 Mitigation Goals, Objectives, & Development.....	187
6.2 Strategies/Projects	187
6.2.1 Mitigation Goals	188
6.3 Hazard/Project Relationship	189
6.4 Project Prioritization	191
The following table provided an overview of all of the projects and priority scorecard. As previous noted, the scorecard allows one to determine the feasibility of a project and other wise prioritize projects.	
6.5 Implementation Process.....	197
6.5.1 Mitigating Projects.....	197

Section 7: Monitor and Maintenance..... 204

7.1 Development and Acceptance..... 204

7.2 Process 205

7.3 Evaluation 205

7.4 Evaluation Criteria 206

7.5 Update..... 206

7.6 Incorporation into Existing Planning Mechanisms 207

7.7 Continued Public Involvement 207

7.8 The Hazard Mitigation Steering Committee 208

7.9 Participating Jurisdictions 208

Appendix A: Inventory of Hazard Mitigation Programs, Policies, and Funding 209

Appendix B: Historical Storm Event Data..... 217

List of Tables and Figures

Figure 1: Planning Process.....	18
Table 1: Hazard Mitigation Steering Committee Members and Local Officials.....	20
Table 2: Hazard Mitigation Planning Team Table	21
Table 3: Participating Jurisdictions.....	21
Table 4: Meeting/Phase Kickoff Table	22
Table 5: Date and Purpose of Meetings.....	25
Table 6: Organizations.....	26
Table 7: Existing Plans and Studies Utilized in the Update.....	27
Table 8: Participation Table (Data request)	29
Table 9: Towns in Traill County and Population.....	33
Figure 2: Map of Traill County.....	33
Table 10: Average Temperature and Precipitation by Month	35
Figure 3: Average Annual Precipitation.....	36
Figure 4: Lake Agassiz Region 5	38
Figure 5: Traill County Aquifers	40
Table 11: Summary of estimated potential drainable soils overlying aquifers.....	41
Figure 6: North Dakota Lake, Rivers and Water Resources	42
Figure 7: Watersheds in North Dakota.....	43
Figure 8: Wetland Mitigation Bank for North Dakota	44
Figure 9: Traill County Topography.....	46
Table 12: Traill County Land Use	47
Table 13: Population of Traill County since 1880 (U.S. Census).....	48
Table 14: Population 1980-2010, Region 5 ND, by County	49
Table 15: Comparable Growth in Neighboring Counties	49
Table 16: Households, and Average Household Size of Traill County (U.S. Census)	49
Table 17: Population Projections for Traill and Surrounding Counties	50
Table 18: Traill County's Population by Age Groups in 2010 (U.S. Census).....	51
Table 19: Children	52
Table 20: Elderly	52
Table 21: Females	52
Table 22: Population with a Disability	52
Table 23: Institutionalized Population	53
Table 24: Traill County Poverty.....	53
Table 25: Population of Traill County by Race and Ethnicity	54
Table 26: Language Spoken at Home in Traill County.....	54
Table 27: Level of Education for Traill County	54
Table 28: Income and Benefits per Household in 2012 Traill County	55
Table 29: Employment Status in Traill County Estimates from 2008-2012	55
Table 30: Occupations in Traill County (estimates from 2008-2012)	56

Table 31: Location of Churches in Traill County	56
Table 32: Religious Bodies	57
Table 33: Most Common Industries in Traill County	57
Figure 10: Traill County Crop Trends.....	58
Table 34: Traill County Farm Profile	58
Table 35: Crimes Known in 2005 in Traill County	59
Table 36: Traill County Airports	60
Figure 11: Railroads in North Dakota.....	61
Figure 12: Railroads in Traill County.....	62
Table 37: FRA Railroad Track Classification	62
Figure 13: Crude Oil Pipelines in North Dakota	64
Figure 14: Natural Gas Pipelines in North Dakota	64
Table 38: Principal and Major Arterials Serving Region 5, ND.....	66
Figure 15: North Dakota Highway System	67
Table 39: Traill County Dams.....	67
Table 40: Fire Departments in Traill County	68
Table 41: Heating Fuel for Households in Traill County.....	70
Table 42: Schools in Traill County	71
Table 43: Hazards Identified	73
Figure 16: Risk Assessment Process	74
Table 44: Frequency/Probability	75
Table 45: Regional Classification.....	75
Table 46: Impact Assumptions.....	76
Table 47: Impact Magnitude Ratings Descriptors	77
Table 48: Impact Descriptors	78
Table 49: Risk Scoring Key.....	78
Table 50: Flood Hazard Risk Assessment	81
Table 51: Historical Flood Events in Traill County.....	82
Table 52: Declared Disasters for Flood in Traill County.....	82
Table 53: Mitigation Actions in the Past Five Years.....	84
Table 54: Building Exposure by Occupancy Type for the Study Region	88
Table 55: Expected Damage to Essential Facilities	88
Figure 17: Traill County Flood Analysis	89
Figure 18: Per Capita Average Annualized Loss by County in North Dakota	90
Table 56: Vulnerability Analysis for Flooding	92
Figure 19: National Weather Service Windchill Chart	95
Table 57: NWS Warning Terminology Table.....	95
Table 58: Severe Winter Weather Risk by City in Traill County	96
Table 59: Major Declared Disasters for Severe Winter Weather for Traill County	97
Table 60: Mitigation Actions in the Past Five Years.....	97
Table 61: Rankings for Overall Severe Winter Storm Vulnerability	102

Table 62: Severe Winter Weather Vulnerability Analysis for Traill County	102
Table 63: Vulnerability Analysis by Jurisdiction for Severe Winter Weather	103
Table 64: Urban Fire/Structural Collapse Hazard Risk Assessment	105
Table 65: Structural Fire Data for Traill County from 2007 to 2013	106
Table 66: Mitigation Actions in the Past Five Years	106
Table 67: Urban Fire or Structural Collapse Hazard Rating	109
Table 68: Communicable Disease Risk by City in Traill County	112
Table 69: Communicable Disease History in Traill County	112
Table 70: Mitigation Actions in the Past Five Years	115
Table 71: Hazardous Materials Risk by City for Traill County	124
Table 72: Mitigation Actions in the Past Five Years	125
Table 73: National Weather Service Warning Terminology	129
Table 74: Severe Summer Weather Risk by City in Traill County	130
Table 75: Severe Summer Weather in Traill County from 2009 to July 2015	131
Table 76: Major Declared Disasters for Severe Summer Weather for Traill County	133
Table 77: Mitigation Actions in the Past Five Years	135
Table 78: Rankings for Overall Severe Summer Weather Vulnerability	140
Table 79: Vulnerability Analysis by Jurisdiction for Severe Summer Weather	140
Table 80: Subsidence Hazard Risk Assessment	143
Figure 20: Tornado Events per County in ND from 1950-2013	145
Table 81: Tornado Risk by City in Traill County	146
Table 82: Tornado Events in Traill County from 2009-2015	147
Figure 21: Tornado Track for Traill County	147
Table 83: Major Declared Disasters for Tornadoes for Traill County	148
Table 84: Vulnerability Analysis by Jurisdiction for Tornado	149
Table 85: Wildfire Hazard Risk Assessment	153
Table 86: Mitigation Actions in the Past Five Years	154
Figure 22: Wildfire Risk by County in North Dakota	157
Table 87: Vulnerability Analysis for Wildland Fire	158
Table 88: Transportation Incident Hazard Risk Assessment	162
Table 89: Mitigation Actions for Transportation Accidents	162
Table 90: Dam Failure Hazard Risk Assessment	167
Table 91: Traill County Dams	167
Figure 23: Traill County Map of Dams with Largest Max Pool Volume	168
Table 92: Mitigation Actions for Dam Failure	169
Table 93: Vulnerability Analysis for Dam Failure	170
Table 94: Traill County Hazard Prioritization	173
Table 95: City of Buxton Hazard Prioritization	173
Table 96: City of Clifford Hazard Prioritization	174
Table 97: City of Galesburg Hazard Prioritization	174
Table 98: City of Grandin Hazard Prioritization	175

Table 99: City Hatton Hazard Prioritization	175
Table 100: City of Hillsboro Hazard Prioritization	176
Table 101: City of Mayville Hazard Prioritization	176
Table 102: City of Portland Hazard Prioritization	177
Table 103: City of Reynolds Hazard Prioritization	177
Table 104: Unincorporated Hazard Prioritization for Traill County	178
Table 105: Plans Policies Programs and Ordinances in Place	180
Table 106: Assessment of Local Capability	181
Table 107: Hazards Mitigated by Each Proposed Project	189
Table 108: Prioritization Criteria	192
Table 109: Project Score Card	193
Table 110: Mitigation Projects	197
Table 111: Programs/Policies/Plans	201
Table 112: Jurisdictional Process for Mitigation Incorporation	202
Table 113: Mitigation Strategies	203
Table 114: Traill County Hazard Mitigation Plan Update Schedule	206
Table B.1 Historical Flood Events for Traill County	217
Table B.2 Historical Severe Summer Weather for Traill County (Hail, Thunderstorm Wind, Lightning, Extreme Heat, Tornado)	218
B.3 Historical Severe Winter Weather for Traill County (Blizzards, Heavy Snow, Ice Storms, Extreme Cold)	227
B.4 Historical Wild Land Fire for Traill County	234

Section 1: Introduction

Every day, unforeseen circumstances threaten Traill County. Natural, technological, and human-made hazards can cause loss of life, property, and jobs.

Hazard mitigation in Traill County has become an increased priority due to an emphasis placed on preventing disasters and reducing damage prior to an actual event occurring. The stimulus of this planning effort is the Disaster Mitigation Act of 2000 (DMA 2000). The Disaster Mitigation Act of 2000 requires that units of local government (cities, townships, and counties) have an approved mitigation plan in order to receive mitigation grant funding from disasters occurring after November 1, 2004. The purposes of the Disaster Mitigation Act were fourfold:

1. Revise sections of the Robert T. Stafford Disaster Relief and Emergency Assistance Act;
2. Govern costs of federal disaster assistance;
3. Organize a national program for pre-disaster mitigation; and,
4. Streamline dispensation of disaster relief.

Hazard mitigation planning is a collaborative process during which jurisdictions develop a plan that outlines how they will protect themselves from hazards. FEMA requires that this planning process occurs in all counties across the nation. A county or local government that does not comply with these requirements will not be eligible for certain aspects of federal mitigation funding.

Mitigation actions implemented today will reduce the disaster recovery dollars needed for tomorrow. Hazard mitigation breaks the recurring damage/loss cycle. Mitigation is currently accomplished in several ways: construction, prevention, planning, and education. It is through these mitigation methods that a balance between the constructed and natural environments is achieved.

The overall goal of the Traill County Hazard Mitigation Plan is to get people, property, jobs, and natural resources out of harm's way. The plan is organized in five related, but distinct areas that will provide Traill County and participating jurisdictions the most flexibility to achieve the overall goal. The sections include:

1. **County Profile** – This chapter contains information on the County's history, demographics, physical features, infrastructure, and emergency response
2. **Hazards Profile** – This chapter identifies and profiles the various hazards addressed in the plan
3. **Risk Assessment** – This chapter provides a risk assessment for each local governmental unit covered in the plan
4. **Goals, Objectives, and Mitigation Strategies** – This chapter identifies the specific mitigation steps the participating jurisdictions have committed to

HAZARD MITIGATION

“Hazard mitigation refers to any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazardous conditions. Making the best long-term decisions requires analytical steps that are best summarized as planning” (FEMA, 2002).

5. Plan Administration – This chapter outlines how the plan will be administered

The plan provides guidelines for dealing with present and future hazards. More specific steps are outlined in the county emergency response plans, watershed plans, county water management plans, and zoning ordinances. The written plan does not replace existing operational mitigation plans currently in use, but supplements them, helping to reinforce and/or improve present and future mitigation. The finished plan depicts a unified and continuous effort and commitment by many dedicated people in Traill County, all participating jurisdictions, as well as North Dakota Department of Emergency Services, and FEMA.

1.1 Plan Goals and Authority

The goals of the Traill County Hazard Mitigation Plan are to:

- Increase community understanding of emergency management and build support for hazard mitigation;
- Develop, promote, integrate and track mitigation strategies;
- Continue to improve and enhance the County's emergency management program;
- Increase the economic stability, core values, and quality of services of the County; and,
- Increase mitigation resources to eliminate or minimize harm done to people, property, jobs, and natural resources in Traill County by natural and manmade hazards.

The Traill County Hazard Mitigation Plan has been developed in accordance with requirements set forth in the Disaster Mitigation Act of 2000. The Disaster Mitigation Act of 2000 establishes the framework for pre-disaster hazard mitigation planning and provides the legal basis for state, local, and tribal mitigation planning requirements. The newly introduced Section 322 highlights the importance of coordinating hazard mitigation efforts among state, tribal, and local jurisdictions. Under 44 CFR §201.6 local governments must have a FEMA approved hazard mitigation plan in order to apply for and/or receive mitigation funding through existing hazard mitigation assistance programs. Three of the federal mitigation programs that provide funding to implement projects are detailed below.

1.2 Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters.

The program enables mitigation measures to be implemented during the immediate recovery from a disaster. These mitigation measures include:

- Acquisition of real property from willing sellers and demolition or relocation of buildings to convert the property to open space use
- Retrofitting structures and facilities to minimize damages from high winds, flood, or other natural hazards
- Safe room construction
- Elevation of flood prone structures

- Development and initial implementation of vegetative management or invasive species programs
- Minor flood reduction projects that do not duplicate the flood prevention activities of other Federal agencies
- Localized flood control projects, such as certain ring levees and floodwall systems, designed specifically to protect critical facilities
- Post-disaster evaluations of potential building codes modifications
- Hazard mitigation planning

1.3 Pre-Disaster Mitigation (PDM)

The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. These activities include:

- Voluntary acquisition of real property in flood plains and or property repeatedly damaged by flooding
- Elevation of existing public or private structures
- Construction of safe rooms for public or private structures that meet FEMA requirements
- Hydrologic and hydraulic studies/analyses
- Engineering and drainage studies for project design and feasibility
- Protective measures for utilities, water, sewer, roads and bridges, and storm water management to reduce/eliminate long-term flood risk

1.4 Flood Mitigation Assistance (FMA)

The Flood Mitigation Assistance (FMA) program implements cost-effective measures to reduce or eliminate the long-term risk of flood damage to National Flood Insurance Program (NFIP) structures. State-level agencies, tribes, and local governments are eligible sub-applicants through Homeland Security and Emergency Management (HSEM). Eligible projects include:

- Acquisition, structure demolition, or structure relocation with the property deed restricted for open space uses in perpetuity
- Elevation of structures
- Dry flood proofing of non-residential structures
- Minor structural flood controls activities
- Repetitive flood claims
- Severe Repetitive Loss

1.5 Participation

Effective mitigation planning does not occur in a vacuum. It requires the entire community to be involved in the mitigation planning process. Thus, the planning process and its ability to identify, engage, and include the entire community is just as important as the plan itself. Throughout the mitigation planning process, Traill County invited all of the jurisdictions to attend mitigation planning meetings, participate in workshops,

and provide input and feedback in the development of the mitigation plan. The following jurisdictions were represented in updating the Traill County All-Hazard Mitigation Plan Update:

- Buxton
- Clifford
- Galesburg
- Grandin
- Hatton
- Hillsboro
- Mayville
- Portland
- Reynolds
- Traill County

In addition to the jurisdictions, efforts were made to invite the public to participate in the planning process.

Section 2: Mitigation Plan Update

Effective planning efforts result in high quality and useful plans; however, written plans are only one element in the process. The planning process is as important as the plan itself. A successful planning process forges partnerships and brings together a cross-section of government agencies, the public, and other stakeholders to reach consensus on how to achieve the desired outcome and resolve a community issue.

Applying an inclusive and transparent process adds validity to the plan. The result is a common set of community values and widespread support for directing financial, technical, and human resources to an agreed upon action. The planning process was an integral part of the Traill County's Hazard Mitigation Plan. This section describes Traill County's planning process and how the hazard mitigation plan evolved.

FEMA Requirements Addressed in this Section:

Requirement

§201.6(b) an open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

§201.6(b) (1) (1) an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

§201.6(b)(2) (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

§201.6(b) (3) (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

§201.6(c) (1) The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

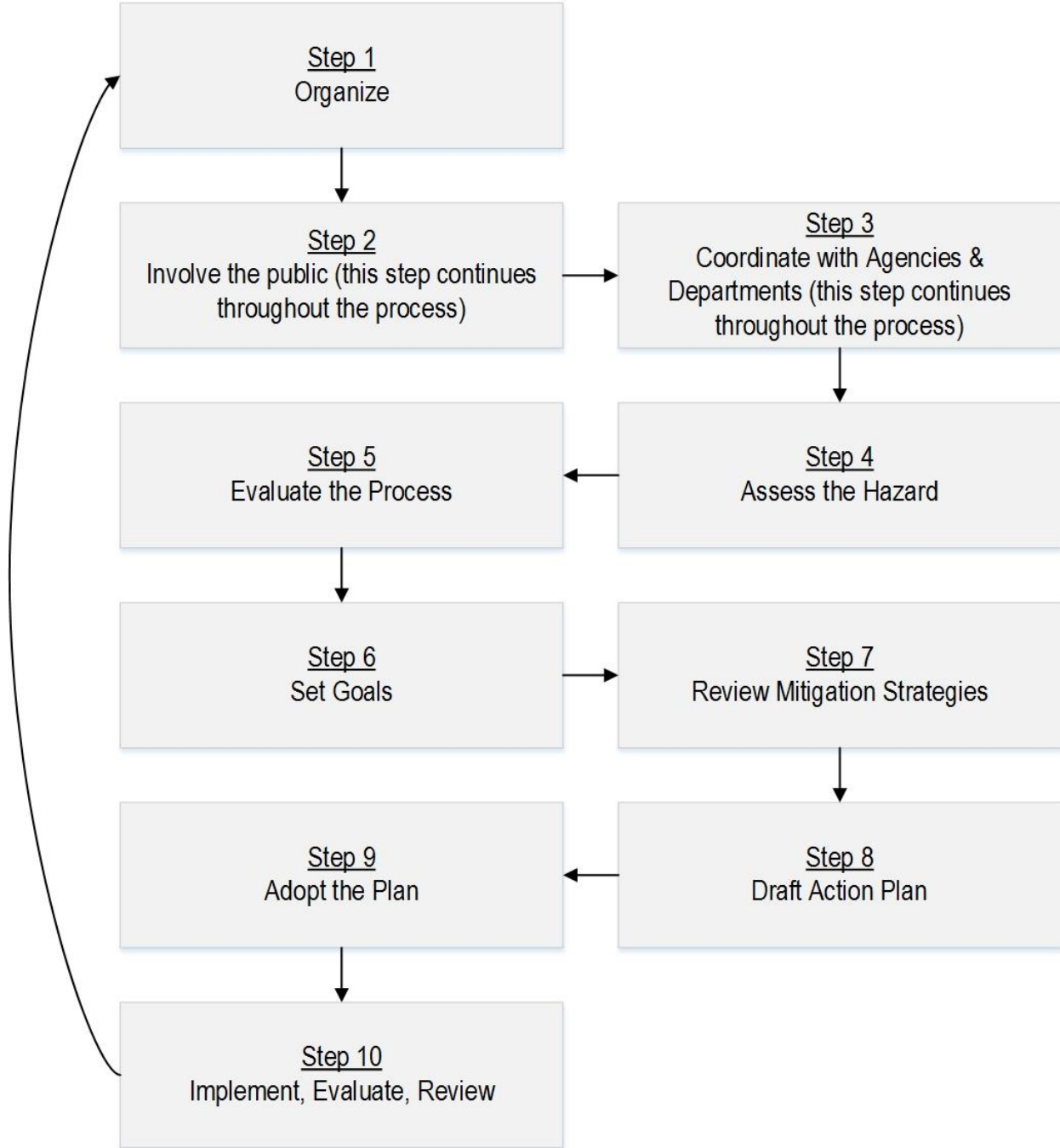
§201.6(c) (4) (i) The plan maintenance process shall include a section describing the method and schedule for monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

§201.6(c) (4) (iii) The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

2.1 Planning Process

To help guide the mitigation update, the Traill County Steering Committee, and by extension the Hazard Mitigation Planning Team, followed the 10-step process listed below. The planning process is based on the FEMA guidance for mitigation planning. The following graph is a visual representation of the planning process used throughout the plan update cycle.

Figure 1: Planning Process



In addition to the listed process, it is important to note that several key stakeholders reviewed the hazards and their effects on people and property, identified ways to reduce and prevent damage, and recommended the most appropriate and feasible measures for implementation. The Hazard Mitigation Planning Team organized the current plan and updated procedures, reviewed existing plans and programs, and coordinated with stakeholders and the public. The Hazard Mitigation Steering Committee coordinated with key agencies and other organizations to provide insight and discussion throughout the planning process.

2.1.1 Plan Administrators

Because mitigation planning is an all-inclusive process, it was crucial to involve the Traill County Emergency Manager, Hazard Mitigation Steering Committee, Hazard Mitigation Planning Team, and participating jurisdictions. To accommodate this requirement, these key groups were assigned various duties and responsibilities. These responsibilities were created to ensure the mitigation plan was comprehensive, reflected the goals of Traill County, and fulfilled the requirements of the mitigation planning process. The groups worked closely with several key stakeholders who helped to shape the plan.

2.1.2 Emergency Manager Role and Responsibilities

Sheriff Steve Hunt, the Traill County Emergency Manager, was ultimately responsible for completing the hazard mitigation plan update and ensuring that all identified mitigation activities were incorporated into comprehensive strategies that protect the County and its participating jurisdictions. The Traill County Emergency Manager led the update process and the Hazard Mitigation Steering Committee and Hazard Mitigation Planning Team, as well as stakeholders across the county. The following includes a summary of the duties and responsibilities of the Emergency Manager for this project:

- Oversee the planning process
- Ensure the Plan meets the needs of the County and citizens, and complies with the code of federal regulations
- Select the Hazard Mitigation Steering Committee members
- Chair the Hazard Mitigation Steering Committee
- Lead the Hazard Mitigation Planning Team
- Take attendance and document all meetings
- Serve as Point of Contact for the plan and planning process
- Ensure the plan was up to date and maintained; i.e., as outlined in the “*Maintain and Maintenance*” section of this plan
- Work with participating jurisdictions and other key stakeholders to ensure the plan represents the entire county
- Ensure that participating jurisdictions are included in the planning update
- Invite the public to participate and post all updated milestones for review and comment

2.1.3 The Mitigation Steering Committee (Note: The Local Emergency Planning Committee served as the Traill County Mitigation Plan Update Steering Committee)

A vital component of the Traill County 5-year mitigation update effort was to identify the Hazard Mitigation Steering Committee and jurisdictional officials. Identification of this core group was important in ensuring implementation and support of the mitigation planning process. Hazard Mitigation Steering Committee members and local officials were included in the planning process for their knowledge of the county, cities, and community services.

Table 1: Hazard Mitigation Steering Committee Members and Local Officials

Name	Title	Organization
Steve Hunt	Sheriff/Emergency Manager Traill County	Traill County
Tony Ernst	Sheriff's Department/Assistant Emergency Manager	Traill County
Ray Weber	Chief of Police	Hillsboro Police Department
Ken Ihry	Auditor	City of Reynolds
Coryn Martin	Superintendent	Traill County Highway Department
Ed Lenaburg	Councilman	City of Portland
Lee Brenna	Chief	Mayville Fire Department
Don Moen	Mayor	City of Mayville
Deberah Nobliski	Auditor	City of Galesburg/Galesburg QRU, Hillsboro Ambulance
Shelia Anderson	Mayor	City of Clifford
Gary Peterson	Traill County	Water Resource District
Gene Rosholt	Mayor	City of Buxton
Sven Mickels	Mayor	City of Portland
Jamie Reed	Chief	Hillsboro Fire Department
Mark Forseth	Mayor	City of Hillsboro
Lloyd Kenedy	Mayor	City of Reynolds
Paula Pederson	Superintendent	Hillsboro School District
Stefan Hofer	Member	West Traill Ambulance
Brenda Stallman	Member	Traill County Public Health
Doug Meyer	Mayor	City of Hatton

Note: Traill County Emergency Services provided this list of Hazard Mitigation Steering Committee Members and Jurisdictional officials.

With regard to the mitigation planning cycle of 2015, the Hazard Mitigation Steering Committee and local officials was responsible for ensuring the following:

- Oversee the plan and ensure its relevance to the changing situation of the County
- Monitor and evaluate the mitigation strategies
- Ensure documents reflect current hazard/risk analysis, development trends, code changes and risk perceptions of the county
- Ensure the plan was up to date and maintained as outlined within the plan
- Provided guidance to the Hazard Mitigation Planning Team
- Approve the plan update and processes used to complete the plan

2.1.4 Hazard Mitigation Planning Team

The Hazard Mitigation Planning Team provided technical guidance, documented the planning process, and wrote the mitigation plan update. The Traill County Emergency Manager served as the coordinating entity of the Hazard Mitigation Planning Team.

The Hazard Mitigation Planning Team facilitated the overall plan development to ensure the Hazard Mitigation Plan and Traill County met the requirements of DMA 2000. Beyond administration, content organization, and text development, the following duties summarize the Hazard Mitigation Planning Team's responsibilities:

- Organize and facilitate all meetings
- Review all documents provided by the Trail County Emergency Manager (EM) and participating jurisdictions
- Provide technical assistance
- Guide the plan development to adhere to DMA 2000 requirements
- Modeled disasters
- Conduct a capability assessment
- Conduct a risk assessment
- Create a hazard and community profile
- Attend and facilitate all the Hazard Mitigation Steering Committee meetings

Table 2: Hazard Mitigation Planning Team Table

Traill County Planning Team		
5-year Update		
Member	Organization	Title
Steve Hunt	Traill County	Emergency Manager
Michael Kemp	Integrated Solutions Consulting	Project Manager
Kimberly Pleva-Berka	Integrated Solutions Consulting	Planner

2.1.5 Participating Jurisdictions

Jurisdictions participated in the planning process by providing information, attending meetings, and giving substantive feedback regarding their jurisdiction and the overall mitigation plan update process. They were key participants in the general planning process, hazard identification, risk assessments, and the mitigation strategy update. The insight provided by the jurisdictions was invaluable in ensuring the plan represented the entire county.

Participating jurisdictions were responsible for the following:

- Ensure their participation in the mitigation planning process
- Provide relevant information pertinent to their jurisdiction
- Ensure that the mitigation plan would be integrated into other planning mechanisms within their own jurisdictions, such as comprehensive or capital improvement plans, when appropriate
- Work with the Traill County Emergency Manager and mitigation planning and steering committees as part of the iterative planning process
- Provide information concerning past mitigation actions and create new mitigation actions
- Review and provide comments on the plan's community profile, hazard profile, risk assessment, capability assessment, mitigation goals, and maintenance and management section

Each jurisdiction participating in the plan update acted as an official conduit between their respective cities and their citizens. With regard to the 2015 planning cycle, the following jurisdictions in the table participated in the planning efforts of the Traill County Hazard Mitigation Plan.

Table 3: Participating Jurisdictions

Participating Jurisdictions
Buxton, Clifford, Galesburg, Hillsboro, Hatton, Mayville, Portland, Reynolds, and Traill County

2.1.6 Planning team/Steering Committee/Jurisdictional Meetings and Participation

To kick off the planning process, a series of conference calls were held between Traill County emergency manager planning team steering committee and other key stakeholders. These meetings helped organize the planning process. During these meetings, planning goals were created, priorities were set, responsibilities were delegated, and key stakeholders and public participants were identified.

While the kickoff meeting discussed several issues, some of the key outcomes included the following important planning details:

- Due to concerns with time commitments and available county resources, it was communicated to the Hazard Mitigation Planning Team that correspondence would be in electronic format as much as possible (email, conference calls, electronic document management systems, and web pages)
- It was understood that the County would be responsible for ensuring jurisdictional and public participation and providing requested documents and resources needed to complete the planning process
- The Traill County Emergency Manager would take and keep all records, notes, and attendance of all meetings
- The Hazard Mitigation Planning Team would complete a community profile, hazard profile, risk assessment, capability assessment, and update mitigation actions as per their contract with Traill County. To ensure the involvement of County stakeholders, the planning process would be an iterative process with local individuals reviewing and approving all sections of the plan.

At the request of the Traill County Disaster and Emergency Services, meetings were to serve as both planning and steering meetings. It was also requested that the planner start each meeting with a tutorial concerning general mitigation concepts, as there was a concern that those attending the meetings may have limited experience and knowledge of hazard mitigation. Following the tutorial, each meeting agenda included an overview of the actual planning process, updates of the planning process, and approval of various sections of the plan.

To ensure open communication and input, all meetings were open to the public. Meeting invitations were sent via the county and city websites, postings in the Traill County newspaper, mass emails, and direct invites. The following table contains a schedule of the planning meetings.

Table 4: Meeting/Phase Kickoff Table

Meeting Number	Meetings				
	1	2	3	4	5
Date	01-27-15	04/01/15	5/30/15	05/11/2016	TBD
Location	Hillsboro ND	Hillsboro ND	Hillsboro ND	Hillsboro ND	Hillsboro ND
Meeting Focus	Plan Kickoff Meeting	Community Profile Kickoff	Risk Assessment Kickoff	Mitigation Actions Kickoff	Plan Approval Kickoff

Note: While each of these phases was actually completed with the use of several meetings only kickoff dates are presented here.

Meeting One (Kickoff: 01-27-15): The focus of the kickoff meeting was to set the stage of the planning process, set expectations, and to ensure the plan would accurately represent the makeup of the county and participating jurisdictions. An invitation to this meeting was provided to all of the participating jurisdictions along with all city and county organizations. The Traill County Disaster and Emergency Services sent invitations using an existing city and county contact list.

The meeting was well attended and input from those in attendance proved invaluable. The Hazard Mitigation Planning Team provided an introduction to the planning process, a general understanding of mitigation, and introduced the concept of the community profile. The Hazard Mitigation Planning Team reviewed the mitigation crosswalk and noted that the required elements of the plan. Finally, the Team discussed the iterative process, placing an emphasis on the importance of feedback, input, and communication. After suggesting a timeline for completion, the Team decided to organize the plan into phases.

Outcomes: The major outcome of the meeting was the understanding that the Hazard Mitigation Planning Team would provide drafts of the community profile for review. It was noted the Hazard Mitigation Planning Team and stakeholders would create the community profile (and subsequent sections of the plan) using an iterative process. The Hazard Mitigation Planning Team provided the community profile in draft form and the stakeholders provided comments and added additional county information to provide further context and accurately portray the local perspective.

It was understood that documents would be circulated for viewing and comment. It was further acknowledged that Hazard Mitigation Planning Team would use electronic surveys as a means to collect data for the plan update. Finally, it was established that the Traill County Emergency Manager would be responsible for ensuring notification and participation of those within the county and participating jurisdictions.

Other outcomes of the meeting concerned the issue of notification and participation. It was understood that several methods would be used to inform the team, stakeholders, and the public of the mitigation process. The Hazard Mitigation Planning Team also suggested that each jurisdiction place an announcement on their respective web pages informing the public that the mitigation update process had begun, how and where to participate, points of contact, and meeting dates. The Hazard Mitigation Planning Team further requested each jurisdiction add an item announcing the planning process in their respective city council meetings as an official agenda item. Council agenda items are typically reported and listed in the Traill County's newspaper, allowing for both city councils and the public to be informed. Finally, it was suggested for those jurisdictions with regular newsletters to include information about the mitigation planning process. To ensure everyone's efforts were coordinated and recorded, it was requested that all the actions used to encourage participation to be reported to the Traill County Emergency Manager.

Meeting Two (Kickoff-04/01/15): The second meeting was the kickoff to a series of meetings held in person, electronically, and via phone conferences with each of the participating jurisdiction's representatives. The purpose of this series of meetings was to present the draft findings of the community profile, enhance the profile with local input, and approve the community profile. The Hazard Mitigation Planning Team also used this opportunity to present the findings of the capability assessment, as well have each of the jurisdictions approve the final capability assessment.

Outcomes: Outcomes of the meetings included additional data, improvements, and acceptance of the

community profile and capability assessment.

This series of meetings was primarily completed with the planning team and the Traill County Emergency Manager with the Emergency Manager meeting with the Traill County Commissioners, jurisdictional Mayors, and other key stakeholders.

Meeting Three (Kick off 5/30/15): This meeting kicked off the hazard profile and risk assessment process, during which the planning team provided the Traill County Emergency Manager a progress update on the mitigation planning process, discussed what hazards should be included in the plan, and provided an overview/tutorial of the risk assessment. It was additionally noted that the Hazard Mitigation Planning Team would create a plan maintenance section for inclusion in the Plan.

Outcomes: Outcomes of these meetings included deciding what disasters were to be included in the County Hazard Mitigation Plan and approval of the hazard profile and risk assessment process.

Note: This series of meetings was primarily completed with the planning team, meeting with the Traill County Emergency Manager and in turn the Traill County Emergency Manager meeting with the Traill County Commissioners, jurisdictional Mayors and other key stakeholders.

Meeting Four (Kickoff-05/11/2016): This meeting was organized around updating and finalizing the mitigation projects to be included in the Traill County Hazard Mitigation Plan. The primary purpose of this series of meetings was to include as many participants and key stakeholders as possible in the completion of the mitigation project section of the plan.

Outcomes: The initial meeting was attended by the planning team, emergency manager and subcommittee of the steering committee, all of the participating jurisdictions were participants and provided input. In addition, the Traill County Emergency Manager used the Traill County Newspaper and the Traill County web page to invite the public to participate in this process and comment on the plan. The result of this meeting was the creation of a list of mitigation actions, a cost-benefit analysis, and the final approval the mitigation project chapter of the Traill County Hazard Mitigation Plan update.

Meeting Five (Kickoff-TBD): The purpose of these meetings was to approve the final sections of the plan. Participating jurisdictions, key stakeholders, and the public were given a chance to review the plan and provide comment. The plan approval period lasted for approximately two months (August to September 2016).

Outcomes: With the approval of the final sections of the Plan, the Traill County Emergency Manager deemed the plan complete. The Traill County Hazard Plan was sent for in for state review.

2.1.7 Additional Key stakeholder and other participant Meetings and Participation

Several additional meetings and communications were utilized to complete the five phases of the planning process. The Traill County Emergency Manager was the primary facilitator and leader of these meetings and communications. These additional meetings provided the Hazard Mitigation Planning Team with further information and insights that were vital to the plan update and ensured every phase of the planning process was approved by each participating jurisdiction. Meeting attendees included officials from all of the county's jurisdictions, key stakeholders from various organizations, subject matter experts, regional and state officials, and the public.

What follows is a comprehensive list of all meetings that occurred over the entire planning process. The dates, as well as a general synopsis of what occurred at the meetings, who participated, and general notes are provided in the following table. Meetings were held both in person and over conference calls.

Table 5: Date and Purpose of Meetings

Meetings with Key Stakeholders, Community, and Other Interested Parties			
Date	Purpose	Forum	Participants
01/27/5	Traill County Hazard Plan Update Kick-Off Meeting, Community profile	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the Public
3/9/15	Traill County Hazard Mitigation Plan Update Community profile	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the Public
4/1/15	Traill County Hazard Mitigation Plan Community/Hazard Profile and Risk Assessment	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the Public
5/30/15	Traill County Hazard Mitigation Plan Community/Hazard Profile and Risk Assessment	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the Public
2/3/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the Public
2/17/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee
2/18/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee
2/23/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
2/25/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
3/18/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
3/21/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation planning Committee
5/11/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the Public
5/23/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
6/15/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
6/27/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee

Meetings with Key Stakeholders, Community, and Other Interested Parties			
Date	Purpose	Forum	Participants
7/8/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee
8/14/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
8/17/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
9/19/16	Traill County Hazard Mitigation Plan Mitigation Projects	Plenary	Mitigation Planning Committee, Mitigation Steering Committee, Participating Jurisdictions and the public
TBD	Traill County Hazard Mitigation Plan Approval	Plenary	Local Emergency Planning Committee
TBD	Traill County Hazard Mitigation Plan Approval	Plenary	Traill County Planner, Traill County Disaster and Emergency Services
TBD	Traill County Hazard Mitigation Plan Approval	Plenary	Traill County Deputy Planner and Traill County Disaster and Emergency Services
NOTE: Traill County Emergency Manager was responsible for creating this table and/or any notes and signup sheets resulting from the noted meetings.			

2.1.8 Partners and Stakeholders

Involving partners and stakeholders in the mitigation planning process assisted in obtaining a thorough and comprehensive understanding of the County's diverse programs, facilities, operations, community vulnerabilities, hazard risks, existing and planned developments, infrastructure projects, and opportunities to implement mitigation strategies. To facilitate involvement in the mitigation update, the Hazard Mitigation Steering Committee and planning team met with and/or used resources provided by a variety of local, regional, state, and federal authorities. Where appropriate, contacts were also made with regional, state, federal agencies and other external organizations to determine how their programs could support the mitigation efforts. The following is a list of organizations that were used as resources and/or are actively supporting Traill County's mitigation efforts.

Table 6: Organizations

List of Organizations
<ul style="list-style-type: none"> • U.S. Geological Survey • U.S. Army Corps of Engineers • U.S. Department of the Interior • National Weather Service • Federal Emergency Management Agency • Traill County Disaster and Emergency Services • Bureau Land Management, • Traill County Public Schools • Traill County Commissioners • Traill County Sherriff • Traill County Planner

List of Organizations

- Traill County Hi-way Department
- Traill County District Health
- Traill County Water resource Board
- Traill County Extension
- Nodak Electric CO-OP Inc.
- Cass Count CO-OP
- Traill County School Superintendent
- Mayors and City Councils of Buxton, Clifford, Galesburg, Hillsboro, Hatton, Mayville and Portland

2.1.9 Review and Incorporation of Existing Plans and Studies

To ensure the plan was completed using best practices and included accurate information, the Hazard Mitigation Planning Team reviewed various public domain documents to include plans, studies, and guides to begin developing the hazard mitigation plan update. These plans included, but were not limited to, mitigation plans from surrounding jurisdictions, FEMA guidance documents, emergency services documents, contingency plans, community plans, federal, local, state regulations/ordinances, and other similar public domain documents. No copyright protection is claimed in original US government works or any of the resources used in this report.

The following table is a list of the public domain plans and other documents the Hazard Mitigation Planning Team used to guide the Plan update. Sources are also listed and cited within the document.

Table 7: Existing Plans and Studies Utilized in the Update

Existing Plans and Studies Utilized in the Update		
Plans/Studies/Guides	Author	Plans/Studies/Guides and their use in creating this plan
American Fact Finder Community Facts	US Census Bureau	This resource was used to inform the development Chapter 3, the Community Profile section of this document.
2012 Agricultural Census for Traill County	US Department of Agriculture	This resource was used to inform the development Chapter 3, the Community Profile section of this document.
National Climate Assessment for North Dakota	US global Change Research Program	This document was used to inform Chapter 4, the Risk Assessment section of this document.
2014 North Dakota Crash Summary Report	North Dakota Department of Transportation	This document was used to inform Chapter 4, the Risk Assessment section of this document.
Potential Cost Savings from the Pre-Disaster Mitigation Program	Congressional Budget Office (2007)	This document was used to inform the planning process as identified in Chapters 1,2 and 5
How-to-Guide (Series 386–1, 2, 3, 4, & 5)	FEMA	These documents were used to inform the planning process as identified in Chapters 1,2 and 5
NFIP Community Rating System	FEMA	This document was used to inform the flooding section in Chapter 4, the Risk Assessment section of this document.
National Flood Insurance Program	FEMA	This document was used to inform the flooding section in Chapter 4, the Risk Assessment section of this document.
Dams within the Jurisdiction of the State of North Dakota	State of North Dakota Water Commission	This document was used to inform the Chapter 3 Community Profile and the dam failure section in Chapter 4, the Risk Assessment section of

Existing Plans and Studies Utilized in the Update		
Plans/Studies/Guides	Author	Plans/Studies/Guides and their use in creating this plan
		this document.
Storm Events Database	National Oceanic Atmospheric Administration	This document was used to inform Chapter 4, the Risk Assessment section of this document.
The Right-to-Know Network	Center for Effective Government	This document was used to inform the hazardous material section in Chapter 4, the Risk Assessment section of this document.
Hazus-MH: Flood Event Report for Traill County	Traill County	This document was used to inform the flooding section in Chapter 4, the Risk Assessment section of this document.
2014 Multi-Hazard Mitigation Plan for State of North Dakota	NDEM	This document was used to inform the community profile Chapter 3 and risk assessment Chapter 4 sections.
2010 Traill County Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan	Traill County	This document was used to inform the community profile Chapter 3, risk assessment Chapter 4 and mitigation project Chapter 6 sections.
Texas Tech University	Wind Science & Engineering Research Center	This document was used to inform the risk assessment Chapter 4 and mitigation projects in chapter 6
Traill County Soil Survey	USDA	This document was used to inform the community profile Chapter 3 and mitigation projects in chapter 6
2011 North Dakota Crop Insurance Profile Report	USDA	This document was used to inform the risk assessment Chapter 4 and mitigation projects in chapter 6
Tornado History Project for Traill County, ND	Tornado History Project	This document was used to inform the risk assessment Chapter 4
National Transportation Safety Board Aviation Accident Database for Traill County	National Transportation Safety Board Aviation Accident Database	This document was used to inform the risk assessment Chapter 4
2008 Economic Impacts of Climate Change on North Dakota Report	The Center for Integrative Environmental Research University of Maryland	This document was used to inform the risk assessment Chapter 4
North Dakota State Water Commission	North Dakota State Government	This document was used to inform the risk assessment Chapter 4
Population Trends by ND County	North Dakota Demographics Center	This document was used to inform the community profile Chapter 3
Comprehensive Economic Development Strategy 2013 – 2017 Region 5, North Dakota	Lake Agassiz Regional Council	This document was used to inform the community profile Chapter 3
Burlington Northern and Santa Fe Railroad, Emergency Action Plan	Burlington Northern Santa Fe Railroad	This document was used to inform the community profile Chapter 3 and risk assessment Chapter 4.

Note: All plans, studies and guides that were directly or indirectly used during this plan update are listed in this table. Direct quotes and gleaned information are also cited within the body of this document.

2.1.10 Participation and Data Request

The success of this plan update was heavily dependent on the cooperation of the Hazard Mitigation Steering Committee, participating jurisdictions, and the Hazard Mitigation Planning Team. The Hazard Mitigation Planning Team created a timeline for the plan update, created plan phases, and provided direction on what the requirements to complete each phase. Plan instructions, included noting who should participate, what documents should be provided to the Hazard Mitigation Planning Team for review, how to review documents, and the overall planning process was shared with the Hazard Mitigation Steering Committee and participating jurisdictions. The information was regularly maintained and updated throughout the planning process.

Table 8: Participation Table (Data request)

	Information/Editing Requested by Planning Team					Information noted as being validated by jurisdictions			
	January 2015 Community Profile	April 2015 Risk Assessment	May 2015 Mitigation Projects	May 2016 Plan Review	August 2016 Review and Final Acceptance	March 2015 Community Profile	May 2015 Risk Assessment	August 2016 Mitigation Projects	September 2016 Plan Review & Approval
Medicine Lake	X	X	X	X	X	X	X	X	X
Plentywood	X	X	X	X	X	X	X	X	X
Outlook	X	X	X	X	X	X	X	X	X
Westby	X	X	X	X	X	X	X	X	X
Trail County	X	X	X	X	X	X	X	X	X

Note: The above table does not represent actual meetings, but rather the planning process. The table shows timeframes of when the Hazard Mitigation Planning Team requested data and/or feedback, when the data was verified by the jurisdictions, and which jurisdictions participated in the process. Appendix C contains a signed document certifying Chapter 2, this table, and that each jurisdiction was an active participant in the creation of this document and the mitigation planning update process.

2.1.11 Summary of the Planning Process

The following section provides a bulleted overview of the planning process and the major changes that occurred to this plan during the update. The planning update as conducted in the following phases:

- Community Profile Creation
- Hazard Profile
 - Hazard selection and prioritization
- Risk Assessment Conducted
 - Impact (assumptions and magnitudes)
 - Risk
 - Disaster modeling
 - Complete assessment
 - Jurisdictional review
 - Public review
- Mitigation Strategy Creation
 - Update of existing strategies
 - Creation of new strategies
 - Prioritizing strategies
 - Cost benefit analysis

- Jurisdictional review
- Public review
- Final Plan Approval
 - Plan overview created
 - Plan monitoring created
 - Plan maintenance created
 - The mitigation plan was reconciled with the most current language used in planning/information/codes etc. used by the participating jurisdictions
 - Jurisdictional review
 - Public review
 - Plan review

2.2 Changes Made During this Plan Update

The following section provides an overview of the significant updates reflected within this plan.

- The overview of community profile sections changed to reflect the most recent census data (2010) and changes within the County
- The community profile section was updated and expanded upon. The community profile includes:
 - General overview, including historical setting
 - Physical characteristics including climate and precipitation, geology, geography, hydrology, surface water, groundwater, lakes, rivers, watersheds, wetlands, soil, topography, and land use
 - Population and demographics including historic population, population trends, comparable growth, households, population projections, population by age groups, and special populations
 - Cultural conditions including race and ethnicity, education, socioeconomic conditions, employment status, occupation, faith-based community, economic conditions, agriculture, future development, and crime
 - Critical infrastructure including airports, railroads, pipelines, solid waste facilities, transit, transportation, highways, water control structures, water pollution control revolving fund, public water access, emergency services, healthcare, emergency resources, energy sector, schools and college students
- The mitigation goals were updated
- A capability assessment was conducted
- The hazard risk assessment was updated to account for the disasters and changes within the community over the past five years
- The overview of mitigation goals, objectives and strategies was updated to reflect new goals, new objectives, and new strategies
- Processes were created to ensure governance and accountability of the plan
- A monitor and maintenance section was created to ensure the plan remains updated
- Three hazard scenarios were modeled (flood, tornado and hazard material release)
- Mitigation strategies/projects for each participating jurisdiction were developed, with each jurisdiction identifying at least one new action that did not exist in the previous plan.

The following sections constitute the actual mitigation update and are a culmination of all the participants' effort. The information in each section plays an integral role in the mitigation planning process and is interdependent upon the entirety of the planning process. For assistance in using this document or to be involved in future Plan updates, please contact Trail County's Emergency Manager.

Section 3: Community Profile

Traill County's detailed and in-depth community profile was developed as a key element of the Hazard Mitigation Plan, however, its utility goes far beyond this plan alone. The community profile is an overview of the political governance, economy, geography, climate, population, community assets, future development and trends, and commercial and industrial make-up of Traill County. The community profile provides the County with a solid foundation for developing a common operational picture for mitigation efforts, but can also be referenced for other activities, such as THIRA, emergency training, exercises, and actual incidents.

To complete the community profile, Traill County's Emergency Manager and its representatives contacted numerous agencies, conducted research, and examined several technical reports and records. Traill County and the cities of Buxton, Clifford, Galesburg, Hatton, Hillsboro, Mayville, Portland, and Reynolds also participated in the planning efforts. Elected officials, first responders, emergency management, health care providers, public works, road departments, businesses, and the public and provided input towards this plan and the planning process.

The following pages provide a broad range of information that serves to provide a context for the subsequent sections in this plan. This section is divided into five broad categories:

1. General Historical Overview
2. Physical Characteristics
3. Population and Demographics
4. Community Conditions
5. Critical Infrastructure

This information was used in the subsequent Risk Assessment section to determine the type and magnitude of the County's risks.

A hazard mitigation plan will secure the life, wellness, and security of its residents, avert repetitive damages due to various hazards, and furnish a faster recovery process when a disaster does occur. In addition, there is an increased sense of cooperation and communication among jurisdictions and with the public, as well as an increased possibility for funding recovery projects.

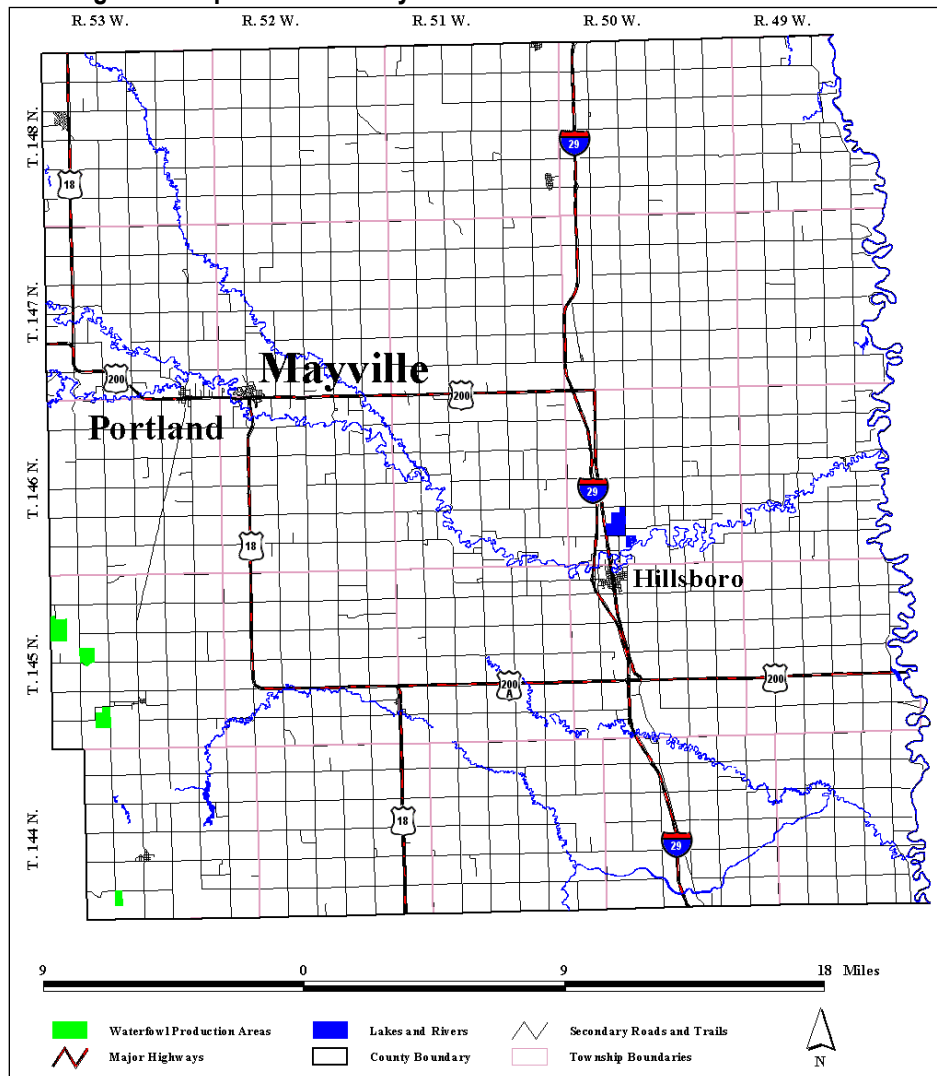
3.1 General Overview

Traill County is located in the east-central portion of North Dakota. Traill County is 862 square miles, making it the 48th largest county in the state. It is 32 miles from north to south and 31 miles from east to west. Traill County is bounded by Grand Forks County to the north, Steele County to the west, Norman County, MN to the east and Cass County to the south. Hillsboro is the county seat and the following table defines incorporated communities in the county and corresponding populations. The Goose River flows southeastward through Traill County and into the Red River, which borders the county on the east.

Table 9: Towns in Traill County and Population

Town	Population	Town	Population
Buxton	350	Clifford	51
Galesburg	157	Hatton	707
Hillsboro	1563	Mayville	1953
Portland	604	Reynolds	311

Figure 2: Map of Traill County



Elevation in Traill County ranges from about 805 feet above mean sea level (amsl) along the Red River along the northeast corner of the county, to nearly 1,570 feet in the southwestern part of the county. Most of the county consists of upland glaciated plains. There is significant loose soil and deep topsoil.

According to the 2013 estimated census, the population of Traill County is 8,245. This represents a 1.5% increase in population since 2010. The median age in Traill County is 42.6 years old (U.S. Census Bureau).

3.1.1 Historical Setting

Traill County was established on January 12, 1875, and organized on February 23, 1875. The first county seat was Goose River, which changed its name to Caledonia in August 1875. The county seat was moved in 1896 to Hillsboro to be more centrally located. The county was named for Walter John Strickland Traill (1847-1938), a Canadian who was employed by Hudson Bay and was a prominent citizen during the early days of the county.

3.2 Climate and Precipitation

Traill County has a sub-humid continental climate characterized by marked fluctuations in daily and seasonal maximum and minimum temperatures, and light to moderate precipitation. The precipitation tends to be irregular in occurrence, amount, and area of coverage. The inconsistency of the county's weather arises from the interaction of three major air masses which originate in distinct global regions: cold, dry air from the polar region; warm, moist air from the Gulf of Mexico; and cool, moist air from the northern Pacific. Both the temperature and the moisture characteristics of the northern Pacific air mass change as the air moves across the Rocky Mountains. The resulting air, which is usually mild and dry, reinforces the continental nature of the county's climate. The polar air mass tends to dominate the other two, but its influence is considerably lessened during the summer.

Normally the temperature is moderate until the beginning of July, after which short, hot periods are experienced until the end of August. The freeze-free period is the number of days between the average last occurrence of freezing temperatures in the spring and the average first occurrence of 32°F or lower in the fall. The length of the freeze-free period approximates the length of the growing season, which ranges from fewer than 110 days to over 130 days between May 12th and September 23rd in Traill County. Topography and local weather conditions can produce subfreezing temperatures at the ground surface while the air temperature a few feet above the ground remains above 32°F.

There is a large range in the number of days during which temperatures reach or exceed 90°F each year. Along the Canadian border in the northeast, maximum temperatures of 90°F or more occur only for an average of eight days, while in parts of the southwest and south central temperatures equaling or exceeding 90°F can be expected on 32 days. There is also a pronounced wedge of days when temperatures equal or exceed 90°F extending northward from south central North Dakota into Traill County on the Canadian border. In an average year, about 75% of days with temperatures equaling or exceeding 90°F occur in July and August. Regardless of location, the numbers of days with temperatures of 90°F or above are nearly the same in July as in August.

The annual temperature pattern reflects several features which are found on most monthly temperature maps. Three warm air ridges oriented north-south are evident. Two of the warm air ridges are located

near the eastern and western borders of the state, while the other is positioned through the central part of the state extending sharply northward from Sioux County into Renville and Traill Counties. The ridge of warm air along the eastern border results in temperatures on the North Dakota side of the Red River Valley being warmer than on the Minnesota side.

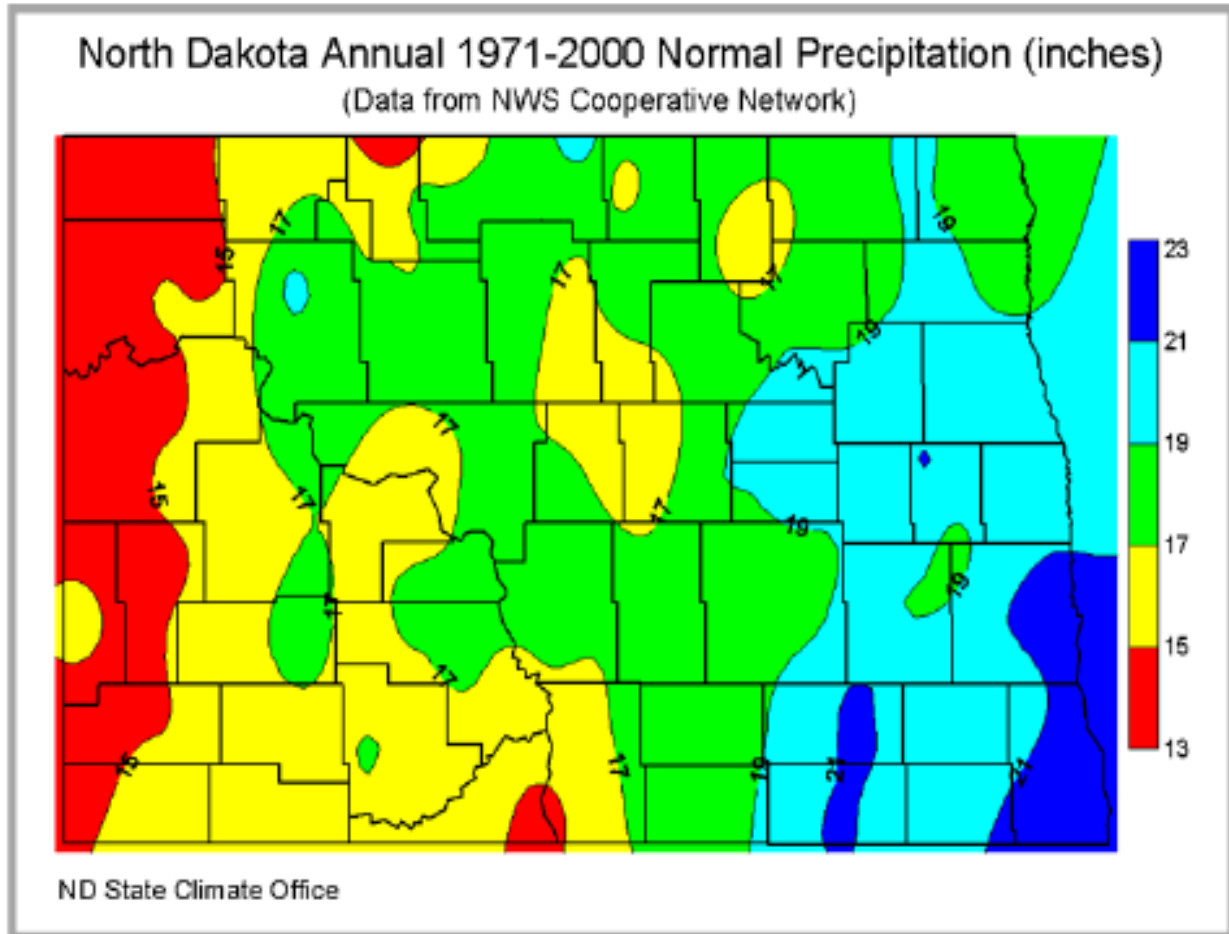
3.2.1 Climate and Precipitation

During the winter months, cold, dry polar air dominates the region. During the summer months, hot, dry air masses from the desert southwest, along with warm, moist maritime tropical air masses that originate over the Gulf of Mexico, are common. The spring and fall months serve as transition periods between the summer and winter, with alternating intrusions of air from various sources.

Table 10: Average Temperature and Precipitation by Month

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	16	23	35	55	68	77
Average low in °F:	-3	2	15	30	42	54
Av. precipitation in inch:	0.71	0.55	1.06	1.18	2.68	3.74
	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	81	80	70	55	36	21
Average low in °F:	58	55	45	32	18	3
Av. precipitation in inch:	4.61	3.19	2.4	2.24	0.87	0.71

Figure 3: Average Annual Precipitation



Source: North Dakota State Climate Office. 2007.

Traill County has an annual precipitation of around 19.7 inches. It receives a little more than average precipitation compared to the state of North Dakota, which receives an annual average of 18.59 inches and almost less than half of the average of the continental United States (38.67 inches). Figure 3: Average Annual Precipitation illustrates the monthly average precipitation between the years 1981-2010 in Traill County and the state of North Dakota. Traill County has a monthly average of less than an inch of rain.

3.2.2 Geology

The North Dakota Geological Survey was created by an act of the North Dakota Legislature in 1895. After more than 110 years, the Survey still serves as the primary source of geological information in the state. Its mission over the years has grown and is now three-fold: to investigate the geology of North Dakota; to administer regulatory programs and act in an advisory capacity to other state agencies, and to provide public service to the people of North Dakota.

The Geological Survey publishes maps and reports on the mineralogical, paleontological, and geochemical resources of North Dakota, including oil and gas, coal, uranium, clay, sand and gravel, volcanic ash, potash and other salts, etc. In addition to the mapping of subsurface resources, the Survey is actively mapping the surface geology throughout the state with an emphasis on urban areas and the identification of geohazards, such as landslides. Survey publications support the regulatory programs of the Industrial

Commission, as well as other state and federal agencies, and assist mineral companies, geotechnical consulting firms, city and county governments, landowners, and citizens of the state. The North Dakota Geological Survey regulates coal exploration, subsurface mineral exploration and development (this includes all elements, minerals, and compounds other than oil and gas, sand and gravel, and coal), geothermal facilities (both commercial and residential), the Class III Underground Injection Control (UIC) Program, and paleontological resources on state-owned lands.

The Class III Underground Injection Control Program is a program of the North Dakota Department of Health Ground Water. The following information was provided by the North Dakota Government Health website. The Safe Drinking Water Act established the Underground Injection Control Program to provide safeguards so that injection wells do not endanger current and future underground sources of drinking water. An injection well is defined by the UIC Program as any bored, drilled, or driven shaft or a dug hole where the depth is greater than the largest surface dimension used to discharge fluids underground. Class III injection wells are wells that are injected for extraction of minerals or energy and regulated by the North Dakota Geological Survey.

The Geological Survey and the Oil and Gas Division are in the Department of Mineral Resources and under the North Dakota Industrial Commission. The main office of the Department of Mineral Resources is located at 1016 East Calgary Avenue in Bismarck. The paleontology program of the Geological Survey is housed in the Clarence Johnsrud Paleontology Laboratory in the North Dakota Heritage Center (state museum) on the State Capitol grounds in Bismarck. The North Dakota State Fossil Collection, as well as the State Rock and Mineral Collection, are also housed in the Heritage Center. The North Dakota Geological Survey's Wilson M. Laird Core and Sample Library are located on the University of North Dakota campus in Grand Forks. The facility currently houses 375,000 feet of core and 30,000 boxes of drill cuttings obtained from oil and gas wells.

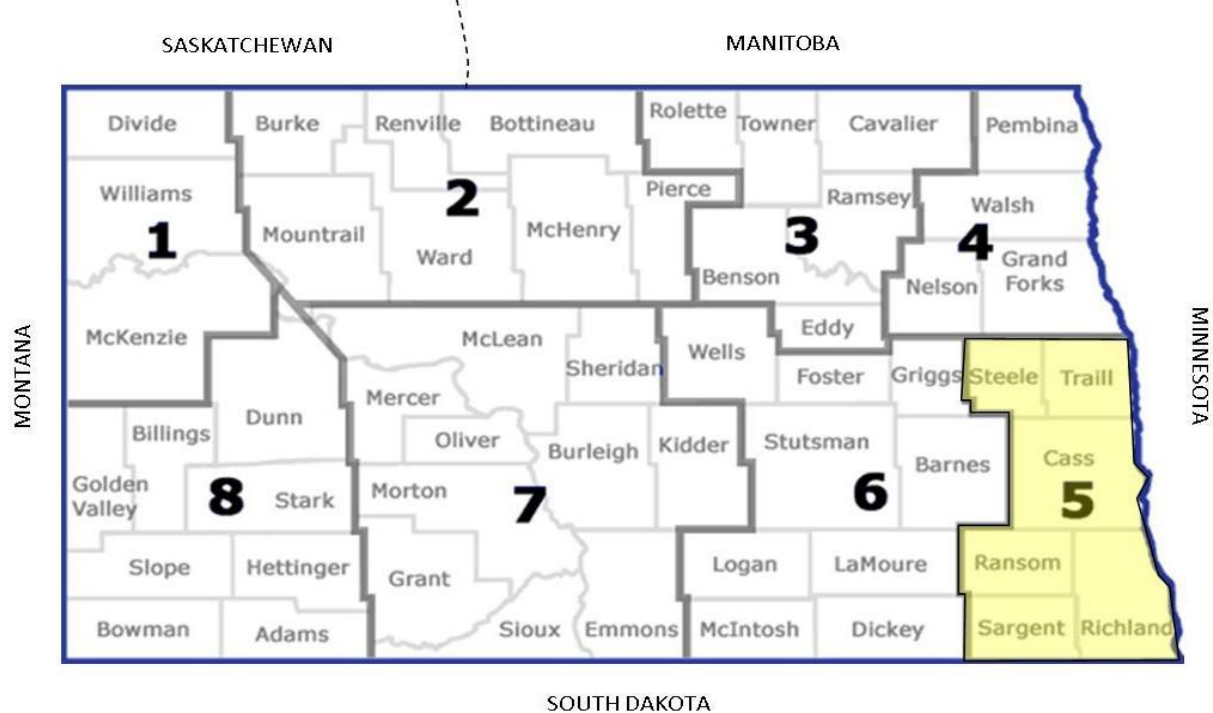
3.2.3 Geography

The Lake Agassiz District (State Planning Region 5) comprises the six most southeastern counties in North Dakota. Its eastern border is the Red River of the North (the North Dakota-Minnesota state line), and its southern border is the North Dakota-South Dakota state line. All of Region 5 lies within the drainage basin of the Red River of the North. The region is located about 250 miles northwest of Minneapolis, MN and 200 miles south of Winnipeg. The eastern two-thirds of the area was once covered by a huge lake known as Lake Agassiz, formed from meltwaters of the last glacial age. The lake began to form in the Red River Valley when the glacier retreated north of the drainage divide between the Hudson Bay and Mississippi River drainage basins, near Browns Valley, Minnesota. North-draining rivers were blocked on the north by the ice sheet. The lake that formed ahead of the retreating glacier was small at first and overflowed southward into the Minnesota River Valley. As a result of this lake, the topography is extremely flat in the eastern two-thirds of the region.

The western edge of glacial Lake Agassiz plain is marked by several ancient, remnant beaches. Deltas also formed where large rivers entered the lake; these deltas consist of huge, fan-shaped accumulations of sand. In many places, the wind has blown the surface of the deltas into dunes, such as the Sheyenne dunes in Ransom and Richland Counties and the Hankinson Sand Hills in Richland County.

The western third of the region has a topography that is gently rolling along the western edge where the Lake Agassiz bottom grades into glacial till. The area is characterized by many prairie potholes, sloughs, and lakes; making the area a prime habitat for waterfowl production and another wildlife habitat.

Figure 4: Lake Agassiz Region 5



3.2.4 Hydrology

The hydrology of North Dakota is a system of groundwater (aquifers), lakes, watersheds, wetlands, and a network of rivers and streams. Aquifers are areas of rock below the ground surface that can produce sufficient amounts of water to efficiently supply the communities within the region. There are three different types of aquifers; unconfined, is where the water table is able to move freely without interference due to the lack of aquitard, a non-permeable formation, semi-confined, is where the water table is partially confined due to semi-permeable formations, and confined, is where the water table is completely confined by non-permeable formations above and below the body of water. The amount of groundwater available is dependent on the amount of precipitation the region receives each year.

3.2.5 Surface Water

Water is a major natural resource concern in the Lake Agassiz Region, both for the quality and quantity of water. Water resources are divided into two categories; surface water and ground water. The surface water consists of natural lakes, man-made lakes, marshes, rivers, and other streams, while the underground water pertains to aquifers.

Many of the streams, rivers, and lakes, in varying degrees, have a problem with erosion and sedimentation resulting in reduced water quality for recreation, fish, and wildlife. Major sources of sediment are unprotected crop fields, eroding drain outlets, and roadside and stream bank erosion. Estimates from the National Sedimentation Laboratory indicate a large portion of sediment in rivers and streams is the result of stream bank erosion. There is a need for proper riparian management in order to educate landowners of proper land use and to demonstrate proper treatment eroding riparian areas.

Erosion, along with the increased use of agricultural chemicals in the form of fertilizers, herbicides, and pesticides, poses a threat to the quality and quantity of the area's surface water and ground water

resources. This concern is identified in the North Dakota State Department of Health and Consolidated Laboratories Non-point Source Pollution Management Plan. As the demand for agricultural products increases, more emphasis will be placed on production, and the problems associated with erosion and the use of chemicals will become more pronounced. Land treatment watersheds have the potential to protect and enhance the area's water resources. The efforts and resources of public and private entities are needed to carry out strong land treatment programs. There are currently five active watershed projects located in Cass, Ransom, Richland, and Sargent Counties.

During the last ten years, there has been an increase in cropland tiling in the six County Lake Agassiz Region. According to current estimates from the National Resources Conservation Services (NRCS) in North Dakota, 75,000 to 100,000 acres have been tiled in the Red River Valley. Since tiling is being installed primarily to reduce the effects of soil salinity on crop production, the increase of tiled acres will likely continue into the foreseeable future. Tile drain discharges likely will adversely impact water quality; little is known about the possible impacts to surface waters and additional studies are needed. Tiling is common in Traill County. Tiling mitigates increased soil salinity and serves to dewater excessively wet fields during wet cycles.

Most wetlands in the Region are found in the western portions of Sargent, Ransom, and Steele Counties. Bodies of water larger than 40 acres are found mostly in Sargent and Richland Counties. All of the Lake Agassiz Region lies within the drainage area of the Red River of the North. The topography ranges from gently rolling glacial drift prairie to an extremely flat glacial lake basin.

3.2.6 Groundwater

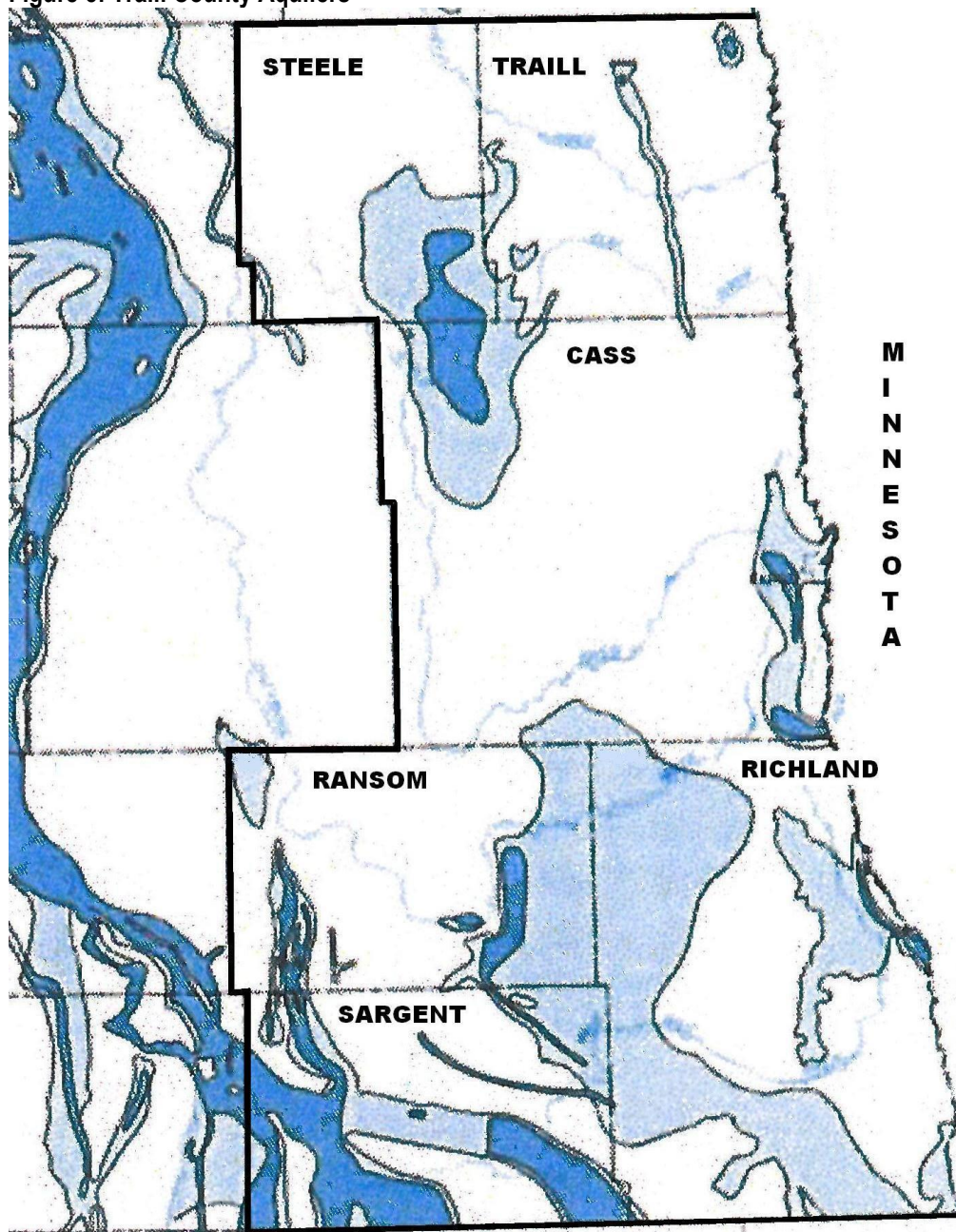
Ground water investigations have been completed in all counties of the Region. Most known and developed aquifers in the Red River Basin, the main source of water for the region's small communities, are small bedrock and minor drift aquifers having limited yields. Higher yielding aquifers, greater than 500 gallons per minute, are located in Sargent County and portions of Steele and Cass Counties. Most aquifers in the region have yields that range from 50 to 500 gallons per minute. Richland County has the most area underlain by aquifers.

Many communities and rural farms need adequate high-quality water in order to supply domestic use. Ground water contamination from arsenic is a problem in southern Richland County. Rural water systems have been installed in all six counties; however, Steele, Traill, and Cass are the only counties with nearly complete coverage.

Traill County is served by 2 rural water districts. Grand Forks-Traill Rural Water District serves the northern portions of the county while Traill Rural Water District (TRWD) serves the southern portions. The cities of Mayville and Hillsboro have partnered with TRWD in an arrangement whereby TRWD furnishes raw water (from wells) to both Mayville and Hillsboro. Mayville and Hillsboro both operate modern reverse osmosis water treatment plants. In addition to supplying treated water to their own residents, Mayville and Hillsboro sell treated water back to TRWD for distribution to their own rural customers.

Fargo and other participating communities formed the Lake Agassiz Water Authority to explore moving Missouri River Water east through a pipeline system or existing channel and the Sheyenne River during drought. The project has lost favor with the federal government in light of the proposed \$2 billion Red River Diversion project. If the Missouri River Project goes forward it may be with state money only.

Figure 5: Traill County Aquifers



Modified from North Dakota State Water Commission, 1982

EXPLANATION



**YIELDS GREATER THAN 500 GALLONS
PER MINUTE AVAILABLE**

**YIELDS FROM 50 TO 500 GALLONS PER
MINUTE AVAILABLE**

For each county, aquic soils were selected only within the boundaries of aquifers, as defined within the

SWC database. Soil mapping units were selected from the SSURGO database (USDA-NRCS 2007). The SSURGO database contains information about soil as collected by the National Cooperative Soil Survey over the course of a century. Soil mapping units were included if their predominant soil was of an aquic suborder.

Acreage for all included mapping units within aquifers was then summarized for each county. Results are summarized in Table 12. For the 18 counties analyzed, the percent of acreage overlying aquifers ranges from negligible (Cavalier, Pembina, and Walsh Counties) to a maximum of 52% for Griggs County, with a composite average of 20%. This means that overall, 80% of the land in the 18 counties could be drained with no negligible impact on pumpable ground water. Of the aquifer acreage for the 18 counties analyzed, aquic soils (soils likely to be profitably drained) vary from negligible (LaMoure County) to a maximum of 54 percent (Richland and Traill Counties), with a composite mean of about 35%. This means that about 35 % of the aquifer land itself could be profitably drained. If 20% of the land (aquifer land) could potentially affect well capture could be profitably drained, then a composite average of about 7% of all the land in the 18 counties evaluated would potentially have a conflict between tile drainage and water pumpage.

Table 11: Summary of estimated potential drainable soils overlying aquifers

County	County in Acres	Aquifer in Acres	Aquic Soils in Acres	Sandy Aquic Soils in Acres	Fine Aquic soils in Acres	Percent County Soils Over Aquifers	Percent Aquifer Soils that are Aquic	Percent County soils that are <i>aquic</i> and over aquifers	Percent <i>Aquic</i> soils that are sandy*	Percent Aquifer soils that are <i>aquic</i> and sandy
Traill	55,964	40,680	21,975	1,676	20,299	7	54	4	7	4

Source: Potential Effects of Subsurface Drainage on Water Appropriation and the Beneficial Use of Water in North Dakota

3.2.7 Lakes

The only Lake in Traill County is Grandin Lake. It is located on the eastern side of the county near Hillsboro and has public access as well as fishing access with a fishing license.

3.2.8 Rivers

The Elm River and the North Branch Elm River run through Traill County.

The Red River borders Traill County on the eastern side. The Red River is a North American river, originating at the union of the Bois de Sioux and Otter Tail rivers between Minnesota and North Dakota. It flows northward through the Red River Valley, forming the border of Minnesota and North Dakota and continuing into Manitoba, Canada. It empties into Lake Winnipeg, whose waters join the Nelson River and ultimately flow into the Hudson Bay.

The Red River flows through several urban areas along its path, including those of Fargo-Moorhead and Grand Forks in the United States and Winnipeg in Canada. The Red River is about 550 miles long, of which about 395 miles are in the United States and about 158 miles are in Canada. The river falls 230 feet on its journey to Lake Winnipeg where it spreads into the massive deltaic wetland known as Netley Marsh.

In the United States, the Red River is sometimes called the Red River of the North, to distinguish it from

the Red River that is a tributary of the Atchafalaya River, and that forms part of the border between Texas and Oklahoma.

The Goose River and the North Branch Goose River run through Traill County. The Goose River is a 179-mile-long tributary of the Red River of the North. Via the Red River, Lake Winnipeg, and the Nelson River, it is part of the watershed of Hudson Bay. The Goose River is crossed by the Northwood Bridge, listed on the National Register of Historic Places.

Figure 6: North Dakota Lake, Rivers and Water Resources

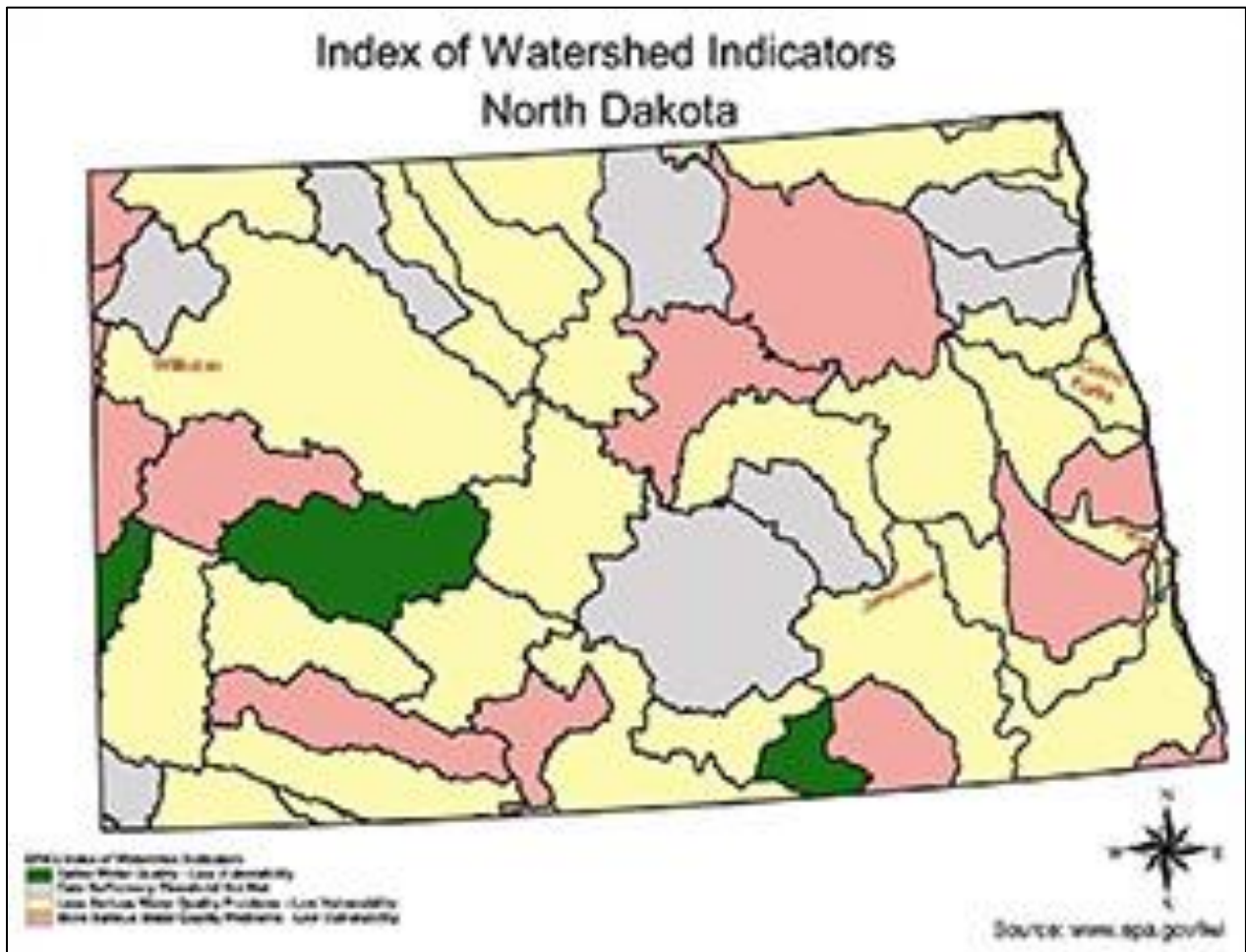


3.2.9 Watersheds

North Dakota has fifty-two watershed districts. Water-related problems are solved and prevented by these units. The watersheds which serve Traill County are the Elm-Marsh Watershed, Goose watershed, and the Sandhill-Wilson watershed. Each of these 3 watersheds serves parts of North Dakota and Minnesota. The boundaries of a watershed differ from the political boundaries of a county because a watershed boundary is dependent upon the local bodies of water. A water-related event such as a flood knows no boundaries, so it is important to manage water and practice mitigation in conjunction with all jurisdictions within a watershed.

The Natural Resources Conservation Service of North Dakota is part of the Emergency Watershed Protection (EWP) Program. The purpose of the EWP program is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.

Figure 7: Watersheds in North Dakota



3.2.10 Wetlands

Wetlands are transitional areas between land and water. Wetlands are saturated with water or covered by shallow water at least part of most years. Only specially adapted plants can thrive in these wet, saturated soil conditions.

Wetlands include, but are not limited to, swamps, marshes, bogs, prairie potholes, sloughs, and wetland fringe adjacent to streams. Less obvious wetlands may only hold water for a few weeks in the spring.

As a public works agency, North Dakota Department of Transportation (DOT) must obtain appropriate approvals and permits from regulatory agencies when projects will have unavoidable adverse impacts to wetlands. The goal of the Wetlands Reserve Program (WRP), which was a voluntary program that offered landowners the opportunity to protect, restore, and enhance wetlands on their property, is to ensure that wetland and water resources are accurately identified during project development and that appropriate measures are taken to avoid and minimize impacts whenever feasible, then compensate if needed.

Developing and establishing mitigation banks provide an efficient and effective way to offset unavoidable natural resource impacts, improve environmental compliance efforts, and create ecologically sustainable mitigation and conservation projects. The banking program allows NDDOT to efficiently mitigate for

unavoidable wetland and natural resource impacts from highway construction and maintenance projects.

The banking program aims to meet NDDOT's mitigation needs for highway construction and maintenance projects, address resource and regulatory agency statutes and regulations, and increase efficiency in the mitigation/conservation permitting and approval process by:

- Improving project delivery by increasing certainty and removing mitigation and associated permitting issues from the critical path of project development;
- Meeting or exceeding state and federal compensatory mitigation and conservation requirements;
- Ensuring banking program projects optimize mitigation investment by addressing ecological priorities on a watershed and landscape level and implementing long-term protection, stewardship, and adaptive management for bank sites.

Wetland mitigation Banks for unavoidable impacts to jurisdictional wetlands are regulated by the United States Army Corps of Engineers and by the Federal Highway Administration for Executive Order 11990 impacts.

Figure 8: Wetland Mitigation Bank for North Dakota



Map 1. Wetland Mitigation Bank Regional Service Areas For North Dakota

3.2.11 Soil

The soils within the Lake Agassiz Region are among the most fertile and productive in the world, therefore it would be expected a large percentage of land would be cropland. The soils are also the Region's most valuable resource, and must therefore be wisely managed. Of concern is the potential for erosion, which has depleted soils in the past, the excessive use of agricultural chemicals, poor management practices (such as lack of crop rotation and excessive tillage), and the increasing amount of prime agricultural land lost to urban development (mostly around the Fargo area). Of particular concern is the impact to the

Region's soil and resulting loss of agricultural production because of soil salinity.

Since the early 1990s, there has been a significant increase in soil salinity, which is a concern for producers in the Region. The Natural Resources Conservation Service (NRCS) estimates 1.5 million to 2.5 million acres of saline soil in the Red River Valley. The fertile soils of the Red River Valley, known as glacial Lake Agassiz, formed when deposits filled the lake after the last ice age ended about 10,000 years ago. During the ice age, a sheet of glacial ice several thousand feet thick depressed the earth as much as 600 feet and created a huge bowl, resulting in several hundred feet of lake deposits. The Red River Valley is now a regional discharge area for the entire northern plains, with salty water moving into and through the valley.

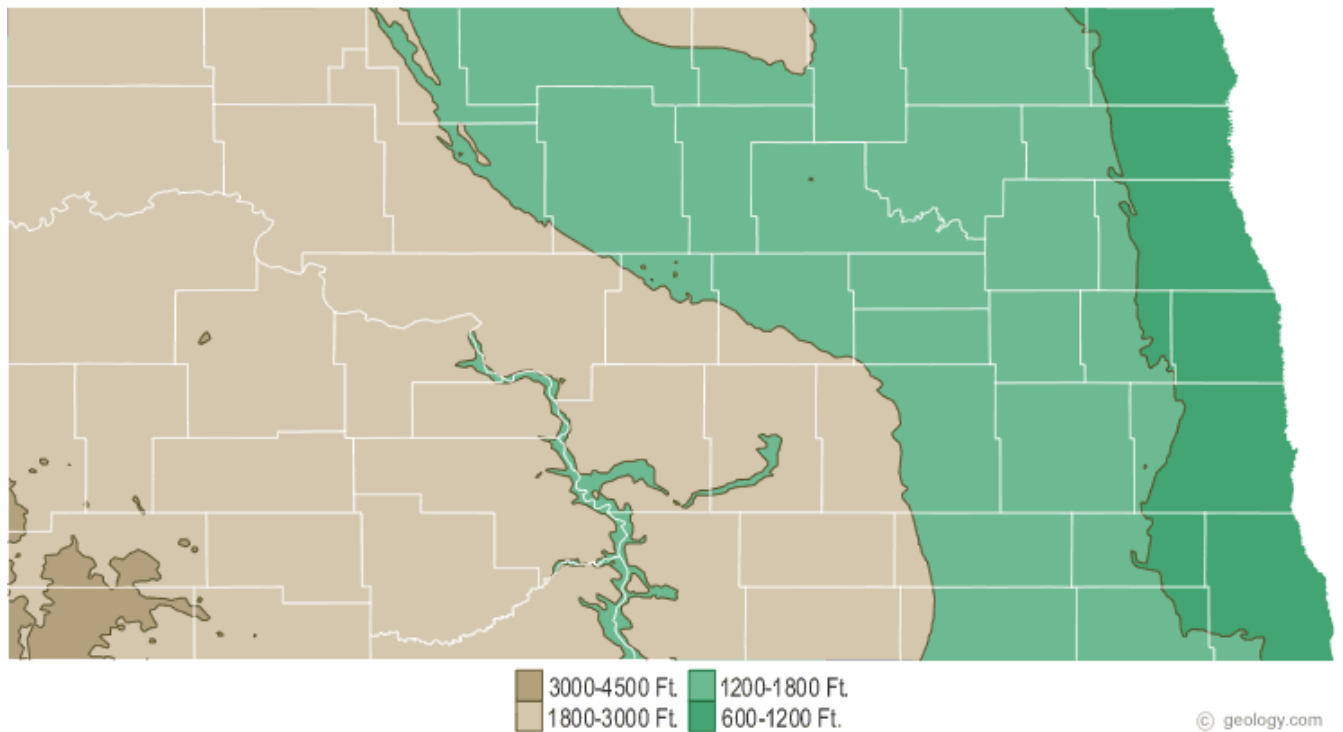
There is a potential for very high economic losses to agricultural producers. NRCS estimates economic losses over the next 50 to 75 years could reach well into the billions of dollars. Therefore, an increased awareness of the impacts of salinity, a better understanding of the problem, methods to better estimate the acreage of increasing soil salinity and the development of a long-term strategy for reducing salinity in the valley is needed.

Over time, slightly saline soils are becoming moderately to strongly saline; and salinity is moving into more productive non-saline areas. The change is a subtle one, and as such, many producers do not understand the scope of the problem. The increase in saline acres in the Region is the result of the current wet cycle, which began in the early 1990s, and from a change in land use. Soils in North Dakota formed under native prairie vegetation. The conversion of the land to agricultural crop production has caused an increase of soil salinity because annual crops use less moisture than native prairie vegetation, which has allowed for an accumulation of excess moisture in the soil profile. The result of unused soil moisture has been a rise in water tables, the lateral movement of water in the soil, and a migration of water to adjacent lands along the fringes of wetlands and road ditches. Road ditch-affected salinity impacts at least 30,000 acres which are directly caused by road construction. Often this type of salinity can easily be corrected with better construction methods that allow water to adequately flow in the road ditch, rather than allowing water to remain in the road ditch and wick to the adjacent land. Since salts are soluble, they easily move with the soil water. Evaporation or evapotranspiration then removes the excess water from an area, the result of which is salts that remain at or near the soil surface. Since it is economically impractical to seed millions of acres back to native prairie grasses in order to use the excess water, it is important to pursue management options acceptable to the agricultural economic system in an attempt to mimic native grasses and improve water use.

3.2.12 Topography

North Dakota straddles two major US physiographic regions: the Central Plains in the east and the Great Plains in the west. Along the eastern border is the generally flat Red River Valley, with the state's lowest point, 750 ft. Most of the eastern half of North Dakota consists of the Drift Prairie, at 1,300–1,600 ft. above sea level. The Missouri Plateau occupies the western half of the state and has the highest point in North Dakota — White Butte, 3,506 ft. — in Slope County in the southwest. Separating the Missouri Plateau from the Drift Prairie is the Missouri Escarpment, which rises 400 ft. above the prairie and extends diagonally from northwest to southeast.

Figure 9: Traill County Topography



The elevation in Traill County ranges from 600-1200 feet. The lowest point in North Dakota is the Red River at 750 feet, which borders Traill County to the east.

3.2.13 Land Use

According to the 1997 NRCS Natural Resources Inventory (NRI), cropland is the predominant land use and accounts for almost 82% (3,436,800 acres) of the Region's total 4,174,900 acres. For the purpose of this report, cropland is defined as all lands used for crop production, hay land, and Conservation Resource Program (CRP). Ransom and Sargent Counties have the lowest proportion of cropland acreage in the region (73% and 72% respectively), while cropland in Traill County, situated almost entirely in the Red River Valley, makes up about 92% of the total acres in the county. Agricultural uses (combined cropland, hayland, pastureland, and rangeland) comprise 89% of the region's land uses - a strong indicator of the importance of agriculture in the regional economy. The proportion of cropland to rangeland over the last ten years has increased, prompted by high grain prices.

Seven percent of the Region's land, 292,000 acres, is used as rangeland and pastureland, defined as all land with native or tame grasses, as well as shrubs, as the principal cover. Sargent and Ransom Counties have larger proportions of rangeland and pastureland, 12% and 18% respectively, than do the other counties. Noxious weeds, primarily leafy spurge, continue to be an increasing problem in pastureland and rangeland for all counties in the Lake Agassiz Region. It is common to find that production has been reduced by 20-50% or more. According to a North Dakota State University (NDSU) paper "Assessing the Economic Impact of Invasive Weeds: The Case of Leafy Spurge, 2004, statewide, NDSU estimates there are 625,900 acres of rangeland affected with an economic impact of \$105/acre; and 350,300 acres of wild land affected with an economic impact of \$17/acre. The average loss per acre is \$76 to 86 million dollars

annually.

There have been numerous research efforts to find effective control methods for leafy spurge, however, both technical and financial assistance are still needed by county weed boards in their efforts to control this weed.

Forest lands comprise an insignificant percentage of the overall land use picture of the Lake Agassiz Region. Forested areas occur in conjunction with the Region's rivers, the most heavily wooded areas being the Red River Valley, the Sheyenne River Valley, and the Goose River Valley. Approximately thirty years ago, native and urban forests were devastated by Dutch Elm disease, which is still found in every community throughout the entire six-county area. Unfortunately, most elm trees have already been destroyed, however, the remaining trees in rural communities need to be protected primarily by preventing the storage of barked elm firewood.

An Emerald Ash Borer infestation is a concern for communities and landowners in the area. A program of detection and sanitation is needed to protect the ash forest. In 2008, the North Dakota Forest Service completed an inventory of ash trees in preparation of a probable Emerald Ash Borer infestation, the report indicated 36% of trees in the area are ash, all of which would likely be lost with an Emerald Ash Borer infestation. Nearly all rural communities are in need of urban forestry assistance. Efforts to inform communities of current programs which provide financial and technical assistance in the planning and maintenance of urban forests and community beautification is needed.

According to 1997 NRCS Natural Resources Inventory, urban lands comprise only 4.3% of the total land area in the Region, which is defined as developed land within incorporated communities, small and large urban development, and all roads, highway right-of-way, and railroads. Of the Region's six counties, Cass has the greatest proportion of land dedicated to urban uses, 6.5 percent. The conversion of agricultural land to urban uses is taking place in areas adjacent to larger cities in the Region, but most notably around Fargo and West Fargo. West Fargo is the fastest growing city in the state. Sprawling development has become an increasing problem in recent years, where housing subdivisions and large commercial developments comprise most of the growth.

Table 12: Traill County Land Use

Land Use	Traill County (Acres)
Cropland	507,500
Hay land	900
CRP	0
Pastureland	3,400
Rangeland	5,300
Forest Land	5,200
Federal Land	700
Urban	3,600
Transportation	13,200
Water	1,900
Other	10,400
Total	552,100

3.3 Population and Demographics

3.3.1 Historic Population

Trail County's population data since 1880 is presented in Table 14. Notice that the population has decreased nearly every decade except 1890 - 1900, 1900-1910, and 1980-1990. Since 1910, the County has experienced a steady downward trend in population.

Table 13: Population of Trail County since 1880 (U.S. Census)

Year	Population	Percent Change
1880	4,123	—
1890	10,217	147.8%
1900	13,107	28.3%
1910	12,545	-4.3%
1920	12,210	-2.7%
1930	12,600	3.2%
1940	12,300	-2.4%
1950	11,359	-7.7%
1960	10,583	-6.8%
1970	9,571	-9.6%
1980	9,624	0.6%
1990	8,752	-9.1%
2000	8,477	-3.1%
2010	8,121	-4.2%

Source: North Dakota Demographics Center

3.3.2 Population Trends

The 2010 regional population was 185,481 (an increase of 14.4% from 2000) comprising nearly 28% of the state's population. As the table below shows, the increase was due entirely to Cass County, which grew from 123,138 to 149,778 (an increase of 21.6%). The table illustrates the continued decline of the region's rural county population, a decline that had tapered off somewhat between 1990 and 2000 but accelerated in all of the rural counties between 2000 and 2010. The population within the five rural counties has decreased by 8.4% during the past decade. The region's population continues to become increasingly urbanized, a trend that began in the 1930's as farms mechanized and the demand for farm labor diminished.

Table 14: Population 1980-2010, Region 5 ND, by County

County	1980 Pop	1990 Pop	2000 Pop	2010 Pop	1980-90 Change Rate	1990-00 Change Rate	2000-10 Change Rate	1980-10 Change Rate
Cass	88,247	102,874	123,138	149,778	16.6%	19.7%	21.6%	69.7%
Ransom	6,698	5,921	5,890	5,457	-11.6%	-0.5%	-7.4%	-18.5%
Richland	19,207	18,148	17,998	16,321	-5.5%	-0.8%	-9.3%	-15.0%
Sargent	5,512	4,549	4,366	3,829	-17.5%	-4.0%	-12.3%	-30.5%
Steele	3,106	2,420	2,258	1,975	-22.1%	-6.7%	-12.5%	-36.4%
Traill	9,624	8,752	8,477	8,121	-9.1%	-3.1%	-4.2%	-15.6%
Total Rural Counties	44,147	39,790	38,989	35,703	-9.9%	-2.0%	-8.4%	-19.1%
Total	132,394	142,664	162,127	185,481	7.8%	13.6%	14.4%	40.1%

Source: North Dakota State Data Center, Population Trends by ND County, 1870-2000; US Census of Population 2010

3.3.3 Comparable Growth

One of the best ways to understand Traill County's rate of population growth is to examine the growth rates of neighboring counties. Table 16 compares Traill County to Grand Forks County, ND, Polk County, MN, Norman County, MN, Cass County, ND and Steele County, ND.

Table 15: Comparable Growth in Neighboring Counties

County	2000 Census	2010 Census	% change
Grand Forks County, ND	66,109	66,861	+1.1%
Polk County, MN	31,369	31,600	+0.7%
Norman County, MN	7,442	6,852	-7.9%
Cass County, ND	123,138	149,778	+21.6%
Steele County, ND	2,258	1,975	-12.5%
Traill County, ND	8,477	8,121	-4.2%

According to the above information, Traill County is experiencing a moderate level of population decrease compared to the counties around it. Cass County is experiencing the most population growth, while Steele County experienced the most population decrease.

3.3.4 Households

Currently, the number of family households in Traill County comprise 63.3% of the county's households, with 26% of those having children under the age of 18. There are a greater percentage of households with individuals 65 and older versus those who are households with individuals 18 and under.

Table 16: Households, and Average Household Size of Traill County (U.S. Census)

Total households	Number	Percentage
Family households (families)	2,150	63.3
With own children under 18 years	882	26.0
Husband-wife family	1,838	54.2
Male householder, no wife present	101	3.0
Female householder, no husband present	211	6.2
Nonfamily households	1,244	36.7
Householder living alone	1,062	31.3

Total households	Number	Percentage
Male	515	15.2
65 years and over	131	3.9
Female	547	16.1
65 years and over	371	10.9
Households with individuals under 18 years	936	27.6
Households with individuals 65 years and over	1,008	29.7

According to the Traill County Economic Development Commission Housing Demand Analysis-2030, Traill County is projected to increase in population during the next five years to reach a population of 8,343 by 2020. This also includes an estimated increase of 19 households. The County is projected to consist of an estimated 2,429 owner and 1,006 renter households by 2020. This includes a slight decrease in owner households, but an increase in renter households. The cities of Hillsboro and Mayville were determined to have the greatest demand for new housing development throughout the planning period, due to the existence of recently-platted subdivisions within each community's respective corporate limits.

3.3.5 Population and Household Projections

Population projections by county were released by the ND State Data Center in 2002. The projections were developed using a cohort-survival model based on census trends that reflected downward movement among most rural counties and growth among counties with larger urban centers. A principal assumption of the projections, however, was a weakening of the flow of population from farmsteads and small rural communities into the state's metropolitan areas. When compared with actual counts from the 2010 Census, this assumption proved to be in error or at the very least overstated with respect to trends in the region. The following table shows that the 2010 projections underestimated Cass County's growth by 8.8% and a decline in the rural counties by 5.8%. Through 2010 urban growth increased at a faster pace than during previous decades (1980-2000) and rural county losses accelerated between 2000 and 2010. This trend does not bode well for rural counties and small farm trade center communities.

Table 17: Population Projections for Traill and Surrounding Counties

County	Projected 2010	Projected 2015	Projected 2020	Actual 2010	Difference
Cass County	137,724	144,880	151,651	149,778	8.8%
Ransom County	5,844	5,860	5,840	5,457	-6.6%
Richland County	17,570	17,414	17,218	16,321	-7.1%
Sargent County	4,230	4,225	4,272	3,829	-9.5%
Steele County	2,134	2,102	2,074	1,975	-7.5%
Traill County	8,141	7,987	7,771	8,121	-0.2%
Total Rural Counties	37,919	37,588	37,175	35,703	-5.8%
Total	175,643	182,468	188,826	185,481	5.6%

Tables 19 through 25 are a collection of a few different tables of special populations. This is important because the data points out where there might be some areas of consideration during the planning process.

3.3.6 Population by Age Groups

Table 18 shows the breakdown of Traill County's population by age categories. Traill County's total population is 8,121, with the largest age group makeup being those 50-54 years old. This indicates the major age group in Traill County is older and will be nearing retirement in the next decade, which could

have financial implications on the county.

Table 18: Traill County's Population by Age Groups in 2010 (U.S. Census)

Subject	Number	Percent
Total population	8,121	100.0
Under 5 years	510	6.3
5 to 9 years	465	5.7
10 to 14 years	504	6.2
15 to 19 years	604	7.4
20 to 24 years	528	6.5
25 to 29 years	385	4.7
30 to 34 years	401	4.9
35 to 39 years	428	5.3
40 to 44 years	482	5.9
45 to 49 years	594	7.3
50 to 54 years	643	7.9
55 to 59 years	604	7.4
60 to 64 years	452	5.6
65 to 69 years	380	4.7
70 to 74 years	282	3.5
75 to 79 years	260	3.2
80 to 84 years	279	3.4
85 years and over	320	3.9
Median age (years)	42.6	(X)
16 years and over	6,530	80.4
18 years and over	6,311	77.7
21 years and over	5,924	72.9
62 years and over	1,771	21.8
65 years and over	1,521	18.7

3.3.7 Special Populations

Special population is a term used to express a disadvantaged group, for example, populations with disabilities, minors, and the elderly. Special populations often require accommodations for physical, mental or emotional differences. Emergency service providers must carefully consider special populations. The following tables illustrate four subgroups of special populations in Traill County: elderly, children, female, and individuals with a disability.

The first table outlines the number of households with children. The factor that makes this table noteworthy is the majority of households with children are married couples.

Table 19: Children

Subject	2010 Census Data (US Census Bureau)
Family households with children	821
Married couples with children	646
Single mothers with children	134
Single fathers with children	41

The elderly table is a recap of earlier stated county population data of just the 65 years old and older population. Currently, the number of 65 and older makes up 18.7% of the total county population, but this number will increase exponentially as the baby boomers age.

Table 20: Elderly

Subject	2010 Census Data (US Census Bureau)
65 to 69 years old	380
70 to 74 years old	282
75 to 79 years old	260
80 to 84 years old	279
85 years and older	320
Total	1,521

The female population table represents the number of females in the county. An interesting point shown in this table is that there is a small population of female children in the county.

Table 21: Females

Subject	2010 Census Data (US Census Bureau)
Female Population	4,054
Under 18 years old	872
18 years and older	3182
65 years and older	893

Table 22 outlines the population in Traill County with a disability. The table is an overview of the total of those with a disability condition recognized in the 2010 census.

Table 22: Population with a Disability

Disability Status of the Civilian Non-Institutionalized Population	Number	Percent
Total Civilian Noninstitutionalized Population	7,982	100.0%
With a disability	889	11.1%
Under 18 years	1,819	100.0%
With a disability	57	3.1%
18 to 64 years	4,780	100.0%
With a disability	412	8.6%
65 years and over	1,383	100.0%
With a disability	420	30.4%

According to the US Census Bureau, 2.0% of Traill County's population is considered institutionalized.

Table 23: Institutionalized Population

Subject	2010 Census Data (US Census Bureau)	Percentage
Institutionalized	168	2.0%

The total estimate of individuals in poverty in Traill County was just under 9% in 2010.

Table 24: Traill County Poverty

County Name	Estimate
Traill County, North Dakota	8.9

3.4 Cultural Conditions

Prior to European contact, Native Americans inhabited North Dakota for thousands of years. In the historic period, American Indian tribes included the Mandan people, the Dakota people and the Yanktonai, the latter two tribes of the Lakota peoples. The first European to reach the area was the French-Canadian trader La Vérendrye, who led an exploration party to Mandan villages in 1738.

Dakota Territory was settled sparsely by European Americans until the late 19th century when the railroads were constructed into the region. The European Americans obtained grants for land and vigorously marketed their properties, extolling the region as ideal for agriculture. An omnibus bill for statehood for North Dakota, South Dakota, Montana, and Washington, titled the Enabling Act of 1889, was passed on February 22, 1889, during the administration of Grover Cleveland. His successor, Benjamin Harrison, signed the proclamations formally admitting North Dakota and South Dakota to the Union on November 2, 1889.

The original North Dakota State Capitol in Bismarck burned to the ground on December 28, 1930. It was replaced by an art deco skyscraper that still stands today. A round of federal investment and construction projects began in the 1950s, including the Garrison Dam and the Minot and Grand Forks Air Force bases.

There was a boom in oil exploration in western North Dakota in the late 1970s and early 1980s, as rising petroleum prices made development profitable. This boom came to an end after petroleum prices declined.

In recent years the state has had a strong economy, with unemployment lower than the national average and strong job and population growth. Much of the growth has been based on the development of the Bakken oil fields in the western part of the state. Estimates as to the remaining amount of oil vary, with some estimating over 100 years' worth of oil remaining in the area.

3.4.1 Historical

Traill County was established Jan 12, 1875, and organized February 23, 1875. The first county seat was Goose River which changed its name in August 1875 to Caledonia. The county seat was moved in 1896 to Hillsboro to be more centrally located. The county was named for Walter John Strickland Traill (1847-1938), a Canadian who was employed by Hudson Bay and was a prominent citizen during the early days of the county.

3.4.2 Race and Ethnicity

The vast majority of Traill County, ND is white, with the percentage being 97.2. The next largest category is Hispanic or Latino with 2.6%. This indicates there is not much cultural diversity within the county. This can have a significant impact on hazard mitigation planning.

Table 25: Population of Traill County by Race and Ethnicity

Race	Population	Percent
White	7,897	97.2
Black or African American	71	0.9
American Indian and Alaska Native	111	1.4
Asian	34	0.4
Native Hawaiian and Other Pacific Islander	12	0.1
Some Other Race	95	1.2
Hispanic or Latino	214	2.6

The following table illustrates that there is a distinct majority regarding the language spoken in the homes of residents of Traill County. One can see that 97.2% of residents speak only English at home, and only 1.3% of residents speak Spanish.

Table 26: Language Spoken at Home in Traill County

Language Spoken at Home	Population	Percent
Population 5 years and over	7,622	7,622
English only	7,408	97.2%
Language other than English	214	2.8%
Speak English less than "very well"	30	0.4%
Spanish	101	1.3%
Speak English less than "very well"	6	0.1%
Other Indo-European languages	100	1.3%
Speak English less than "very well"	24	0.3%
Asian and Pacific Islander languages	4	0.1%
Speak English less than "very well"	0	0.0%
Other languages	9	0.1%
Speak English less than "very well"	0	0.0%

3.4.3 Level of Education

The next table indicates the level of education of the residents of Traill County. This indicates that of the population in Traill County 25 and over, the majority of the county has graduated from high school and attended some college.

Table 27: Level of Education for Traill County

Educational Attainment	Number	Percent
Population 25 years and over	5,490	5,490
Less than 9th grade	259	4.7%
9th to 12th grade, no diploma	249	4.5%
High school graduate (includes equivalency)	1,494	27.2%
Some college, no degree	1,261	23.0%
Associate's degree	698	12.7%
Bachelor's degree	1,261	23.0%

Educational Attainment	Number	Percent
Graduate or professional degree	268	4.9%
Percent high school graduate or higher	(X)	90.7%
Percent bachelor's degree or higher	(X)	27.9%

Source: U.S. Census 2010

3.4.4 Socioeconomic Conditions: Income

The income per household in Traill County as of 2012 can tell a lot about the County as a whole. There are a total of 3,374 households in the county. The income range with the highest number of households is the \$35,000-\$49,999 range, with the second largest income range being \$50,000-\$74,999. These statistics indicate that almost half the households in the county have income ranges within the lower to mid-middle class.

Table 28: Income and Benefits per Household in 2012 Traill County

Income and Benefits	Population	Percent
Total households	3,374	3,374
Less than \$10,000	218	6.5%
\$10,000 to \$14,999	169	5.0%
\$15,000 to \$24,999	368	10.9%
\$25,000 to \$34,999	354	10.5%
\$35,000 to \$49,999	680	20.2%
\$50,000 to \$74,999	665	19.7%
\$75,000 to \$99,999	424	12.6%
\$100,000 to \$149,999	373	11.1%
\$150,000 to \$199,999	82	2.4%
\$200,000 or more	41	1.2%
Median household income (dollars)	46,398	(X)
Mean household income (dollars)	60,373	(X)

3.4.5 Employment Status

The following table indicates that the unemployment rate in Traill County is actually significantly less than the national average. The national average unemployment rate is 6.9% and the actual unemployment in Traill County in 2010 was just 1.5%.

Table 29: Employment Status in Traill County Estimates from 2008-2012

Employment Status	Population	Percent
Population 16 years and over	6,507	6,507
In labor force	4,307	66.2%
Civilian labor force	4,305	66.2%
Employed	4,209	64.7%
Unemployed	96	1.5%
Armed Forces	2	0.0%
Not in labor force	2,200	33.8%

Source: U.S. Census Bureau

3.4.6 Occupation

The following table shows that the majority of occupations by people in Traill County are either in management, business, science and arts occupations, or sales and office occupations. These 2

occupation type categories make up almost half of the occupations in the County.

Table 30: Occupations in Traill County (estimates from 2008-2012)

Occupation	Population	Percent
Civilian employed population 16 years and over	4,209	4,209
Management, business, science, and arts occupations	1,238	29.4%
Service occupations	751	17.8%
Sales and office occupations	955	22.7%
Natural resources, construction, and maintenance occupations	550	13.1%
Production (including agriculture), transportation, and material moving occupations	715	17.0%

3.4.7 Faith Based Community

In Traill County, the faith-based community is strong, with three-quarters of the entire county population participating in their religion of choice. The majority of the county is predominantly Evangelical Lutheran with Catholicism ranking second. The adherent totals of the religious groups listed below (5,510) included 75.3% of the total population in 2010.

The faith-based communities have had a long history of providing a communication and reaction conduit for those expressing an interest in disseminating information.

Table 31: Location of Churches in Traill County

Church Name	Location	Affiliation
First American Church	Mayville	Lutheran-ACLC
NY Stavanger Lutheran Church	Buxton	Lutheran-AFLC
Valley Free Lutheran Church	Portland	Lutheran-AFLC
Zoar Free Lutheran Church	Hatton	Lutheran-AFLC
Bang Lutheran Church	Rural Portland	Lutheran-ELCA
Bethany Lutheran Church	Rural Hatton	Lutheran-ELCA
Bruflat Lutheran Church	Portland	Lutheran-ELCA
Elm River Lutheran Church	Galesburg	Lutheran-ELCA
Goose River Lutheran	Rural Hatton	Lutheran-ELCA
Gran Lutheran Church	Rural Mayville	Lutheran-ELCA
Highland Lutheran Church	Rural Cummings	Lutheran-ELCA
Immanuel Lutheran Church	Buxton	Lutheran-ELCA
Little Forks Lutheran Church	Rural Hatton	Lutheran-ELCA
Mayville Lutheran Church	Mayville	Lutheran-ELCA
Normal Lutheran Church	Clifford	Lutheran-ELCA
Our Savior's Lutheran Church	Hillsboro	Lutheran-ELCA
Perry Lutheran Church	Rural Portland	Lutheran-ELCA
St. Olaf Lutheran Church	Rural Reynolds	Lutheran-ELCA
Stordahl Lutheran Church	Rural Galesburg	Lutheran-ELCA
Zion Lutheran Church	Reynolds	Lutheran-ELCA
Audral Lutheran Church	Portland	Lutheran-LCMC
St. John Lutheran Church	Hillsboro	Lutheran-LCMC

Church Name	Location	Affiliation
St. John Lutheran Church	Hatton	Lutheran-LCMC
Our Lady Peace Catholic Church	Mayville	Roman Catholic
St. Rose of Lima Catholic Church	Hillsboro	Roman Catholic
Ebenezer Lutheran Brethren Church	Mayville	Lutheran
Riverside Evangelical Free Church	Mayville	Evangelical
Mayville United Parish	Mayville	United Church of Christ
Hillsboro United Parish	Hillsboro	United Church of Christ

The following table outlines the breakdown of population affiliated with religious congregations.

Table 32: Religious Bodies

Name	Evangelical Church in America	Catholic Church	Lutheran Church	United Church of Christ	Other
Adherents	5,510 (75.3%)	914 (12.5%)	242 (3.3%)	238 (3.3%)	413 (5.6%)
Congregations	18 (64.3%)	2 (7.1%)	1 (3.6%)	2 (7.1%)	5 (17.9%)

Source: Jones, Dale E., et al. 2002. Congregations and Membership in the United States 2000. Nashville, TN: Glenmary Research Center.

3.4.8 Economic Conditions

Table 33 shows the most common industries in the county and displays the percentages for each industry.

Table 33: Most Common Industries in Traill County

Industry	Population	Percent
Civilian employed population 16 years and over	4,209	100.0%
Agriculture, forestry, fishing and hunting, and mining	418	9.9%
Construction	237	5.6%
Manufacturing	448	10.6%
Wholesale Trade	203	4.8%
Retail trade	450	10.7%
Transportation and warehousing, and utilities	270	6.4%
Information	71	1.7%
Finance and insurance, and real estate and rental and leasing	223	5.3%
Professional, scientific, and management, and administrative and waste management services	138	3.3%
Educational services, and health care and social assistance	1,260	29.9%
Arts, entertainment, and recreation, and accommodation and food services	141	3.3%
Other services, except public administration	155	3.7%
Public administration	195	4.6%

3.4.9 Agriculture

Agriculture is the largest industry in North Dakota, although petroleum, food processing, and technology are also major industries. Its growth rate is about 8.3%, and the economy of North Dakota had a gross domestic product of \$36.8 billion in 2013.

Figure 10: Traill County Crop Trends

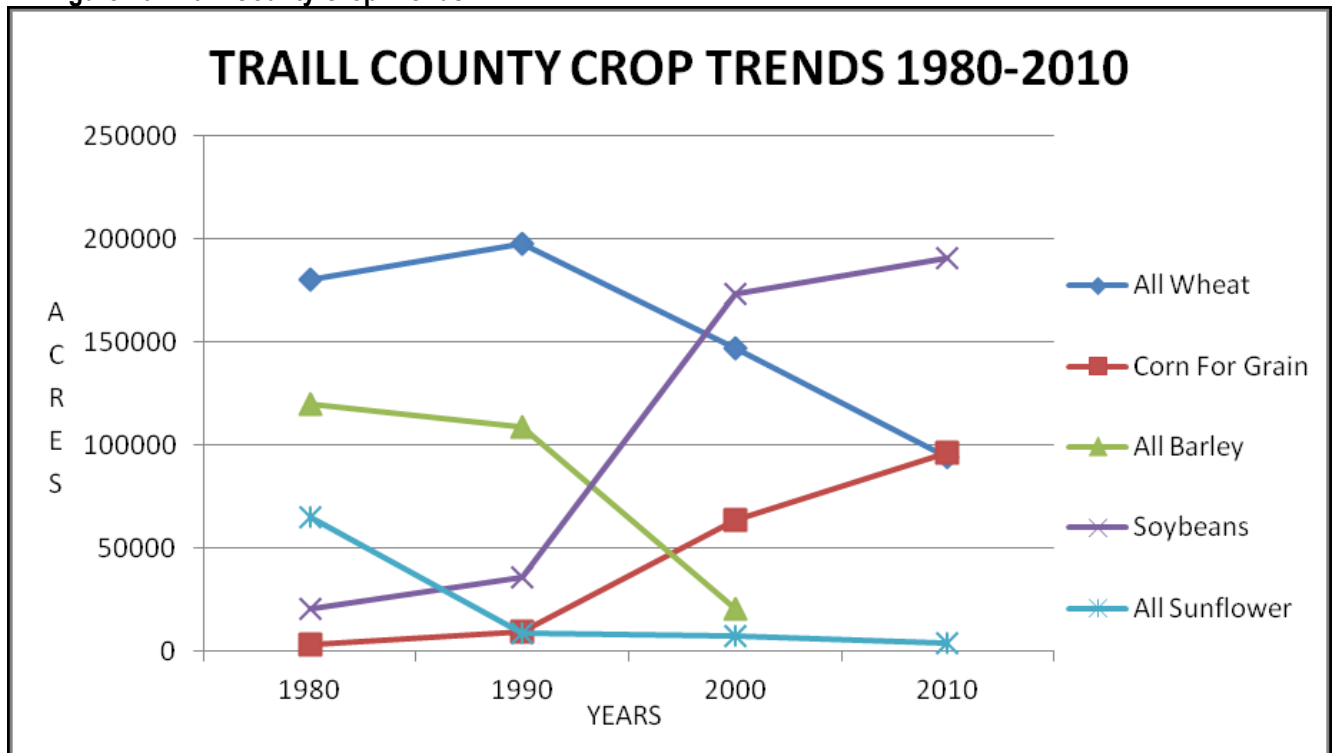


Table 34 outlines the profile for Traill County with regards to farms. Among all the North Dakota counties, Traill County ranks 9th in the total value of agricultural products sold. The table outlines the percent change seen from 2007 to 2012. As you can see, the acreage of land used for farms and the number of farms has increased in the time period indicated. This is critical information because agriculture is a big industry in the County.

Table 34: Traill County Farm Profile

	2012	2007	Percent Change
Number of Farms	468	460	+2
Land in Farms	547,732	543,650	+1
Average Size of Farm	1,170 acres	1,182 acres	-1

Source: U.S. Census of Agriculture

According to the Comprehensive Economic Development Strategy 2013 – 2017 Region 5, North Dakota document, principal crops grown in the region have changed dramatically over the past 30 years. High-value crops such as corn and soybeans have displaced wheat and sunflower as the reigning crops in terms of acres planted and profitability. There has also been an impact on the Conservation Reserve Program (CRP) which was initiated in 1985 to set-aside or remove the nation's most high erodible cropland for agricultural production. In more recent years the program was expanded to include all environmentally sensitive lands. Acres of CRP have fluctuated slightly between the years 1990 and 2010 depending on the type of land targeted for set-aside by USDA and by commodity prices at the time of CRP sign-up periods. A total of 140,083 acres were enrolled in 1990; 204,158 in 2000 and 187,918 in 2010 (National Agricultural Statistics Service).

While the region is not a significant livestock producer in the state, there has been a significant reduction in livestock numbers in the Region. The decline in livestock numbers has most likely occurred because of fewer farm families, less diversification in today's farm operations, and instability in livestock prices in recent years. From 1980 to 2010, the number of head for all cattle decreased from 174,000 to 109,300, milk cows decreased from 7,200 to 1,000, sheep from 38,300 to 5,300 and hogs from 67,200 to 24,200 (National Agricultural Statistics Service). The number of farm operators continues to decline as farms become larger. The number of farm operators decreased by 63% from 1950 to 2006 when the region registered just 3,516 farms. Average farm size was largest in Traill County (1,065 acres) and smallest in Ransom County (423 acres).

3.4.10 Future Development

Current economic trends for the region are as follows:

1. Aspects of agriculture have plummeted in recent years. Counties in the region with the most population loss often are agriculturally dependent. Population loss is an important issue in many counties.
2. Employment in the region has increased since 1990, but it is not an even growth. The gain is not enough to prevent population loss. Large losses are seen in agriculture and self-employment.
3. Some recent growth in the service and retail portions of the workforce is related to outside visitors coming to the region and surrounding areas for recreational purposes.
4. Agricultural lands and natural areas are a majority of the landscape in the region. The ensuing environment befits the preferences of a rural population.

3.4.11 Crime

The following table outlines the number and type of crime in Traill County from 2005.

Table 35: Crimes Known in 2005 in Traill County

Type of Crime	Number of Known Crimes
Murders	0
Rapes	0
Robberies	0
Assaults	2
Burglaries	4
Thefts	16
Auto Thefts	6

3.5 Critical Infrastructure

The term built environment refers to the human-made surroundings that provide the setting for human activity, ranging in scale from personal shelter and buildings to neighborhoods and cities that can often include their supporting critical infrastructure (bridges, water treatment, highways, etc.) and key resource (schools, museums, etc.) assets. The built environment is a material, a spatial and cultural product of human labor that combines physical elements and energy in forms necessary for living, working and playing. In urban planning, the phrase connotes the idea that a large percentage of the human environment is man-made, and these artificial surroundings are so extensive and cohesive that they function as organisms in the consumption of resources, disposal of wastes, and facilitation of productive enterprise within its bounds.

The County's infrastructure and facilities are important for its normal functioning and the health, safety, and general welfare of its residents. This section identifies Traill County's important critical infrastructure and facilities, including subsections on transportation, schools, medical facilities, waste facilities, and historic sites.

3.5.1 Airports

Traill County has 2 community airports: Mayville Municipal Airport and Hillsboro Municipal Airport. Both of these airports have paved landing strips available. In Mayville, the Mayville Airport Authority started a major airport renovation in 2014 that included a new asphalt runway that is now in service. Traill County is roughly midway between Grand Forks and Fargo. The nearest airline airport depends on from which part of the county an individual is in. For individuals in southern Traill County, the nearest airline airport is Hector Field at Fargo (Cass County), whereas for individuals in northern Traill County, the nearest airline airport is Grand Forks International (Grand Forks County).

Table 36: Traill County Airports

Traill County				
Hillsboro	Hillsboro Municipal Airport Authority	Runway 16 – 3301 x 60 ft. Runway 34 – 3301 x 60 ft.	Asphalt/Good	Fuel, Hangars, Tiedowns, Major Airframe, Major Power plant
Mayville	Mayville Airport Authority	Runway 17 – 3200 x 56 ft. Runway 35 – 3200 x 56 ft.	Asphalt/New	None

3.5.2 Railroads

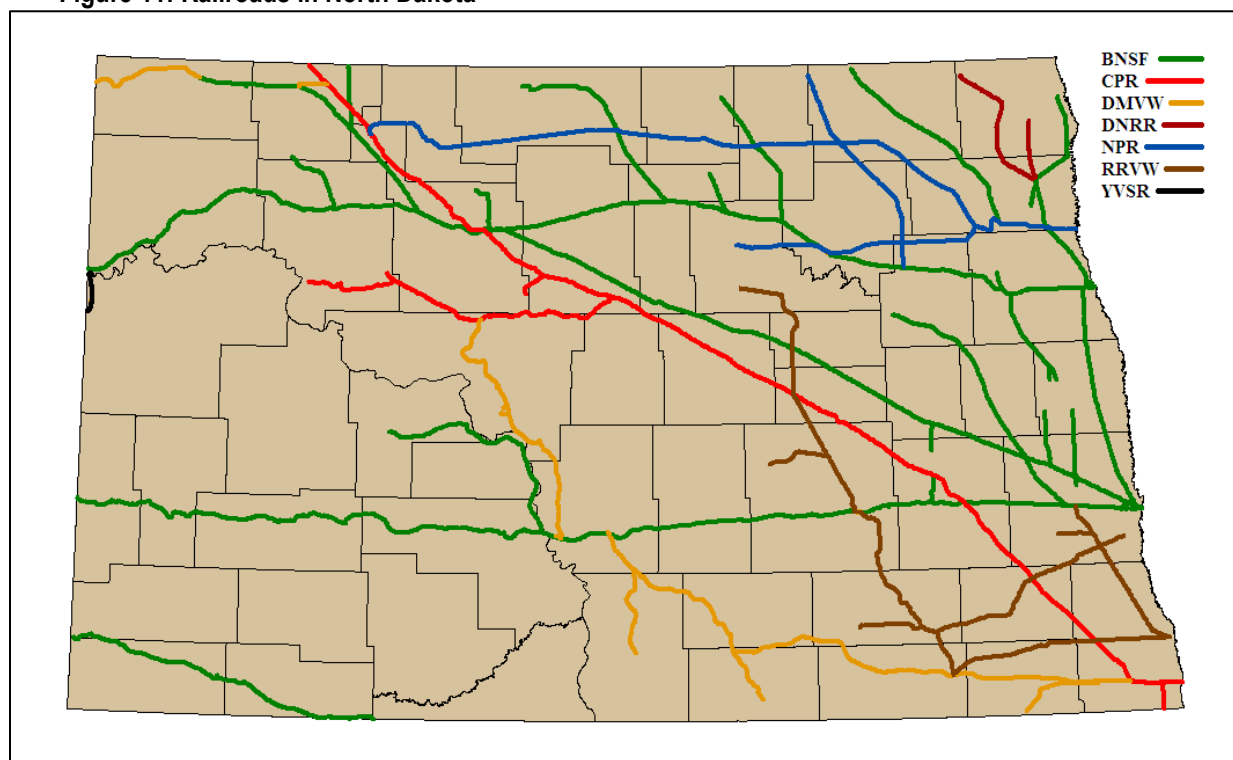
There are eight freight railroads in North Dakota covering 3,328 miles of railroad mileage. The industry employs 1,756 people with an average wage and benefits of \$117,420 per freight railroad employee. In 2012, American railroads moved a ton of freight an average of 476 miles on one gallon of fuel or going from Des Moines Iowa to Fargo North Dakota. On average railroad are four times more fuel efficient than trucks. Moving freight by rail instead of truck reduces greenhouse emissions by 75 percent. North Dakota was third in railroad freight. The map below illustrates the North Dakota freight railroad map.

The railway that runs through Traill County is Burlington Northern Santa Fe (BNSF) railway. The BNSF Railway is the second-largest freight railroad network in North America, second to the Union Pacific

Railroad, and is one of seven North American Class I railroads. Every year, BNSF moves more than 12 million tons of wheat, soybeans, corn, sweet beets, beans, and other agricultural products from North Dakota to help feed the world, and they also deliver the lumber needed to satisfy construction demands in the state, the fertilizer from plants around the country to feed crops on the Plains, and the coal needed to power homes in North Dakota.

Since 2005, BNSF has been instrumental in locating 17 new or expanded businesses in North Dakota, creating 40 jobs and generating more than \$23 million in investments. Helping companies like American Crystal Sugar Company in Ardoch, Custom Building Logs, Inc. in Bottineau, and Minot Milling in Minot grow their businesses in North Dakota. BNSF also participated in the development of the Northern Plains Commerce Center, a new public/private logistics center in Bismarck.

Figure 11: Railroads in North Dakota



As seen in the figure below, the railway in Traill County runs through Hatton and down to Portland and Mayville in the northwestern part of the County. In the southwestern portion of the County, the railway goes through Clifford and Galesburg. On the eastern side of the County, the railway starts through Reynolds and moves south through Buxton, then Cummings and Hillsboro.

Figure 12: Railroads in Traill County



Table 37: FRA Railroad Track Classification

Class	Freight Speed (mph)	Passenger Speed (mph)
One	10	15
Two	25	30
Three	40	60
Four	60	80

The efficiency of a railroad is affected by the physical condition of the rail lines. The Federal Railroad Administration (FRA) track classification is based upon the physical characteristics of the roadbed, track geometry, and track structure. There are four different track classifications with maximum freight and passenger speeds (Table 38). Characteristics related to the roadbed include drainage and vegetation. Track geometry includes gauge, alignment, elevation, and surface. Track structure involves ballast,

ties, rail, spikes, joints, and switches. These characteristics determine the allowable operating speeds for each rail line.

The weight restriction of a particular line has a great effect on the movement of grain traveling through the County. The most efficient means for rail shipment of grain is by 100-ton hopper cars. Such cars have a gross weight of 263,000 pounds. Without access to a rail with strength to handle these hopper cars, a shipper must choose between small rail cars or truck transportation. Both the CP/Soo and BNSF rail lines are designated to handle over 263,000 pounds. As a result, the CP/Soo and BNSF rail lines both bear over 10,000,000 gross tons of freight annually.

3.5.3 Pipelines

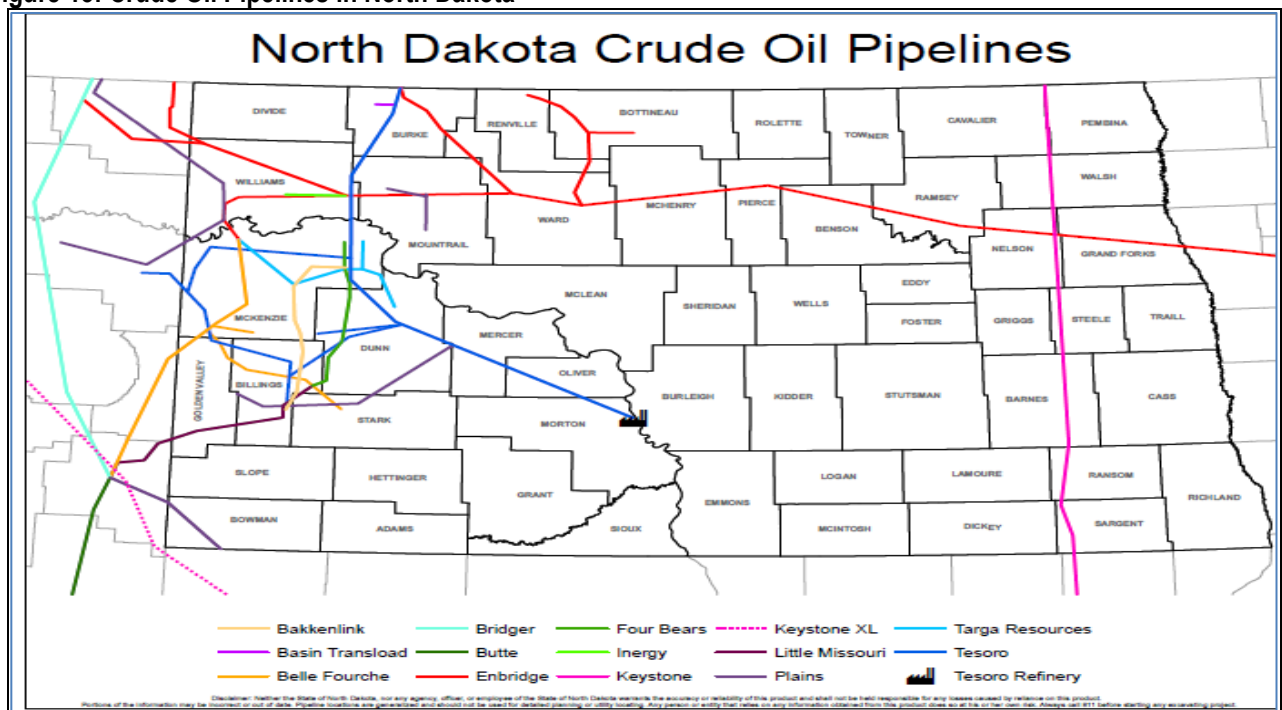
The energy transportation network of the United States consists of over 2.5 million miles of pipelines. That's enough to circle the earth about 100 times. These pipelines are operated by approximately 3,000 companies, large and small. Based on data generated from annual reports from pipeline operators, the network includes approximately:

- 175,000 miles of onshore and offshore Hazardous Liquid pipeline;
- 321,000 miles of onshore and offshore Gas Transmission and Gathering pipelines;
- 2,066,000 miles of Gas Distribution mains and service pipelines;
- 114 active LNG Plants connected to our gas transmission and distribution systems; and
- Propane Distribution System pipelines.

Although pipelines exist in all fifty states, most of us are unaware that this vast network even exists. This is due to the strong safety record of pipelines and the fact that most of them are located underground. Installing pipelines underground protects them from damage and helps protect our communities as well.

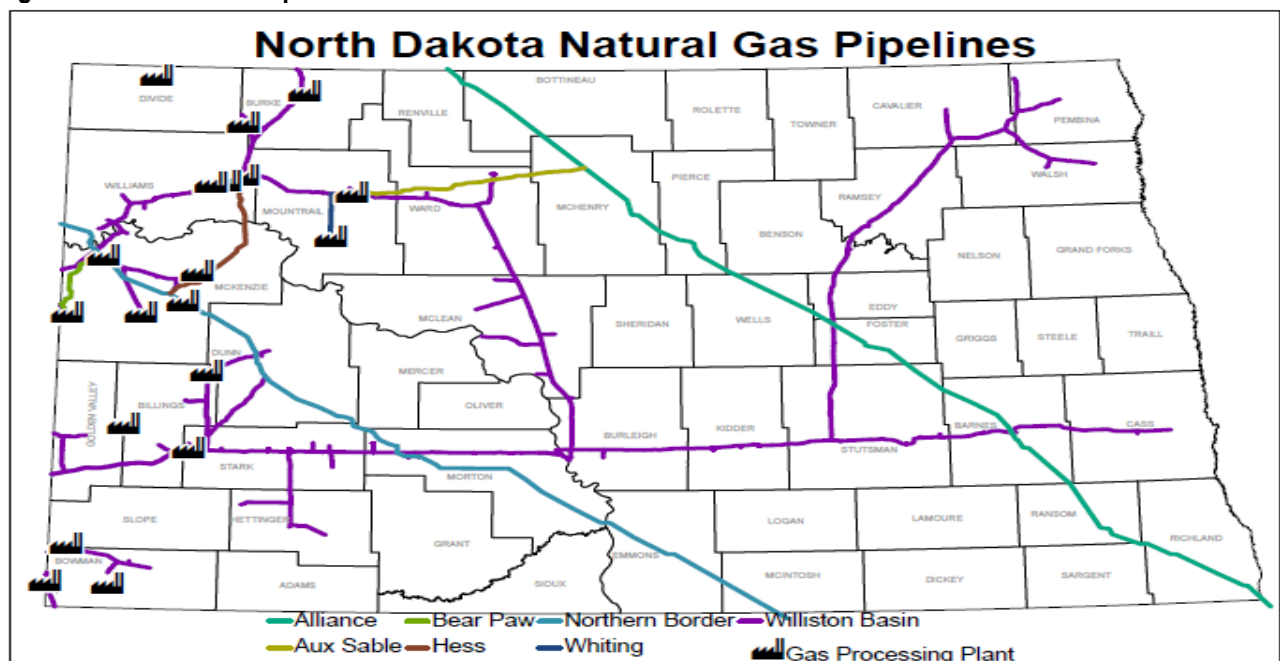
North Dakota's Pipeline Authority (PA) was established by the Legislature in 2007. The North Dakota Industrial Commission is the North Dakota Pipeline Authority. The Authority was created for the purpose of diversifying and expanding the North Dakota economy by facilitating the development of pipeline facilities to support the production, transportation, and utilization of North Dakota energy-related commodities. The Authority may participate in a pipeline facility through financing, planning, development, acquisition, leasing, rental, joint ownership, or other arrangements. The maps below illustrate North Dakota pipelines.

Figure 13: Crude Oil Pipelines in North Dakota



The map above illustrates crude oil pipelines that run through North Dakota. Traill County has no crude oil pipelines that run through the county.

Figure 14: Natural Gas Pipelines in North Dakota



The map above shows there are no natural gas pipelines that run through Traill County.

3.5.4 Solid Waste Facilities

In Traill County, Waste Management, Inc. is used to dispose of household garbage for the residents in the County. Traill County operates its own sewage treatment center.

3.5.5 Transit

Mass transit is considered to be an essential public service. Mass transit provides for increased capacity on heavily traveled roads, provides transportation access to persons with disabilities or those otherwise unable to drive, supports dense land use development, decreases dependence on car use, and helps to prevent the creation of additional air pollution from diminished individual car use. There is no mass transit available in Traill County.

3.5.6 Transportation

The primary purpose of any transportation system is to move goods and people both safely and efficiently. An efficient and balanced transportation system includes highways, railroads, mass transit, and aeronautics. While the most influential mode of transportation is the automobile, the other types of transportation play an important role in the overall network.

Traill County's transportation system is made up of the township, county, and state roads, railways, an airport, trails, and public transportation. Through these pathways come materials and services needed to sustain the area. Agriculture, various businesses, tourism, government, and residents are all dependent on the transportation system.

3.5.7 Highways

Because of its rural nature, the county is highly dependent upon its network of federal, state, and county roads, and highways. State Highway 200 is the major east-west route across the county. Interstate Highway I-29 and State Highway 18 are the major north-south routes. These state and federal highways along with the hard surfaced and graveled county and township roads provide a good transportation network.

The Functional Classification System is a method used to describe the main function each road performs in the highway network. It is essentially a hierarchy of roads using criteria that describe the function that a particular road performs in a highway network (typically access and mobility). There is a general agreement among the public that the responsibility for the most important roads should be assigned to the highest level of government. In this fashion, the greatest resources for road maintenance and construction are devoted to the most heavily traveled roads. It follows that less traveled roads become the responsibility of local levels of government. Definitions for each of the road types in the Functional Classification System are provided below:

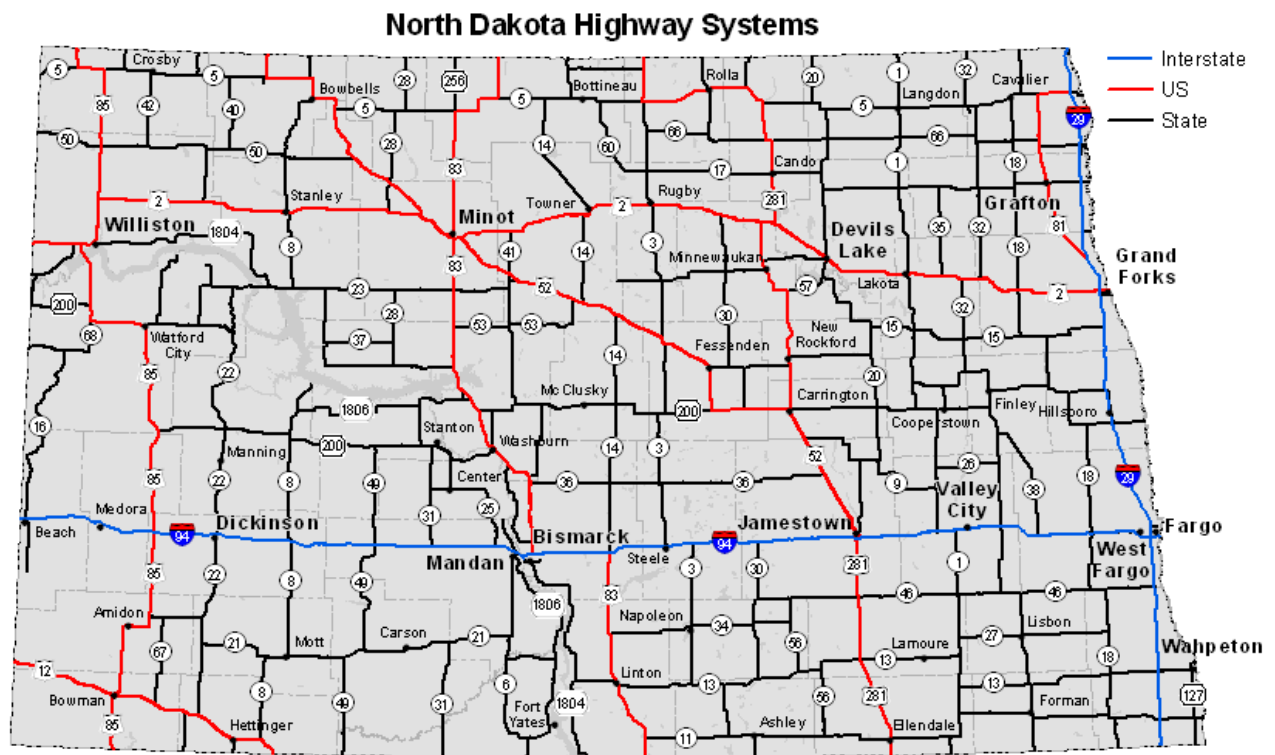
- **Principal Arterial** – These highways provide an integrated network of routes, which carry the highest traffic volumes, serve the longest trip movements, and provide for statewide or interstate travel. They serve all major urbanized areas and population centers. Principal arterial routes provide for through movement with minimum interference.
- **Minor Arterial** – These highways link cities, larger towns, and other major traffic generators, such as major resort areas, to each other and to principal arterial routes. They form an integrated network which provides for movement within the State and between counties.

- **Major Collectors** – These routes provide service to the county seat and to the larger cities not served by principal or minor arterials. They predominately serve trips within the County and link locally important traffic generators with their service areas and other nearby larger cities with higher order routes.
- **Minor Collectors** – These routes link smaller cities and locally important traffic generators and provide developed areas with reasonable access to a higher functioning roadway.
- **Local Roads** – The rural local roads primarily service relatively low traffic volumes and short distance trips.

Table 38: Principal and Major Arterials Serving Region 5, ND

Interstate	Counties Served	Principal Cities Served	
I-94	Cass	Fargo, Mapleton, Casselton	East-West – Minneapolis, St. Paul, MN; Billings, MT
I-29	Richland, Cass, Traill	Hankinson, Fargo, Hillsboro	North-South – Kansas City, MO; Winnipeg, Manitoba
Principal State Arterials			
ND 200	Traill, Steele	Hillsboro, Mayville, Portland	East-West
ND 13	Richland, Sargent	Wahpeton, Wyndmere, Milnor, Gwinner	East-West
Major State Arterials			
ND 18	Traill, Cass Richland	Mayville, Hunter, Arthur, Casselton, Leonard, Wyndmere, Lidgerwood	North-South
ND 32	Steele, Ransom, Sargent	Finley, Lisbon, Gwinner, Forman	North-South
ND46	Cass, Ransom	Kindred, Enderlin	East-West
ND 27	Ransom	Lisbon	East-West
ND 11	Richland, Sargent	Fairmount, Hankinson, Lidgerwood, Forman	East-West
ND 127	Richland	Wahpeton, Fairmount	North-South

Figure 15: North Dakota Highway System



December 1, 2007

3.5.8 Water Control Structures

Table 39 lists the 5 water control structures that have been classified as dams by the Department of Natural Resources (DNR), all of which have been assigned a hazard potential. A dam's hazard potential is rated low to significant. According to the table, a majority of the dams in the County have been classified as having a hazard potential rating low (the safest rating).

Table 39: Traill County Dams

Name	Max Pool Volume	Hazard Rating	Location
Augustadt	6040	Significant	Galesburg
Portland	165	Low	Mayville North
Hillsboro	285	Low	Hillsboro
Mayville Dam	123	Low	Mayville South
Elm River	325	Low	Galesburg

*Source: State of North Dakota Water Commission, Dams within the Jurisdiction of the State of North Dakota

3.5.9 Water Pollution Control Revolving Fund

According to the North Dakota State Government, the Federal Clean Water Act authorizes a Clean Water State Revolving Fund program to provide funds to finance water pollution control projects. Under the Act, the U.S. Environmental Protection Agency (EPA) awards annual capitalization grants to each state to capitalize a State Revolving Fund (SRF), which the State can then use to provide loans for both point source (wastewater) and nonpoint source water pollution control projects. As part of its capitalization grant application, each State must annually prepare an Intended Use Plan (IUP) that describes the intended use of the available funds.

The State Revolving Fund Program (SRF) was established in 1990 to enable North Dakota to receive federal capitalization grants as authorized under the Clean Water Act. In 1998, the SRF was amended to enable the State to receive capitalization grants as authorize under the Safe Drinking Water Act. The SRF grants received from the United States Environmental Protection Agency, are to be used to make below-market interest rate loans to political subdivisions for the purpose of financing authorized projects, to establish reserve funds, and for other purposes allowed under the Clean Water and Safe Drinking Water Acts. Authorized projects under the SRF include wastewater treatment facilities, nonpoint source pollution control projects, and public water systems. The North Dakota Department of Health and the Authority jointly administer the SRF.

3.5.10 Public Water Accesses

The creation in 1930 of the North Dakota Game and Fish Department was a continuation of efforts to preserve fish and game species in the state. At its inception, the enforcement of game and fish laws was the department's primary conservation tool. Over the years the legislature has increased enforcement authority and assigned regulatory powers to the agency aiding its efforts to preserve fish and wildlife and their habitats. There are no public water accesses in Traill County.

3.5.11 Emergency Services

The Traill County Sheriff's Office is located in Hillsboro, ND. There is also a police department in Hillsboro. There used to be a police department in Mayville, however, Mayville now contracts with Traill County Sheriff for law enforcement services.

There are fire departments located in 7 locations in Traill County.

Table 40: Fire Departments in Traill County

Department	Number of Stations	Number of Firefighters	Type of Firefighters
Clifford Rural Fire Protection District	1	15	Volunteer
Galesburg Rural Fire District	1	15	Volunteer
Buxton Fire Protection District	1	25	Volunteer
Hatton Fire Department	1	40	Volunteer
Portland Fire Protection District	2	50	Volunteer
Hillsboro Fire and Rescue	1	25	Volunteer
Mayville Fire Department	1	30	Volunteer

There are also ambulance services provided to the county through the West Trail Ambulance Services located in Mayville, ND, and Sanford Hillsboro Ambulance Service located in Hillsboro.

3.5.12 Healthcare

The county is served by two fully accredited hospitals. Sanford Medical Center in Mayville is a 25-bed hospital that had been ranked as one of the top 100 rural hospitals in the country. Hillsboro Medical Center in Hillsboro was remodeled in 2009 to provide a 16-bed critical access hospital for acute and swing bed care. The Sanford Medical Center in Mayville and the Hillsboro Medical Center both work with the Sanford Clinic for medical staff. These hospitals also have emergency and therapy services. In addition to these local hospitals, Traill County is also served by Altru Health System in Grand Forks, Sanford Health in Fargo, Essential Health in Fargo, and Kindred Hospital in Fargo.

Hillsboro and Mayville, as well as all of Traill County, are served by Sanford Clinics. These clinics are located in the hospitals in each city and have dedicated staff that lives in these communities, so they know patients by name.

Traill County also has three long-term care facilities: Hatton Prairie Village, Hillsboro Medical Center and Luther Memorial Home.

3.5.13 Emergency Resources

A wide variety of public and private resources may be available throughout the disaster life cycle. Developing a plan to identify these sources and manage resources offered is critical to effectively meet a community's specific needs and goals. There will be rules, and occasionally, strings attached to external sources of funding and assistance, but a community that has researched the allowable uses of federal and state assistance can better work toward accomplishing its unique redevelopment goals.

Some specific sources of assistance that have been utilized in the Lake Agassiz Region include:

- Small Business Administration (SBA)
- HUD and EDA Supplemental disaster funds
- ND National Guard
- Federal Emergency Management Agency (FEMA)
- North Dakota Department of Emergency Services (NDDDES)
- County and Municipal support
- US Army Corps. Of Engineers (USACE)
- Red Cross
- Salvation Army
- Private Companies

3.5.14 Energy Sector

North Dakota is a small state undergoing a big boom in energy. It contains the prolific Williston Basin with its Bakken Shale formation and a half-dozen of the nation's largest oil fields. The state has one of the smallest populations in the United States but experienced the greatest percent increase in Gross Domestic Product (GDP) in 2012, primarily because of its oil boom. North Dakota has other fossil energy resources as well, including substantial lignite coal reserves.

North Dakota's rolling plains slope gently upward toward the Rocky Mountains and include plateaus, broad river valleys, occasional buttes, and the famous North Dakota Badlands. Two major rivers, the Red and the Missouri, drain the state. The Red River flows north to the Hudson Bay and the Missouri flows south to the Mississippi. The Red River Valley, an extremely flat glacial lake plain, is noted for its highly productive

farmland. A rural state, North Dakota ranks fourth in the nation for total cropland harvested. The state's soils are very productive and supply significant amounts of corn for ethanol production, placing North Dakota among the top 10 ethanol-producing states in the nation.

Located at the geographic center of North America, North Dakota has a continental climate characterized by large temperature variations, irregular precipitation, plentiful sunshine, low humidity, and nearly continuous wind. Serious flooding caused by heavy rainfall occurs occasionally. The completion of the Garrison Dam in the 1950s greatly reduced the extent and danger of Missouri River flooding. The turbines at Garrison Dam, the fifth largest earthen dam in the United States, provide the state's hydroelectric generation. North Dakota's winds and abundant sunshine provide resources for both wind and solar electricity generation.

Total energy consumption in North Dakota ranks among the lowest in the nation; however, consumption per person and per dollar of GDP ranks among the highest. This is, in large part, because of the high heating demand during North Dakota's very cold winters and because of the state's energy-intensive economy. The industrial sector accounts for roughly one-half of energy consumption in the state. North Dakota's major industries include agriculture, which contributes over one-tenth to the state's GDP, and the energy-intensive food-processing and petroleum industries. The transportation sector is the second largest energy-consuming sector and accounts for over one-fifth of consumption, while the residential and commercial sectors each account for almost one-seventh.

North Dakota's total energy production is about three times its consumption. The surge in production over the past few years has come chiefly from the major development of petroleum resources within the Williston Basin's Bakken Shale play. More than one-half of the state's total energy production is in the form of crude oil. Coal provides about one-fourth of the total, and natural gas and renewable energy, including the fast-growing wind sector, provide the remainder.

The following table outlines the most common heating fuel for houses and condos in Traill County.

Table 41: Heating Fuel for Households in Traill County

House Heating Fuel	Population	Percent
Occupied housing units	3,374	3,374
Utility gas	84	2.5%
Bottled, tank, or LP gas	1,063	31.5%
Electricity	1,599	47.4%
Fuel oil, kerosene, etc.	497	14.7%
Coal or coke	0	0.0%
Wood	57	1.7%
Solar energy	5	0.1%
Other fuel	57	1.7%
No fuel used	12	0.4%

3.5.15 Schools

Traill County schools have high graduation rates, favorable student-teacher ratios, and outstanding performance. Schools serving Traill County are listed below:

Table 42: Schools in Traill County

School	Communities Served	Grades Served
Hatton Public School	Hatton	K-12
Central Valley School	Traill and Grand Forks	K-12
Hillsboro Public School	Hillsboro	K-12
Mayville-Portland-CG School District	Mayville, Portland, Clifford, and Galesburg	K-12

3.5.16 College Students

Mayville State University is located in Mayville, North Dakota, the largest city in Traill County. As the nation's first tablet PC University, Mayville State provides its full-time, on-campus students, teachers, and staff a tablet PC to use while at Mayville State. Mayville State's mission is to educate and guide students as individuals so they may realize their full career potential and enhance their lives. This is done in an environment that reflects Mayville State's tradition of personal service, commitment to innovative, technology-enriched education, and dynamic learning relationships with community, employers, and society. As of fall 2014, Mayville State University had a total enrollment of 1081 students, 635 of which are full-time students and 446 of which are part-time students. The average class size is 15.4 students, and there are 85 faculty members. There are more than 14 colleges, universities, and tribal colleges within 100 miles of Traill County.

Section 4: Risk Assessment

A risk assessment is critical to mitigation and comprehensive emergency management because it allows communities to measure and better understand the potential impact of hazards on their communities. Conducting a risk analysis is a multi-step process. The risk assessment process includes identifying hazards, profiling hazard events, determining how frequent hazards occur, and determining both the type and magnitude of hazard impact. A risk assessment provides the means for emergency managers and community leaders to develop mitigation actions, to prioritize resource needed to address operational activities and to ultimately help a community become more resilient (Schwab, Eschelbach, and Brower, 2007).

FEMA Requirements Addressed in this Section:

§201.6(c) (2) (i): The risk assessment shall include a] description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

§201.6(c) (2) (ii): The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c) (2) (i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

§201.6(c) (2) (ii) (A): (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

§201.6(c)(2)(ii)(B): (B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.

§201.6(c)(2)(ii)(C): (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

§201.6(c) (2) (iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

4.1 Hazard Profile

The first step in conducting risk analyses is to identify which hazards are the most probable to impact one's community. With regard to Traill County's mitigation plan update, an all-inclusive list of hazards was considered for inclusion in the plan update. The Hazard Mitigation Planning Team reviewed several sources to include Traill County's previous hazard mitigation plan, hazards identified by FEMA (Multi-Hazard Identification and Risk Assessment), the Region's Threat and Hazard Identification Risk Analysis (THIRA), the North Dakota State Multi-Hazard Mitigation Plan, and mitigation plans of other neighboring counties. In addition to reviewing the region's mitigation plans, the Hazard Mitigation Planning Team analyzed past declared disasters and spoke to local experts and residents. To elicit input from both officials

and citizens, a survey was created and distributed to all of the participating jurisdictions.

While this iteration of the plan evaluated a wide variety of hazards, after careful analyses, receiving feedback from the public and approval of the steering committee, it was decided that this update would essentially remain the same as the previous plan, less the exceptions below. As suggested by the Hazard Mitigation Planning Team and approved by the Hazard Mitigation Steering Committee and upon receiving feedback from the citizens of Traill County, the following changes were made:

1. The risk assessment process would be updated to better align with the current professional standards.
2. The hazard of terrorism was eliminated from the plan. Traill County has other plans in place (such as the THIRA) which serve as the primary planning documents to address non-natural and political hazards.
3. Severe summer storms will take into account damage caused by hail, heat, lightning, rain, thunder & wind.
4. Severe winter storms will take into account damage caused by blizzard, extreme cold & ice storms.
5. The hazards of political unrest, aircraft incidents, cybercrime, water contamination, terrorism, transportation accidents and shortage etcetera are 1) not natural hazards; 2) are addressed in other plans.
6. Earthquake was not profiled as it was decided the frequency and impact of an event on Traill County and participating jurisdictions was negligible
7. Communicable diseases will be expanded to include infectious diseases. Note, infectious diseases include communicable diseases, but communicable diseases do not include infectious diseases.
8. Drought will not be included (HMP are not set up to address issues associated with drought).

Table 43 provides a summary of the final hazards identified in the hazard risk assessment.

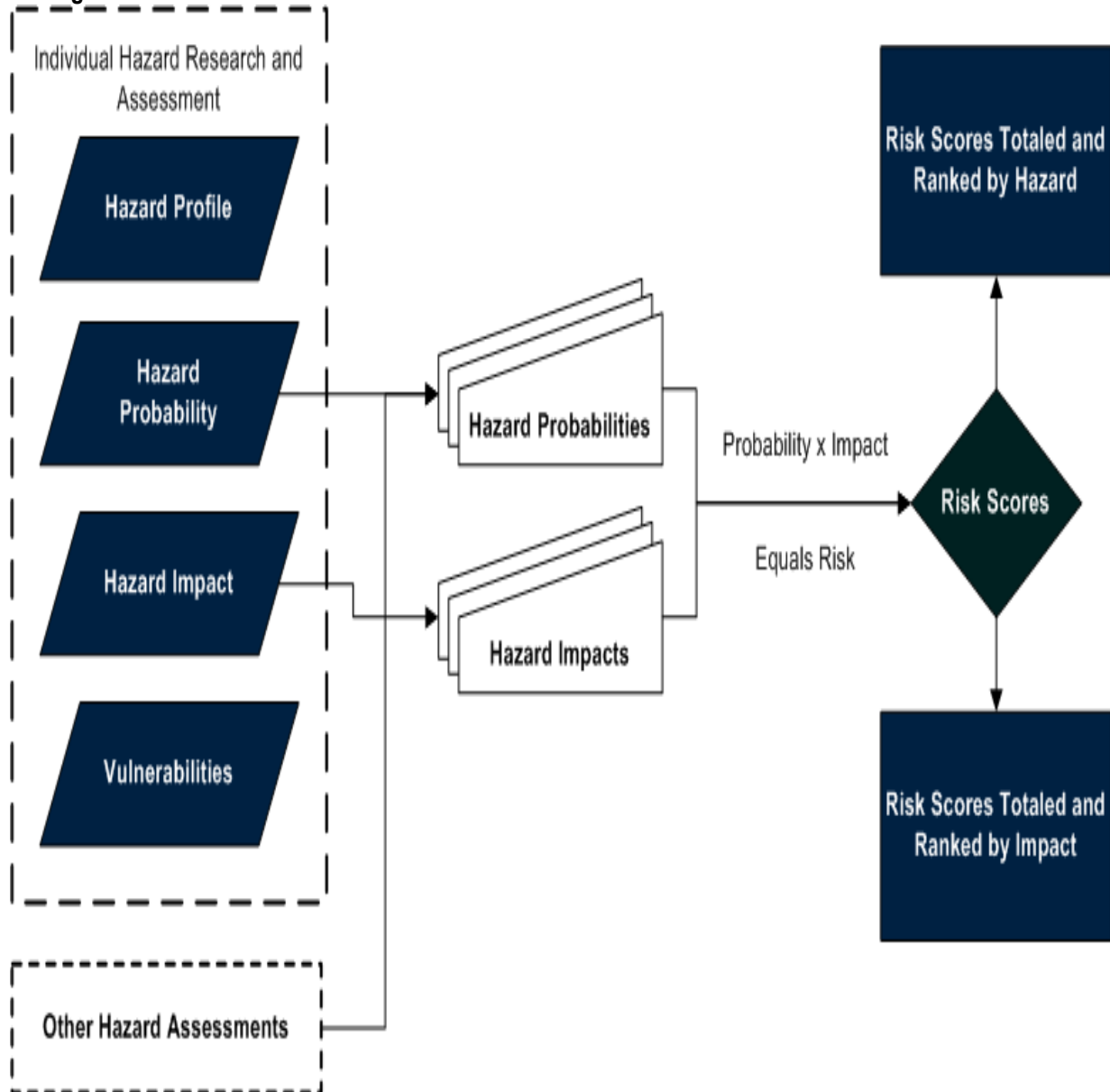
Table 43: Hazards Identified

Natural Hazards	Natural Hazards	Technological Hazards
Communicable Diseases	Severe Summer Weather (Including, hail, downbursts, thunderstorm winds, Lightning, and Extreme Heat)	Hazardous Material Incidents
Dam Failure	Severe Winter Storm (Blizzards, Heavy Snow, Ice Storms, and Extreme	Transportation Accidents
Flooding	Wildfire	Urban Fire or Structure Collapse
Geologic Hazards: Subsidence	Tornado	

4.1.1 Risk Assessment Process

At the most fundamental level, both DHS and FEMA recognize that risk is equal to frequency X consequence ($R = FC$) of a hazard. More specifically, the risk is based on the premise that in order to have a certain level of risk there must be a probability or likelihood of a hazardous event to occur. Likewise, if the event does occur, it must have an impact or consequence. The following section outlines the methodology used to determine Traill County's risk.

Figure 16: Risk Assessment Process



To assess hazards and determine risk, the planning team proposed that a methodology based on probability and impact be utilized. First, each hazard was researched, documented, and assessed for frequency and impact. Then, the hazard frequency and impacts were compiled for all of the individual hazard assessments. Once this data was compiled, the frequency and impact calculations were tabulated to obtain a matrix of risk scores. The risk methodology as highlighted above was presented to the Steering Committee during the December 10, 2014, steering/planning meeting.

4.1.2 Probability of Future Occurrences

The probability of future occurrences is commonly determined by using the frequency of past events to

gauge the likelihood of future occurrences. In the case of Traill County, the hazard analyses and update was based on the County's historical data, the written record and information provided by citizens of Traill County, and input from participating jurisdictions. When possible, a 50-year period was used to determine the probability (note, not all hazards report 50 years of data). The data used for all the hazard probabilities can be found in Appendix B.

The method used in Traill County's plan for standardizing the scale of probability values was based on the probability as shown below. The metrics for these classifications have been modified to reflect the 50-year reoccurrence interval used for this risk assessment and properly reflect the scale for the probabilities that were analyzed.

Table 44: Frequency/Probability

Frequency/Probability		
Level ID	Description Index Value	Index Value
Unlikely	Rare with no documented history of occurrences or events. Annual probability of less than 0.001	.5
Possible	Rare occurrences of at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001	1
Likely	Likely occurrences with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01	2
Highly Likely	Highly Likely Frequent events with a well-documented history of occurrence. The annual probability that is greater than 0.1.	3

One issue to note is that hazard data is often reported regionally versus being isolated to a single community. When determining risk, regional reporting can present a challenge in that multiple communities are noted as being impacted versus individual cities or counties. For example, NOAA might report that a severe storm affecting the southcentral part of Traill County while not directly indicating the city of Viking as being affected. As such, to ensure each jurisdiction (or in the example, Viking) is accounted for, a quadrant system was used.

The quadrant used in the Risk Analyses simply arranged Traill County and its cities into the regional reporting categories (Central Traill, Southcentral Traill, Northcentral Traill, Northwestern Traill, Southwestern Traill, Northeastern Traill, and Southeastern Traill). For tabulating hazards frequency, the following Regional Classification Table demonstrates which cities are associated with each jurisdiction.

Table 45: Regional Classification

Regional Classification	
Central	Hillsboro , Unincorporated Traill County
Southcentral	Unincorporated Traill County
Northcentral	Buxton , Unincorporated Traill County
East central	Unincorporated Traill County
West central	Clifford, Mayville, Portland , Unincorporated Traill County
Northwestern	Hatton , Unincorporated Traill County
Southwestern	Galesburg Unincorporated Traill County
Northeastern	Unincorporated Traill County
Southeastern	Reynolds Unincorporated Traill County

Note: The quadrant system was only used when the Hazard data used regional indications and did not directly indicate a community.

4.1.3 Hazard Impact

When conducting a risk analysis, creating a probability of a hazard occurrence is just one of several steps one must take to determine risk. To determine risk one must also take in account both impact assumption and impact magnitudes.

Impact assumptions describe how hazards impact the County and/or its cities. The specific set of impact assumptions listed below were selected for Traill County's hazard risk analyses. The listed impact assumptions were chosen as they 1) can be caused by several different hazard events; 2) are mostly independent of each other; 3) each can be (to certain degrees) mitigated; 4) are often cited in the disaster literature (Center Comprehensive Emergency Management Research. 2015); and 5) are commonly used in disaster planning.

Table 46: Impact Assumptions

Impact Assumptions	
Casualties/Trauma	Non-Critical injuries that require medical attention.
Communication, Lack thereof	Disruption of communication including mobile and wired phone, radio, television, and satellite.
Continuity of Government	Disruption of county government normal operations.
Debris	Dry, wet, hazardous, organic or inorganic materials that need to be cleared and properly disposed of.
Emergency Services Disrupted/Limited	Fire, Rescue, and Medical services are either overwhelmed or unable to respond normally.
Evacuation Needs	Hazardous conditions require the evacuation from either a specific site or larger area within the county.
Fatalities	Death due to the hazard.
Hazardous Material Release	Hazard event causes a hazard material release as a secondary hazard.
Overwhelm of First Responders	First responders are overwhelmed or unable to respond.
Mass Care Needs	Hazard event requires emergency sheltering of citizens.
Physical Damage / Asset Destruction	Loss or damage to the built environment.
Power, Disruption/Outages	Inability to supply power to end users or lack of enough power.
Transportation, Disruption/Failure	County roads, sidewalks, and public transit are obstructed or unable to function normally.
Economic Loss	Hazard causes loss or disruption to economic assets.

4.1.4 Impact Magnitudes

Disaster is loosely determined by when a jurisdiction's capacity is exceeded or when the jurisdiction no longer has the capacity to cope with the hazard. To quantify impact assumptions, it is necessary to determine the magnitude that hazard might have on a jurisdiction. The metric for impact magnitude consisted of a number of descriptors that are normally associated with a jurisdiction's capability and capacity to respond to, mitigate, and or recover from hazed events. A full list of these magnitude ratings is presented in the Impact Magnitude Rating table below.

Table 47: Impact Magnitude Ratings Descriptors

Impact Magnitude Ratings	
Rating	Descriptors
0	Hazard has no foreseeable effect specific to the impact assumption (rare).
1	The impact is present but is extremely light having relatively no notable adverse effect on the jurisdiction.
2	The impact has an effect on the Jurisdiction but does not always require next level government intervention.
3	Impact necessitates a county response or deployment of resources, impact disrupts normal/planned community functions.
4	Impact requires EOC operations or other coordinated response efforts.
5	The cost of impact exceeds a threshold of being unusually detrimental or disruptive to the Jurisdiction.
6	The impact is taxing on county's resources and has a widespread effect on the greater community.
7	The impact has an extended response / short-term recovery duration exceeding 36 hours and some long-term recovery needs.
8	Impact exceeds county and municipal response capabilities/capacities.
9	Long-term recovery planning needed, State or Federal resources needed to aid response and recovery from the impact.
10	The impact is so great it disrupts basic county function for an extended period of time and causes secondary hazards.

The final steps in calculating consequence (impact score) is to provide a magnitude of each impact. Once each impact is assigned a magnitude rating, the sums of each impact are added together and divided by 14 (the number of impact assumptions). The maximum impact score for each event could be 10 while the minimal score could be 0.

The challenge with using this model is to quantify hazard impacts so that they use similar scales and are easily interpreted without inserting bias. To account for bias, it was decided that once the data was calculated, it would be made available for review and comment by the Steering Committee, participating jurisdictions, and public. The Traill County Emergency Manager was responsible for informing the public, Steering Committee and participating jurisdictions that the information was available for review and to provide comment. The hazard risk assessment was reviewed with input occurring from each of the participating jurisdictions. In instances where the findings provided by the jurisdictions were inconsistent with the written record, the average of the two data sets was used to determine the County's hazard frequencies.

Table 48: Impact Descriptors

Impact		
Level ID	Description Index Value	Index Value
No Impact	No action required.	0
Low (Less than 3.33)	Minimal action required.	1
Moderate (3.34-7.45)	Action required with present resources.	2
High (7.5-10)	County resources are overloaded and additional help is required.	3

4.2 Risk

This section is a summary of risks and the factors that contributed to the overall risk score for each hazard. Data was derived from Traill County's past mitigation plan, readily available data (internet searches, disaster database), and records provided by Traill County and the participating jurisdictions. The individual hazard profiles were the basis that informed the hazard risk analysis process. The probability, impact and risk hazard event data was analyzed for each of the listed hazards and for each of the participating jurisdictions in the county.

Table 49: Risk Scoring Key

Risk Scoring Key	
0 – 3.23	Little To No Risk
3.24 - 5.49	Low Risk
5.5 - 7.74	Moderate Risk
7.75 – 9	High Risk

To satisfy the risk equation proved earlier (i.e. Risk = Frequency X Consequence), a final risk score for each jurisdiction was generated. The risk was determined by multiplying the probability index number by the hazards consequence index number (i.e. Consequence = Impact Assumption X Impact Magnitude / 14). Risk scores range from 0-9 and are categorized as Little to No Risk (score of 0 to 3.23), Low Risk (score of 3.24 to 5.49), Moderate Risk (score of 5.5 to 7.74) and High Risk (score of 7.5 or higher). The table to the right summarizes the risk-scoring key.

To assist the reader in understanding how risk was determined an example is provided.

EXAMPLE: Over the past 50 years, hazard X occurred 40 times. From this information, it can be determined that this hazard is highly likely to reoccur and is recorded with a probability index score is equal to 3. Additionally, the hazard impact assessment suggests the hazard will have a moderate impact on the jurisdiction ($70/14 = 5$) and as such the hazard's impact index score is equivalent to 2. The hazard risk score is calculated based on the probability (3) multiplied by the impact (2), to give an overall risk score of 6 or Moderate Risk.

It should be noted that because some select hazards were grouped, there might be inflation with regard to probability and impact. For example, severe summer storms include instances of hail, thunderstorms, and severe winds. Thus, the number of events and impact will rise causing the risk to also rise.

Another consideration is this model uses both the written record and record as reported by Traill County citizens. Therefore, there may be ambiguity with regard to occurrence and impacts provided in written record. Additionally, while some hazard events technically occur outside of the legal boundaries of a jurisdiction, the effect of these hazards are still felt by those living in the jurisdiction. Thus, it is common for

participants to note hazards such as wildfire and or invasive species as having an impact on their respective jurisdictions regardless of that hazard technically occurring outside the boundaries of their legal jurisdiction. Finally, one must also consider the influence of perception when assessing a hazard's magnitude. For example, one might say an event was worse or less severe than officially reported, such as the perception that a severe storm generated an actual tornado; however, in reality, the event generated severe, straight-line winds.

It should be noted that considerations such as these occur in all data analyses. However, such incommodes do not influence the overall purpose of mitigation or diminish the analyses. Matter of fact, It can be argued that including both qualitative and quantitative data has made the model more accurate as it accommodates for risk perceptions and expertise of those living in Traill County.

4.3 Risk Findings

The hazard risk assessment requires information about what hazards have historically impacted the communities, past mitigation actions, current vulnerability, climate change, the relationship to other hazards and what hazards may present risks in the future. Identifying historical and possible future hazards was primarily accomplished in two phases. The first phase entailed interviewing local government officials and staff, local emergency planning and response staff, and the public. The second phase entailed researching government records and news publications for records of previous hazard events. The results of the initial hazard evaluation were used to further focus the risk assessment on hazards that historically caused the most problems and those judged to be of most future concern.

Using the aforementioned frequency X consequence ($R = FC$) formula, each jurisdiction has its own unique risk score based on the aforementioned 28 points of data. Furthermore, an overall score was provided as a means to show the overall risk to the participating jurisdictions as a whole. Note, while the level of detail for each hazard correlates to the relative risk of each hazard, the risk is limited by the amount of data available. As such as additional information is discovered and or new hazards are identified, this plan can be easily adjusted and updated.

Note, the hazards, and corresponding jurisdictional risk are listed in order of risk. Each of the identified hazards presented below includes a description of the hazard, the risk of the hazard affecting the jurisdictions within Traill County, the vulnerability of the jurisdictions within Traill County, mitigation actions that have taken place in the past five years, and the relationship of the hazard to climate change and other hazards.

The final risk scores were posted on the project webpage and or otherwise shared with jurisdictions and public for review and comment. The Traill County Emergency Manager was responsible for ensuring that the Hazard Mitigation Steering Committee, jurisdictions, and the community at large were aware that the data was available for review.

4.4 Flood

Flooding is North Dakota's most costly and repetitive natural hazard. All 53 counties and four tribal nations have experienced severe damages and losses to public and private properties due to floods. Floodplains in North Dakota are heavily developed with structures such as houses, roads, railroads, industrial sites, businesses, agricultural fields, and recreational facilities. Additionally, growth in the amount of hazardous materials that are being stored, used, and manufactured in the designated floodplains leads to the potential for contamination and complicates and increases the extent of damage caused by flooding. Many of these improvements are in conflict with nature's purpose for the floodway and floodplain. This development results in frequent and mounting flood losses. The effects of flooding depend on upon the nature of the flood itself and the settlement pattern of the area inundated.

Flooding is an overflow of water on land not normally covered by water. Floods are a natural phenomenon; however, human activities often intensify flood hazards because of the alteration of natural conditions. Floods often occur along rivers and streams, along with closed basin lakes, in poor drainage areas, or in oversaturated soils. Flooding of land adjoining the normal course of a stream or river or a closed basin lake is a natural occurrence. If these floodplain areas were left in a natural state, the floods would not cause major damage. The economic attractiveness of vacant land has resulted in the development of some floodplain areas despite the risk. The urban, industrial, and agricultural encroachment on natural floodplain areas has increased the potential for dangerous flooding and causes the flood waters to adversely affect these areas. The flood potential is increased further due to the introduction of impervious surfaces and tilled the ground to areas whose natural state consisted of more pervious and absorptive materials. Rainfall that would normally soak into the ground or take several days to reach a stream or river via a natural drainage basin now quickly runs off streets, parking lots, rooftops, and tilled and ditched agricultural fields, through channels and pipes.

Surface water is that water found on the land surface and includes overland flow and flow in distinct channels. The three major sources of surface water include: 1) streams and rivers flowing into the state, 2) precipitation, and 3) groundwater discharge along streambeds. Surface water leaves the state in outflowing streams and rivers, by evaporation, and by percolating downward into the subsurface groundwater flow system.

Many floods in North Dakota occur because the ground is frozen and/or saturated with moisture and cannot absorb any further moisture. This moisture can come from several different sources and circumstances. One source is a heavy snowpack, which is affected by a rapid warming trend as well as spring rain falling directly on the snowpack.

Another source of flooding, called flash flooding, occurs when heavy rain falls in such a short time that the soil cannot absorb it and/or drainage systems (natural or mad made) cannot carry the volume of water away as quickly as it accumulates. Flash flooding also occurs when heavy rain falls over a prolonged period of time and the ground becomes saturated and cannot absorb the additional moisture fast enough.

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

identify. These types of floods often occur rapidly with significant impacts. Rapidly moving water, only a few inches deep, can lift people off their feet, and only a depth of a foot or two is needed to sweep cars away. Most flood deaths result from flash floods.

4.4.1 Flood Risk

The overall probability for that flooding will occur each year in Traill County is Highly Likely and its relative impact is Moderate, and thus the overall risk for Traill County is Moderate. The risk of flooding for each of the cities is different and was determined based upon the specific data collected and outlined in the history section of this hazard profile. In assessing flood data for the 2015 update, data from 2009 to 2015 was used to determine the risk for each of the cities and the county as a whole. Most notable are the cities of Hatton, Reynolds, and Buxton because they are at a higher risk of flooding due to a history of problematic flooding. The table provided below provides the name of each of the cities in the county, the probability that flooding will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

Table 50: Flood Hazard Risk Assessment

Flood			
City	Probability	Impact	Risk
Buxton	Highly Likely	Moderate	Moderate
Clifford	Likely	Low	Little to No
Galesburg	Likely	Low	Little to No
Grandin	Likely	Low	Little to No
Hatton	Highly Likely	Moderate	Moderate
Hillsboro	Highly Likely	Moderate	Moderate
Mayville	Likely	Low	Little to No
Portland	Possible	Low	Little to No
Reynolds	Highly Likely	Moderate	Low
Traill County	Highly Likely	Moderate	Moderate
Total	Highly Likely	Moderate	Moderate

*The probability is based upon data available from 2006-2015

4.4.2 Flood History in Traill County

In the past 5 years, there have been a total of six floods or flash flood events in Traill County. The city which has been impacted the most frequent has been the City of Hatton, with four of the six flood events impacting the City of Hatton. The flood event which has had the most significant financial impact was in the City of Reynolds with a total of \$60,000 in property and crop damage. In the past 50 years, there have been a total of 26 floods and flash flood events in Traill County. There have been two recent countywide flood events in 2006 which cost a total of \$177,000 in property damage to the county. The flood event which has had the most significant impact to the county in the past 50 years was in 1997, which caused \$10 million in property damage in Traill County.

Table 51: Historical Flood Events in Traill County

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
HATTON	TRAILL CO.	ND	03/22/2009	11:15	CST-6	Flood		0	0	5.00K	0.00K
HATTON	TRAILL CO.	ND	04/01/2009	00:00	CST-6	Flood		0	0	5.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/27/2009	00:00	CST-6	Flash Flood		0	0	10.00K	50.00K
HATTON	TRAILL CO.	ND	03/18/2010	10:48	CST-6	Flood		0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	04/08/2011	09:51	CST-6	Flood		0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	04/28/2013	18:24	CST-6	Flood		0	0	5.00K	0.00K
Totals:								0	0	25.00K	50.00K

Source: National Climatic Data Center

4.4.3 Major Declared Disasters for Flood

Of the aforementioned floods, there have been 26 flood events in the last 50 years in Traill County which have been declared a disaster by FEMA. The majority of the declarations were major declared disasters, which is when the President believes has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. The other declarations were Emergency Declarations, which is when the President determines federal assistance is needed for any occasion or instance. Emergency Declarations supplement state and local efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. The total amount of assistance provided for a single emergency may not exceed \$5 million. If this amount is exceeded, the President shall report to Congress. The beginning and ending dates of the incident are included for these declared disasters, as well as information on the type of assistance program that was provided.

Table 52: Declared Disasters for Flood in Traill County

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaster Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
No	No	Yes	Yes	5/29/2013	DR	Flood	FLOODING	4/22/2013	5/16/2013	
No	No	Yes	No	4/26/2013	EM	Flood	FLOODING	4/22/2013	5/7/2013	
Yes	No	Yes	Yes	5/10/2011	DR	Flood	FLOODING	2/14/2011	7/20/2011	
No	No	Yes	No	4/7/2011	EM	Flood	FLOODING	4/5/2011	7/1/2011	8/2/2013
No	No	Yes	Yes	4/30/2010	DR	Flood	FLOODING	2/26/2010	7/15/2010	
No	No	Yes	No	3/14/2010	EM	Flood	FLOODING	2/26/2010	4/30/2010	11/19/2013
Yes	No	Yes	Yes	3/24/2009	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING	3/13/2009	8/10/2009	
No	No	Yes	Yes	6/5/2006	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/30/2006	4/30/2006	11/15/2012
No	No	Yes	Yes	7/22/2005	DR	Severe	SEVERE	6/1/2005	7/7/2005	8/8/2012

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaster Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
						Storm(s)	STORMS, FLOODING , AND GROUND SATURATI ON			
No	No	Yes	Yes	5/5/2004	DR	Severe Storm(s)	SEVERE STORMS, FLOODING , AND GROUND SATURATI ON	3/26/2004	6/14/2004	7/19/2012
No	No	Yes	Yes	9/10/2002	DR	Severe Storm(s)	SEVERE STORMS, FLOODING , AND TORNADO ES	6/8/2002	8/11/2002	6/8/2010
No	No	Yes	Yes	5/28/2001	DR	Flood	SEVERE STORMS, FLOODING , & GROUND SATURATI ON	3/1/2001	8/9/2001	4/4/2012
No	Yes	Yes	Yes	6/27/2000	DR	Severe Storm(s)	SEVERE STORMS, FLOODING AND GROUND SATURATI ON	4/5/2000	8/12/2000	8/10/2010
No	Yes	Yes	Yes	6/8/1999	DR	Flood	SEVERE STORMS, FLOODING , SNOW, ICE, GROUND SATURATI ON, LANDSLID ES, MUDSLIDE S, AND TOR	3/1/1999	7/19/1999	6/24/2010
No	Yes	Yes	Yes	4/7/1997	DR	Flood	SEVERE FLOODING ,SEVERE WINTER STORMS, SNOWMEL T, SPRING RAINS	2/28/1997	5/24/1997	7/31/2012
No	No	Yes	Yes	6/5/1996	DR	Severe Storm(s)	SEVERE STORMS,F LOODING, & ICE	3/12/1996	6/21/1996	7/19/2002

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaster Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
							JAMS			
No	Yes	Yes	Yes	5/16/1995	DR	Severe Storm(s)	SEVERE STORMS, FLOODING , AND GROUND SATURATION	3/1/1995	7/5/1995	7/16/2001
No	Yes	Yes	Yes	7/26/1993	DR	Flood	SEVERE STORMS & FLOODING	6/22/1993	9/24/1993	3/6/2006
No	Yes	Yes	Yes	5/8/1989	DR	Flood	FLOODING	3/29/1989	5/8/1989	9/29/1995
No	Yes	Yes	Yes	4/26/1979	DR	Flood	SEVERE STORMS, SNOWMELT & FLOODING	4/26/1979	4/26/1979	10/24/1984
No	Yes	Yes	Yes	4/17/1978	DR	Flood	STORMS, ICE JAMS, SNOWMELT & FLOODING	4/17/1978	4/17/1978	5/31/1983
No	Yes	Yes	Yes	7/11/1975	DR	Flood	SEVERE STORMS & FLOODING	7/11/1975	7/11/1975	4/16/1981
No	Yes	Yes	Yes	6/5/1970	DR	Flood	SEVERE STORMS & FLOODING	6/5/1970	6/5/1970	5/16/1972
No	Yes	Yes	Yes	4/18/1969	DR	Flood	FLOODING	4/18/1969	4/18/1969	11/28/1972
No	Yes	Yes	Yes	3/23/1966	DR	Flood	FLOODING	3/23/1966	3/23/1966	8/12/1968
No	Yes	Yes	Yes	5/10/1965	DR	Flood	FLOODING	5/10/1965	5/10/1965	11/7/1967

4.4.4 Mitigation Actions in the Past Five Years

Mitigation actions for flooding from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for flooding. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for flooding is provided below.

Table 53: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Traill County	Mayville Buyout		\$200,000 / City of Mayville	Flood	Completed 2003	High
Traill County	Hillsboro Buyout		\$500,000 / City of Hillsboro	Flood	Completed 1999	High
Traill County	Hillsboro Pool		\$75,000 / Parks Dept.	Flood	Completed 2003	High
Traill County	Hendrum Bridge repairs	Repairs will provide usage of bridge	\$2 Million / MN/ND DOT	Flood	Estimated completion 2015	High
Traill County	Red River Buyouts		\$200,000 /	Flood	Completed	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
			Trail County		1999	
Trail County	Viking Twps. Bridge repairs	Repairs will provide usage of bridge	\$250,000 / Trail Highway	Flood	Estimated completion 2015	High
Trail County	Clean Drains	Prevent from streets flooding into homes	\$25,000 / Water Board	Flood	On-going	Medium
Trail County	City of Hillsboro Storm Sewer		\$1 Million / City of Hillsboro	Flood	Completed 2002	High
Trail County	Bloomfield Twps. Culverts	Prevent from roads flooding	\$10,000 / Trail Highway	Flood	Estimated completion 2015	Medium
Trail County	County 2 repairs on road	Road provides route near river repairs will provide for medical response to residents during disaster events	\$50,000 / Trail Highways	Flood	Estimated completion 2015	High
Trail County	Bridge 250		\$100,000 / Trail Highways	Flood	Completed	
Trail County	Bridge 248		\$100,000 / Trail Highways	Flood	Completed	
Trail County	Repair Bridge 237	Repairs will provide usage of bridge	\$100,000 / Trail Highways	Flood	Estimated completion 2015	Medium
Buxton	Clean silt and debris from city storm water drain ditches and re-grade ditches for better drainage.	The project would allow for faster stormwater runoff from the city streets reducing flooding and minimize the ponding of water in the ditches where mosquito breeding has been a problem. Would minimize property damage and	\$80,000 / City of Buxton	Communicable Disease, Summer storms, flooding	Estimated completion 2013	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		reduce disease exposure to residents.				
Clifford (city lagoon)	Upgrade city's sanitary sewer system by replacing badly deteriorated switching valve and associated piping.	The project would prevent a highly possible failure of the city's sanitary sewer system that would allow the backup of raw sewage in resident's basements causing property damage, contamination, and potential health risks to residents.	\$5,000 / City of Clifford	Communicable Disease, Flooding, Summer storms, Winter storms	Estimated completion 2013	Low
Clifford (Lincoln Ave., Garfield Ave. E., etc.)	Clear city storm water drains ditches from debris and silt deposits, re-grade or replace some of the ditch culverts, and re-grade the slope of ditch walls to reduce rollover hazard when mowing grass.	The project would allow for more efficient drainage of storm water reducing flooding damage, eliminate breeding grounds for mosquitoes, and reduce the risk of a rollover accident when moving the ditches.	\$5,000 to \$7,000 / City of Clifford	Communicable Disease, Flooding, Transportation Accidents	Estimated completion 2013	Low
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods around town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
				e Disease, Homeland Security, Drought, Transportation Accidents, Flooding		
Trail County	Use of brochures and media regarding participation in NFIP	Public awareness of the NFIP educates residents and insurance agents	Staff time / Trail County Commission and Emergency Management	Flooding	On-going	Low
Trail County	Move or construct a building for Trail County Park equipment	This would move the equipment out of flood prone areas	\$25,000 / Trail County	Flooding	Estimated completion 2012	Low
Trail County (Bridge No. 220 - 5 miles east and 2 miles south of Mayville Sec. 13 and 18 Mayville Twp. 145N-52W)	Replace existing culverts and armoring for this low water crossing	By upgrading and strengthening this site it will be better able to withstand flood waters passing through the channel	\$675,000 / Trail County Highway Department	Flooding	Estimated completion 2015	High
Trail County (Bridge #408 - 1mile west and 2 miles south of Clifford Sec. 5 and 6 Galesburg Twp. 144N-53W)	Replacement of existing structure and cleaning existing channel of debris and sediment	This would allow water to move more efficiently and would reduce the backup of water during spring runoff and heavy rains	\$125,000 / Trail County Highway Department	Summer Storms, Flooding, Winter Storms	Estimated completion 2013	Medium

4.4.5 Vulnerability

Data from June 2010 Trail County Multi-Hazard Mitigation Plan:

The Emergency Manager Mike Crocker contacted Ray Morrell at Department of Emergency Services on April 12, 2010, and he provided the following repetitive loss properties: 2 residential structures in Mayville.

Hazus-MH: Flood Event Report for Traill County

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

General Building Stock

Hazus estimates that there are 3,683 buildings in the region which have an aggregate total replacement value of 1.061 million (2010 dollars).

Table 54: Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (\$1,000)	Percent of Total
Residential	753,677	71.0%
Commercial	183,429	17.3%
Industrial	24,870	2.3%
Agricultural	26,434	2.5%
Religion	14,420	1.4%
Government	11,236	1.1%
Education	46,944	4.4%
Total	1,061,010	100.00%

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 124 hospital beds available for use. On the day of the scenario flood event, the model estimates that 124 hospital beds are available in the region.

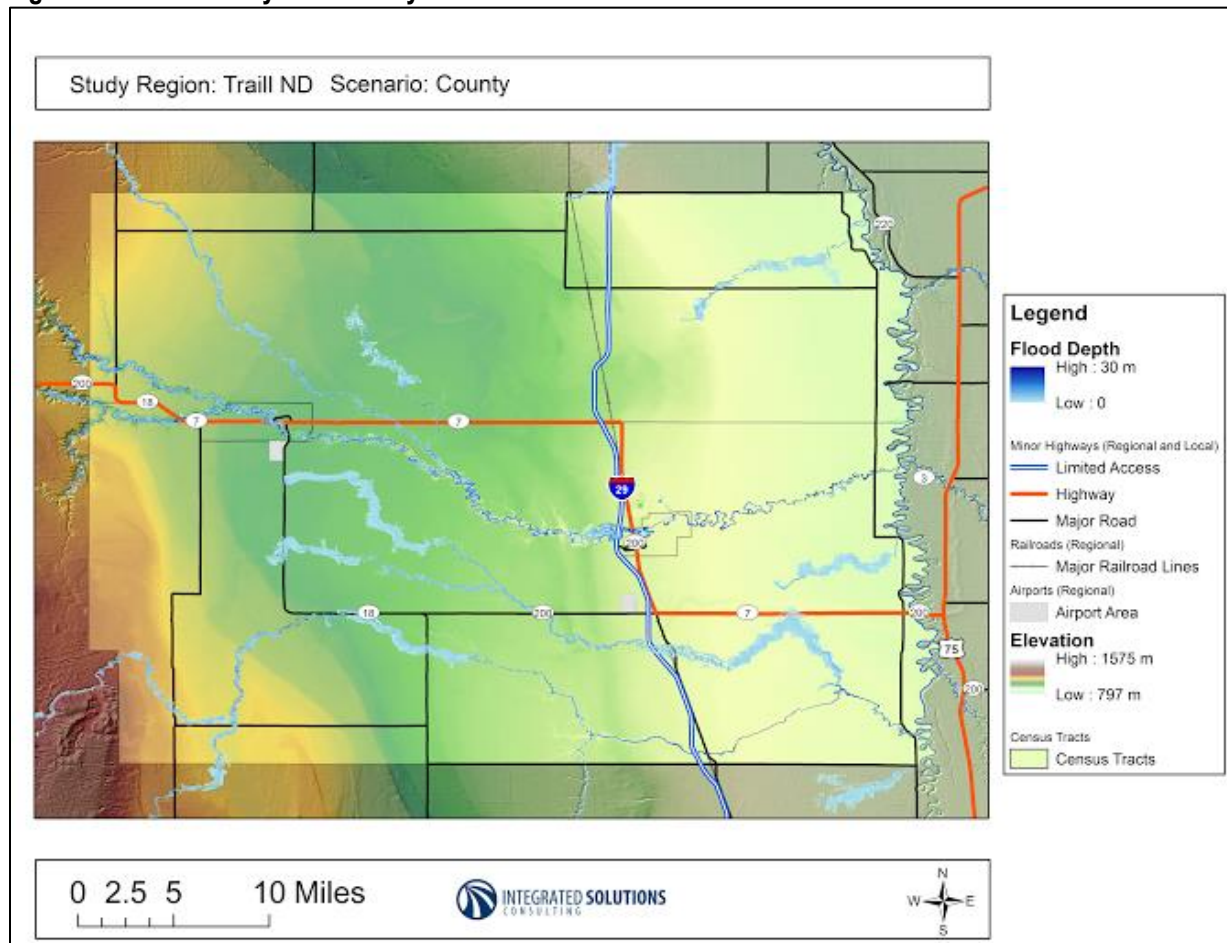
Table 55: Expected Damage to Essential Facilities

Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	7	0	0	0
Hospitals	3	0	0	0
Police Stations	3	0	0	0
Schools	10	0	0	0

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 73 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 42 people (out of a total population of 8,121) will seek temporary shelter in public shelters.

Figure 17: Traill County Flood Analysis



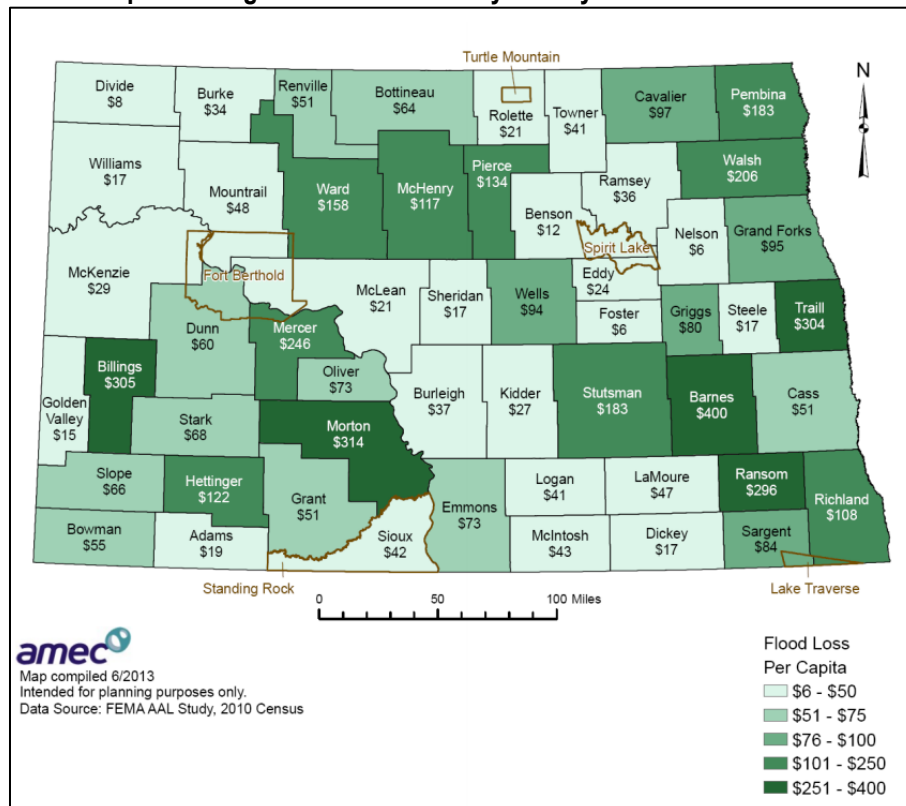
Repetitive Loss and Severe Repetitive Loss

The State of North Dakota 2014 Multi-Hazard Mitigation Plan included the repetitive loss and severe repetitive loss analysis for the counties in North Dakota. A repetitive loss property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978. The losses must be within 10 years of each other and be at least 10 days apart. The repetitive loss inventory for North Dakota as of April 30, 2013, includes a total of 390 repetitive loss properties. Of those properties, 55 are indicated as no longer repetitive because the property address associated with it was not specific enough to be located. In addition, 75 properties are indicated as no longer repetitive because there is no building located on the property and another 23 are indicated as no longer repetitive because flood protection has been provided to the property. This leaves a current total of 237 remaining repetitive loss properties. Traill County had a total of 6 repetitive loss properties as of April 30, 2013. There were 13 losses and a total of \$164,317 paid. The average payment per loss for Traill County was \$77,120.

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

Figure 18 below shows the average annualized loss by county per capita for North Dakota as provided in the 2014 State of North Dakota Multi-Hazard Mitigation Plan. The per capita analysis divides the total Average Annualized Loss by the 2010 population of the county to show the loss normalized by total population. The results of this analysis indicate counties that may have face a more difficult time recovering from floods. This figure indicates Traill County had a higher risk of having a difficult time recovering from floods.

Figure 18: Per Capita Average Annualized Loss by County in North Dakota



Flood Crop Losses

Also included in the 2014 State of North Dakota Multi-Hazard Mitigation Plan was the flood-related crop losses per county. An analysis based on crop insurance payments to insured crops for flood damages in each county over the 10-year period from 2003 to 2012 was provided. The USDA does not differentiate damages resulting from various types of flood. So, these losses include combined losses for all types of flooding. According to the 2011 North Dakota Crop Insurance Profile Report issued by the USDA Risk management Agency, 89 percent of North Dakota insurable crops were insured in 2011. Therefore, the crop insurance payments have been extrapolated to estimate losses to all insurable crops. The crop exposure value from the 2007 Census of Agriculture is provided to provide the basis for an annualized ratio of estimated losses to the total value. Traill County had a total annualized estimated crop loss of \$9,016,040.34 with a crop ratio of 5.1 percent.

National Flood Insurance Program (NFIP):

While several of the mitigation strategies include elements of the NFIP. The county and jurisdictions consider joining and participation in the NFIP as a mitigation action in and of itself. Thus, the following narrative describes the county's participating jurisdictions' involvement and future commitment to the NFIP.

The NFIP is a federal program created by Congress to mitigate future flood losses nationwide through sound community-enforced building and zoning ordinances and to provide access to affordable, federally backed flood insurance protection for property owners. NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the federal government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the federal government will make flood insurance available within the community as a financial protection against flood losses.

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. The Federal Emergency Management Agency (FEMA) manages the NFIP and oversees the floodplain management and mapping components of the Program. Nearly 20,000 communities across the United States and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities.

The 2014 State of North Dakota Multi-Hazard Mitigation Plan provided the flood insurance claim history by county as of January 31, 2013. Traill County had a total number of 53 NFIP policies, with \$9,618,600 in coverage. For Traill County, there have been a total of 151 claims and a total of \$1, 592,339 paid since 1978.

Currently Traill County, the cities of Buxton, Clifford, Edmore, Hillsboro, Mayville, Portland, Reynolds, and the Townships of Belmont, Bingham, Caledonia, Elm River, Greenfield, Herberg, Kelso, Lindass, Mayville, Norman, Noirway and Viking are active participants in the NFIP. To meet their obligation of reducing flood events, these jurisdictions have engaged in robust activities to include identifying and eliminating repetitive loss properties, conducting property buyouts, creating ordinances/building codes, flood mapping, educating their citizens, building levees and completing other various projects. To ensure continued compliance with the NFIP, Traill County, the cities of Buxton, Clifford, Edmore, Hillsboro, Mayville, Portland, Reynolds and the Townships of Belmont, Bingham,, Caledonia, Elm river, Greenfield, Herberg, Kelso, Lindass, Mayville , Norman, Noirway and Viking will continue to monitor its ever changing flood situation and adapt current ordinances and building codes as necessary. The jurisdictions will also enforce ordinances and building codes, continue to educate its citizens and where/when appropriate complete physical projects that reduce the impacts of flooding. As the success of these projects is based on having accurate and up-to-date flood maps, a priority for the Jurisdictions is to ensure the official flood maps are representative of the true risk. Thus, resolving the continued flood mapping issues is and remains the jurisdictions top priority.

What follows is the demonstrated linkage between each participating jurisdiction's hazards, risk, and vulnerabilities. The findings of this section are meant to inform and assist mitigation actions (see Section 6). Note, for this document, vulnerability is defined as any weakness that can be exploited to make an asset susceptible to hazard damage.

Table 56: Vulnerability Analysis for Flooding

Jurisdiction	Vulnerability Analysis
Buxton	The City of Buxton needs to have the storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Buxton also has some ditch culverts which need to be re-graded or replaced and some ditches which need to have the slope re-graded. Buxton is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Clifford	There are city-owned septic tanks in the City of Clifford which need to be replaced. Septic tanks that are old or damaged may cause leaking during a flooding event which could impact the water supply for the City of Clifford. The City of Clifford also needs to have the storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Clifford is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Galesburg	The City of Galesburg needs to have the storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Galesburg is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Grandin	There are no mitigation projects specific to Grandin with regards to flooding. However, any low lying area within Grandin is potentially vulnerable to flooding. Grandin is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Hatton	The City of Hatton needs to have the storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Hatton is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Hillsboro	The City of Hillsboro needs to have the storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Hillsboro also needs to install underground pipe for a secondary sanitary sewer force main discharge line to the lagoon. Hillsboro is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Mayville	The City of Mayville needs to have storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Mayville is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Portland	The City of Portland needs to have storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Portland is also

Jurisdiction	Vulnerability Analysis
	a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Reynolds	The City of Reynolds needs to have storm water drains and ditches cleaned and cleared of debris and silt deposits. Drains which are clogged could potentially cause more significant flooding during snowmelt or periods of heavy rain. Reynolds is also a small agro-service center dependent largely upon the stability of agriculture for growth and flooding could damage crops or agricultural land.
Traill County	There is an extensive history of problematic flooding across the county. The agricultural dependent economy within Traill County makes agricultural lands throughout the county particularly vulnerable to flooding. Any low lying areas within Traill County are particularly vulnerable to flooding. There are two emergency routes (Neillsville Bridge #412 and County Road 17) which need to be repaired to allow for emergency responders to get to where they need to in the event of a medical emergency during severe winter weather.

4.4.6 Flood and Climate Change

According to the 2014 National Climate Assessment, changing extremes in precipitation are projected across all seasons, including higher likelihoods of both increasing heavy rain and snow events and more intense droughts. Winter and spring precipitation and very heavy precipitation events are both projected to increase in the northern portions of the area, leading to increased runoff and flooding that will reduce water quality and erode soils. Increased snowfall, rapid spring warming, and intense rainfall can combine to produce devastating floods, as is already common along the Red River of the North. More intense rains will also contribute to urban flooding. Predictions are that the frequency and severity of these heavy rainfall events will increase.

4.4.7 Relationship to other Hazards

Flooding is related to various other hazards such as severe storms because severe and/or slow moving thunderstorms and spring snow melt can contribute to flooding and under the right conditions can cause flash flooding. Flooding can also be related to dam failure because flood events have the potential to compromise the structural integrity of dams, which could lead to more severe flood events. Additionally, flooding can be related to infectious disease because wastewater spills are a possible consequence of flooding. Public health can be affected because the incidence of infectious diseases can increase with wastewater spills.

4.5 Severe Winter Weather

Winter storms take many forms and vary significantly in size, strength, intensity, duration, and impact. The composition of a storm varies with the temperature, the wind, and amounts of precipitation. Important factors in winter storms include temperature, wind, wind chill, rain, sleet, snow, and blowing snow. Exceptional winter storms can and do cause problems for the communities, residents, and travelers. Examples of these types of storms include blizzards, ice storms, heavy snow events, and extended extreme cold temperatures. While these types of events may not sound serious, the combinations of cold temperatures, the wind, snow, wind chills, ice, and reduced visibilities can make these storms very deadly and costly.

The winter season can begin as early as September and last into May. The bulk of North Dakota's winter weather is from mid-November until early April. On average, there are around ten winter storms (ice storms, heavy snow events, winter storms, and blizzards) each year in North Dakota. Three to four of these storms reach blizzard intensity. As a result, North Dakota typically leads the nation in blizzard frequency. (National Climatic Data Center, 2010; National Weather Service, 2007)

Blizzards

Blizzards, as defined by the National Weather Service, are a combination of sustained winds or frequent gusts of 35 mph or greater and visibilities of less than a quarter mile from falling or blowing snow for 3 hours or more. A blizzard, by definition, does not indicate heavy amounts of snow, although they can happen together. The falling or blowing snow usually creates large drifts from the strong winds. The reduced visibilities make travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills.

Blizzard conditions can also exist without a major storm system being near the state. Strong surface winds can blow already fallen snow, which is known as a "ground blizzard." Visibility can be reduced to near zero even though the sun is shining and the tops of power poles and trees are seen easily. These conditions are extremely variable in duration, from hours to even greater than a day. Ground blizzards are usually accompanied by very cold temperatures and wind chill conditions, making them as potentially deadly as a conventional blizzard.

Ice Storms

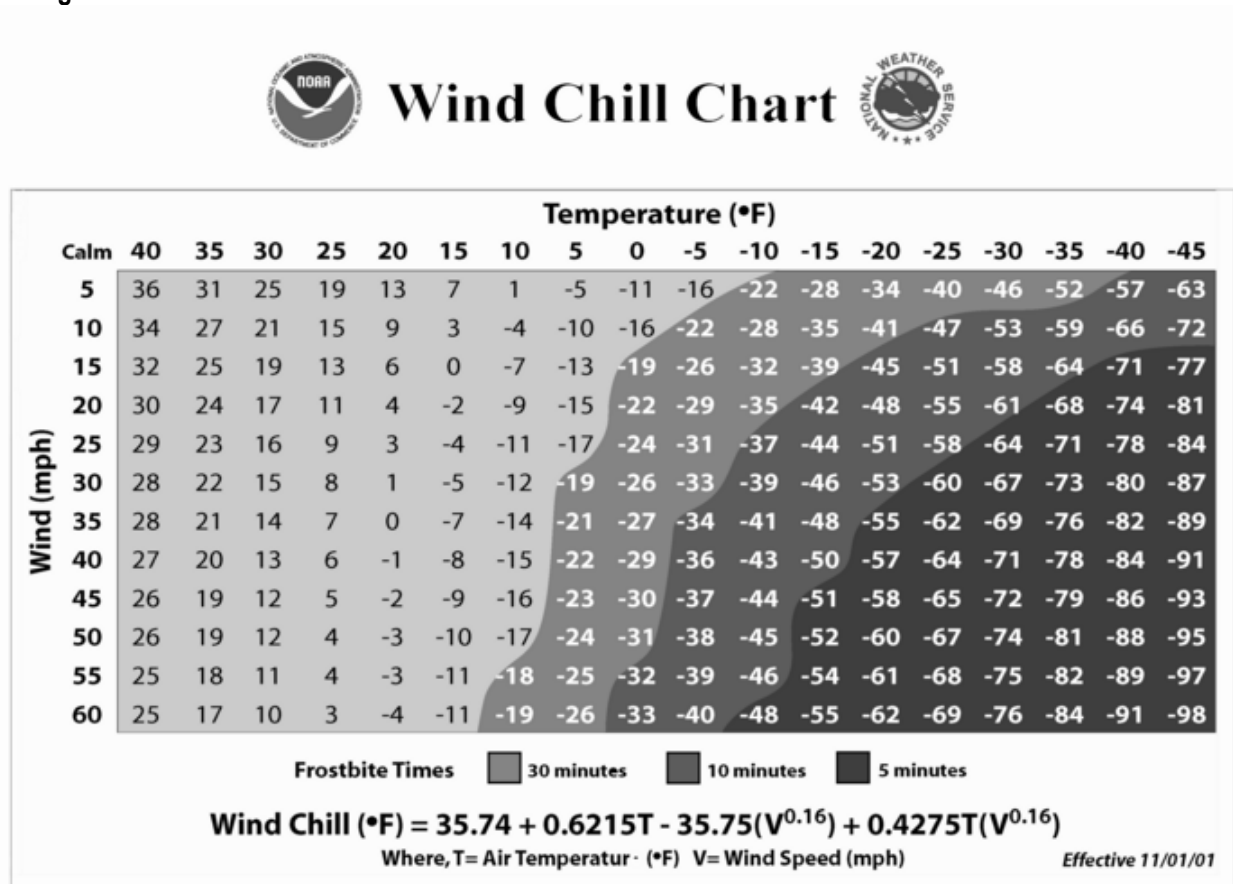
Ice storms develop when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into a warm layer of air, it melts to rain and then freezes on contact when hitting the frozen ground or cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Similarly, sleet occurs when the rain in the warm layer subsequently freezes into pellets while falling through a cold layer of air at or near the Earth's surface.

Extreme Cold

Extended periods of cold temperatures frequently occur throughout the winter months in North Dakota. Heating systems generally compensate for the cold outside. Most people limit their time outdoors during extreme cold conditions, but common complaints usually include pipes freezing and cars refusing to start.

When cold temperatures and the wind combine, dangerous wind chills can develop. Wind chill is how cold it feels when outside. Wind chill is based on the rate of heat loss on exposed skin from wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature, and eventually, internal body temperature. Therefore, the wind makes it feel much colder than the actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service, 2007)

Figure 19: National Weather Service Windchill Chart



The National Weather Service can be credited with providing at least 48 hours forewarning of a severe winter storm. This can give time for residents and governments to prepare for the storm such as stockpiling resources, prepping snow-moving equipment, and making plans. The NWS Warning Terminology Table breaks down the different types of advisories, watches, and warnings and when they are used.

Table 57: NWS Warning Terminology Table

National Weather Service Warning Terminology	
Winter Weather Advisory	Alert for ice, cold weather, or snow that can range from 2 - 6 inches.
Winter Storm Watch	Alert for severe winter weather with a high possibility in the next few days resulting in high accumulations of snow or ice.
Winter Storm Warning	Severe weather (ice, snow, cold) are about to begin or have already started.

National Weather Service Warning Terminology	
Blizzard Warning	Snow condition resulting in high winds, snowdrifts, lack of visibility, and threatening conditions when traveling and to those exposed to the weather.
Ice Storm Warning	High accumulations of ice that will cause dangerous travel and problems to power infrastructure.
Heavy Storm Warning	Snow accumulation of 6 or more inches.

4.5.1 Severe Winter Weather Risk

The overall risk for severe winter weather in Traill County is Moderate, but the probability that a winter storm will occur each year is highly likely. Data from 2009 to July 2015 was used to determine the risk for each of the cities and the county as a whole. All the cities and overall county probability, impact and risk are the same because data was not available by individual city, town or community.

Table 58: Severe Winter Weather Risk by City in Traill County

Severe Winter Weather			
City	Probability	Impact	Risk
Buxton	Highly Likely	Moderate	Moderate
Clifford	Highly Likely	Moderate	Moderate
Galesburg	Highly Likely	Moderate	Moderate
Grandin	Highly Likely	Moderate	Moderate
Hatton	Highly Likely	Moderate	Moderate
Hillsboro	Highly Likely	Moderate	Moderate
Mayville	Highly Likely	Moderate	Moderate
Portland	Highly Likely	Moderate	Moderate
Reynolds	Highly Likely	Moderate	Moderate
Traill County	Highly Likely	Moderate	Moderate
Total	Highly Likely	Moderate	Moderate

4.5.2 Severe Winter Weather History in Traill County

Severe winter weather occurs each winter season in Traill County. The types of severe winter weather that are reported for Traill County include blizzard, ice storms, and extreme cold/wind chill as provided by the National Oceanic Atmospheric Administration. Some of the most notable winter weather in Traill County occurred in 2014. In 2014 there were 8 blizzards which affected the county and 5 extreme cold/wind chill incidences. This is an example of how harsh the winters in Traill County can be.

The National Oceanic Atmospheric Administration (NOAA) provided the history of winter storm events in Traill County. From 2009 to July 2015, there have been 38 recorded events of severe winter weather in Traill County. A comprehensive list of the last 50 years of data can be found in Appendix B.

4.5.3 Major Declared Disasters for Severe Winter Weather

Of the aforementioned severe winter weather events, there have been two severe winter weather events in the last 50 years in Traill County which have been declared disasters by FEMA. These disaster declarations were both major declared disasters, which is when the President believes the storm has

caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. The beginning and ending date of the incident are included for these declared disasters, as well as information on the type of assistance program that was provided.

Table 59: Major Declared Disasters for Severe Winter Weather for Traill County

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaster Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
No	Yes	Yes	Yes	4/7/1997	DR	Flood	SEVERE FLOODING, SEVERE WINTER STORMS, SNOWMELT, SPRING RAINS	2/28/1997	5/24/1997	7/31/2012
No	No	Yes	Yes	1/12/1997	DR	Severe Storm(s)	SEVERE WINTER STORMS AND BLIZZARD CONDITIONS	1/3/1997	1/31/1997	1/21/1999

4.5.4 Mitigation Actions in the Past Five Years

Mitigation actions for severe winter weather from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for severe winter weather. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for severe winter weather is provided below.

Table 60: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Traill County	Communications Backup/ Generator		\$50,000 / Sheriff's Office	Severe Summer/ Winter, Terrorism Hazmat, Mass Casualty	Completed 2005	High
Traill County	Tree Trimming		\$15,000 / Parks Depts.	Severe Summer/Winter Shortage of Critical Materials	On-going	Medium
Traill County	Backup Repeater	Provide dispatch with necessary contact for response times	\$50,000 / Sheriff's Office	Severe Summer/ Winter, Terrorism Hazmat, Mass	Estimated completion 2015	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
				Casualty		
Buxton (Ives St. and Pacific Ave.)	Purchase and install outdoor warning siren with multiple tone capability.	The project would provide early warning to city residents of severe weather, fires, or other emergencies giving them adequate time to seek shelter or respond as needed.	\$30,000 / City of Buxton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Clifford (city lagoon)	Upgrade city's sanitary sewer system by replacing badly deteriorated switching valve and associated piping.	The project would prevent a highly possible failure of the city's sanitary sewer system that would allow the backup of raw sewage in resident's basements causing property damage, contamination, and potential health risks to residents.	\$5,000 / City of Clifford	Communicable Disease, Flooding, Summer storms, Winter storms	Estimated completion 2013	Low
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods around town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Clifford	Purchase 25kw 3 phase portable generator and shore power connection to support heat and lights at city-owned community emergency shelter. Also used to power emergency water pumps in the city	The project would help provide a safe, warm city emergency shelter and provide the resources needed to run emergency water pumps to assist in keeping the city dry.	\$30,000 / City of Clifford	Summer storms, Winter storms, Shortage of Critical Materials	Estimated completion 2013	Medium
Clifford (Memorial Hall – Fire Hall)	Replace (4) old single 44"x44" wood-framed windows in the city-owned building that houses fire department and post office with triple pane thermo-sealed vinyl windows with wind resistant coating.	The project would prevent energy loss, increase the security of the building, and promote a "green" environment.	\$3,200 / City of Clifford	Homeland Security, Summer storms, Winter storms	Estimated completion 2013	Low
Traill County	Purchase and install the remainder of 911 signage needed for the county and township roads.	The project would enable first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	\$100,000 / Traill County Sheriff's Office and County Commission	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Medium
Galesburg	Purchase materials and construct a storage shed with secure locks for the portable emergency generator.	Project would protect the emergency generator from the elements ensuring its readiness when needed, also to	\$1,000 / City of Galesburg	Homeland Security, Winter storms, Summer storms	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		prevent access by securing the housing				
Hatton	Purchase and install new outdoor warning siren for the city	The project would allow early warning of severe weather and/or early notification of local fire by having the ability to remotely activate the siren by the county dispatchers. This would give residents the time needed to seek shelter or respond to the fire department saving time, lives and property.	\$28,000 / City of Hatton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2012	High
Hillsboro	Purchase and install two additional outdoor warning sirens in the city	The project would provide the capability for all the city residents to hear sirens giving them early warning of severe weather or other emergency allowing them time to safely seek appropriate shelter. City's three existing sirens cannot be heard throughout entire city	\$58,000 / City of Hillsboro	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Portland	Purchase and install a new tower, antenna, repeater, 200 new pagers, and	The project would provide more efficient emergency	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	reprogram 200 existing pagers to a new frequency and repeater for county paging system for Fire and EMS first responders.	notification paging to first responders for timely response to emergencies. The current system has become congested causing delays in transmitting critical paging out of first responders. Also, this is needed to meet the new narrow band frequency regulation effective January 1, 2013		Materials, Transportation Accidents, Summer storms, Winter storms, Homeland Security, Flooding, Communicable Disease		
Trail County	Use of media, workshops, exercises and literature to inform the public of the hazards of a winter storm.	To make the public aware of the hazards of a winter storm	Staff time / Trail County Emergency Management	Winter Storms	On-going	Low
Trail County (Bridge #408 - 1 mile west and 2 miles south of Clifford Sec. 5 and 6 Galesburg Twp. 144N-53W)	Replacement of existing structure and cleaning existing channel of debris and sediment	This would allow water to move more efficiently and would reduce the backup of water during spring runoff and heavy rains	\$125,000 / Trail County Highway Department	Summer Storms, Flooding, Winter Storms	Estimated completion 2013	Medium

4.5.5 Vulnerability

The population of North Dakota is most threatened by winter storms while driving or when electric service is lost. Transportation accidents are more common during poor road and visibility conditions and may result in injuries or deaths. Property losses are usually covered by insurance. Approximately 29 percent of North Dakota's population relies on electricity for heat. Many of the counties in eastern and northern North Dakota have electricity as their primary heat source. In addition, those homes and businesses that use natural gas, propane, and fuel oil still often require electricity to run the blowers and heating systems. Therefore, an extended power outage during winter may make many homes and offices unbearably cold. Additionally, during extended winter-time power outages, people often make the mistake of bringing portable generators inside or not venting them properly, leading to carbon monoxide poisoning. With poor

road conditions, sheltering residents may present significant logistical challenges with getting people to heated facilities and feeding locations, and providing medical care. These situations, accompanied by stranded motorists that need to be rescued, represent significant threats to the population. As history has demonstrated, poorly built structures may also experience structural collapses resulting in property losses.

With respect to the economy, agriculture, transportation, and businesses in general may be affected. Winter is not a peak growing season, so agriculture may not be severely affected unless the storms arrive early or late in the growing season. The primary exceptions for agriculture are extremely cold temperatures during calving operations and keeping animals hydrated during blizzards. Ranchers must take precautions not to lose large numbers of calves and livestock during cold and snowy weather. This could have an impact on agricultural profits. Winter storms may slow transportation resulting in business closures and delivery delays. Schools often close temporarily if conditions warrant.

Perhaps the greatest threat to historical values from winter weather is the potential for pipes to freeze and burst during cold weather. Water can easily damage the interiors of structures and their contents, including items of historic value. When roads are impassable, social events may also be postponed or canceled.

To refine and assess the relative vulnerability of each North Dakota county to winter storm events, ratings were assigned to pertinent factors that were examined at the county level. These factors include social vulnerability index, prior events, prior annualized property damage, building exposure valuation, population density, livestock exposure, crop exposure, and annualized crop loss. A rating value of 1-10 was assigned to the data obtained for each factor and then weighted equally and factored together to obtain overall vulnerability scores for each comparison and to determine the most vulnerable counties. The Social Vulnerability Index normally ranges from 1-5. To give the Social Vulnerability Index the same weight as the other factors, the numbers were multiplied by two. Overall vulnerability scores were sorted into rankings from low, low-moderate, moderate, moderate-high, and high. Table 61 summarizes the calculated ranges applied to determine the overall vulnerability ranking based on the scores which ranged from 10 through 39. Table 62 shows the severe winter weather vulnerability analysis specific to Traill County.

Table 61: Rankings for Overall Severe Winter Storm Vulnerability

Low	Low-Moderate	Moderate	Moderate-High	High
10-15	16-21	22-27	28-33	34-39

Table 62: Severe Winter Weather Vulnerability Analysis for Traill County

County	Social Vuln. Rating	# of Events (2000-2003)	Property Damages	Annual Property Damages	Total Building Exposure (\$000)	Population Density
Traill	8	70	\$3,000	\$231	\$1,208,293	9.4
Livestock Exposure	Crop Exposure	Crop Insurance Payments (2003-2012)	Crop Losses(2003-2012)	Annual Crop Loss	Vuln. Score	Overall Vuln. Ranking
5,677,000	\$177,193,000	\$1,189	\$1,336	\$134	23	Moderate

What follows is the demonstrated linkage between each participating jurisdiction's hazards, risk, and vulnerabilities. The findings of this section are meant to inform and assist mitigation actions (see Section 6). Note, for this document, vulnerability is defined as any weakness that can be exploited to make an

asset susceptible to hazard damage.

Table 63: Vulnerability Analysis by Jurisdiction for Severe Winter Weather

Jurisdiction	Vulnerability Analysis
Buxton	Currently, there is not a large use of weather radios in Buxton and a mitigation project is to increase the use of weather radios in Buxton to help warn and prepare citizens for severe winter weather. There is critical infrastructure within Buxton (school and fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions.
Clifford	Currently, there is not a large use of weather radios in Clifford and a mitigation project is to increase the use of weather radios in Clifford to help warn and prepare citizens for severe winter weather. Clifford is in need of purchase and installation of generators in the event that severe winter weather knock the power out. There is critical infrastructure within Clifford (fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions.
Galesburg	Currently, there is not a large use of weather radios in Galesburg and a mitigation project is to increase the use of weather radios in Galesburg to help warn and prepare citizens for severe winter weather. There is critical infrastructure within Galesburg (fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions.
Grandin	There is no critical infrastructure located in Grandin; however, if there is severe winter weather, emergency responders need to be able to access citizens in Grandin, so it is imperative that roadways are being cleared.
Hatton	Currently, there is not a large use of weather radios in Hatton and a mitigation project is to increase the use of weather radios in Hatton to help warn and prepare citizens for severe winter weather. There is critical infrastructure within Hatton (school and fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions.
Hillsboro	Currently, there is not a large use of weather radios in Hillsboro and a mitigation project is to increase the use of weather radios in Hillsboro to help warn and prepare citizens for severe winter weather. Hillsboro is in need of purchasing and installing generators in the event that severe winter weather knocks the power out. There is critical infrastructure within Hillsboro (school, hospital, ambulance service, sheriff's office and fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions.
Mayville	Currently, there is not a large use of weather radios in Mayville and a mitigation project is to increase the use of weather radios in Mayville to help warn and prepare citizens for severe winter weather. There is critical infrastructure within Mayville (school, hospital, ambulance service and fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions.
Portland	Currently, there is not a large use of weather radios in Portland and a mitigation project is to increase the use of weather radios in Portland to help warn and prepare citizens for severe winter weather. There is critical infrastructure within Portland (fire department) which if damaged from severe winter weather, could

Jurisdiction	Vulnerability Analysis
	cause disruption to the citizens and surrounding jurisdictions.
Reynolds	Currently, there is not a large use of weather radios in Reynolds and a mitigation project is to increase the use of weather radios in Reynolds to help warn and prepare citizens for severe winter weather.
Traill County	Traill County needs to continue working with the National Weather Services to improve storm warning and awareness because the current warning system is not adequately preparing citizens. Across Traill County there is critical infrastructure which needs alternative power methods should there be a power outage caused by severe winter weather. There are two emergency routes (Neillsville Bridge #412 and County Road 17) which need to be repaired to allow for emergency responders to get to where they need to in the event of a medical emergency during severe winter weather.

4.5.6 Winter Storms and Climate Change

According to the National Climatic Assessment, annual average temperatures range from less than 40°F in the mountains of Wyoming and Montana to more than 70°F in South Texas, with extremes ranging from -70°F in Montana to 121°F in North Dakota and Kansas. Summers are long and hot in the south; winters are long and often severe in the north. In the Northern Plains, warmer winters may lead to reduced heating demand while hotter summers will increase demand for air conditioning, with the summer increase in demand outweighing the winter decrease.

Changes to crop growth cycles due to warming winters and alterations in the timing and magnitude of rainfall events have already been observed in North Dakota and as these trends continue, they will require new agriculture and livestock management practices.

4.5.7 Relationship to other Hazards

Winter storms have relationships to other hazards such as flooding, urban fire/structural collapses, transportation accidents, and utility outages. In North Dakota, severe winter seasons often translate to severe flooding potential in the spring. Snowmelt from heavy snows can cause localized flooding which can cause dangerous conditions for residents and motorists. It can also destroy property and infrastructure, such as roads. In addition, heavy winter snowstorms can cause power outages that may cause residents to use alternative heating methods, which can increase the risk of structural fires.

Additionally, winter storms can often be associated with transportation accidents. Roadways become hazardous quickly during snow, blowing snow, and ice events. Most accidents involve passenger vehicles; however, an accident involving a commercial vehicle transporting hazardous materials is also possible.

Utility outages are also associated with severe winter weather in North Dakota. Strong winds and ice or snow accumulations can take down utility lines. A long-term utility outage becomes more significant during extended cold periods as sheltering and cold weather exposure becomes more challenging. Accessing those in rural areas following heavy snow events to deliver supplies or provide emergency services can be difficult; the need for such services would be compounded by any long-term utility outage.

4.6 Urban Fire/Structural Collapse

According to FEMA, the term “residential”, as used in fire data analyses, includes properties commonly referred to as “homes,” whether one-, two- or multifamily properties. Residential refers to a type of property, whether it is a building or other type of structure, or whether the property is the land or real estate itself. Residential properties also include manufactured housing, hotels and motels, residential hotels, dormitories, and assisted living facilities, as well as halfway houses for formerly institutionalized individuals (e.g., mental patients, drug addicts, or convicts) that are designed to facilitate their readjustment to private life. The term residential does not include institutional properties such as prisons, nursing homes, juvenile care facilities, or hospitals, though many people may reside there for short or longer periods of time. The term “residential structures” refers to all built structures on residential properties. Structures include buildings as well as other non-building structures (e.g., breezeways, fences, etc.). The vast majority of residential fires, deaths, and injuries occur in buildings, and that is where prevention efforts are targeted most often. The term “residential buildings” refers to those residential structures that are enclosed, and where people spend the majority of their time.

4.6.1 Urban Fire/Structural Collapse Risk

While the probability for urban fire/structural collapses in Traill County is Highly Likely, its relative impact is Moderate, and thus the overall risk for fires in Traill County is Moderate. The risk for fires for each of the cities is the same because data was not available for individual cities/towns. The overall risk was determined based upon the specific data collected and outlined in the history section of this hazard profile. In assessing urban fire/structural collapses for the 2015 update, data from 2009 to 2014 was used to determine the risk for Traill County, including each of the cities and the county as a whole. The table below provides the name of each of the cities in the county, the probability that fire will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

Table 64: Urban Fire/Structural Collapse Hazard Risk Assessment

Urban fire/structural collapse			
City	Probability	Impact	Risk
Buxton	Highly Likely	Moderate	Moderate
Clifford	Highly Likely	Moderate	Moderate
Galesburg	Highly Likely	Moderate	Moderate
Grandin	Highly Likely	Moderate	Moderate
Hatton	Highly Likely	Moderate	Moderate
Hillsboro	Highly Likely	Moderate	Moderate
Mayville	Highly Likely	Moderate	Moderate
Portland	Highly Likely	Moderate	Moderate
Reynolds	Highly Likely	Moderate	Moderate
Total	Highly Likely	Moderate	Moderate

4.6.2 Fire History in Traill County

The table below outlines the historical urban fire/structural collapses which have taken place in Traill County from the Traill County Sheriff's Department. The data was provided by the Sheriff of Traill County and is based on numbers provided by Traill County fire departments.

Table 65: Structural Fire Data for Traill County from 2007 to 2013

Year	Total Calls	Structure Fires	Other Fire Calls
2014	68	8	60
2013	62	7	57
2012	104	16	87
2011	99	7	92
2010	103	9	94
2009	88	10	78

4.6.4 Declared Disasters for Urban Fire/Structural Collapse

There are no reported presidentially declared disasters related to fire in Traill County.

4.6.5 Mitigation Actions in the Past Five Years

Mitigation actions for structural fires from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for structural fires. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for structural fires are provided below.

Table 66: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Traill County	Create Fire Breaks		Unknown / Private/NRCS	Rural Fire	Deleted	
Buxton (Ives St. and Pacific Ave.)	Purchase and install outdoor warning siren with multiple tone capability.	The project would provide early warning to city residents of severe weather, fires, or other emergencies giving them adequate time to seek shelter or respond as needed.	\$30,000 / City of Buxton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		expedite delivery of goods around town.		materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding		
Trails County	Purchase and install the remainder of 911 signage needed for the county and township roads.	The project would enable first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	\$100,000 / Trails County Sheriff's Office and County Commission	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Medium
Hatton	Purchase and install new outdoor warning siren for the city	The project would allow early warning of severe weather and/or early notification of local fire by having the ability to remotely activate the siren by the county dispatchers. This would give residents the time needed to seek shelter or respond to the	\$28,000 / City of Hatton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2012	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		fire department saving time, lives and property.				
Hillsboro	Purchase and install two additional outdoor warning sirens in the city	The project would provide the capability for all the city residents to hear sirens giving them early warning of severe weather or other emergency allowing them time to safely seek appropriate shelter. City's three existing sirens cannot be heard throughout entire city	\$58,000 / City of Hillsboro	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Mayville (Fire Department)	Provide funding to remove existing body and install new body on fire rescue truck	Project would allow the fire department to respond more efficiently to emergencies by having the sufficient storage capacity on the rescue truck for critical rescue equipment that may be needed for a variety of responses (hazardous materials equipment)	\$50,000 / Mayville Fire Department and City of Mayville	Hazardous Materials, Rural Fires, Urban Fires, Wildland Fires, Transportation Accidents	Estimated completion 2013	Low
Portland	Purchase and install a new tower, antenna, repeater, 200 new pagers, and reprogram 200 existing pagers to a new frequency and repeater for county	The project would provide more efficient emergency notification paging to first responders for timely response	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous Materials, Transportation Accidents, Summer	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	paging system for Fire and EMS first responders.	to emergencies. The current system has become congested causing delays in transmitting critical paging out of first responders. Also, this is needed to meet the new narrow band frequency regulation effective January 1, 2013		storms, Winter storms, Homeland Security, Flooding, Communicable Disease		

4.6.6 Vulnerability

Table 67 shows the urban fire or structure collapse hazard ratings from the 2014 State of North Dakota Multi-Hazard Mitigation Plan for Traill County. The county ratings were determined based on the 2010 housing density, which is an indicator of urban areas. The rating was increased if there are no building code-enforcing jurisdictions in the county as building codes provide additional capability to prevent or minimize damages from structural fire or collapse.

Table 67: Urban Fire or Structural Collapse Hazard Rating

County Name	Housing Density per Square Mile	Vulnerability Rating	Building Codes?(County/# Cities)	Adjusted Vulnerability Rating
Traill County	4.39	Moderate	No/2	Moderate

According to the 2014 State of North Dakota Multi-Hazard Mitigation Plan, although structure fires are usually individual disasters and not community-wide, the potential exists for widespread urban fires that displace several businesses or families and exceed local and even state resources. An urban fire that rages uncontrollably despite firefighting efforts and burns a large portion of a downtown area or an important structure could have significant economic impacts. Large fires of this nature have also been known to require significant community resources if lives are lost. North Dakota has the potential for large-scale residential fires, commercial fires, and fires in public venues. In industrial areas, there is the potential of chemical plant fires producing hazardous smoke and fumes

Structural failures, such as inadequate design, older homes, poor maintenance, natural gas explosion or human factors (neglect or human error) can lead to increased vulnerability to fires. Most structural failures occur within residential homes and low-occupancy buildings where there are fewer people around to notice serious issues that could lead to a collapse or fire. There have been some structural collapses involved in commercial and industrial facilities that have caused numerous fatalities and injuries, but such incidents are

rare and are usually due to overloading or design flaws. However, the majority of fatalities due to structure collapse involve residential structures.

4.6.7 Urban Fire/Structural Collapse and Climate Change

According to the National Climate Assessment, North Dakota is part of the Great Plains region and impacts of climate change are occurring across the state. With all the environmental shifts taking place in North Dakota, fires are expected to become both more frequent and more severe. Fires are becoming an even bigger part of the landscape as the impacts of climate change take root. Rising temperatures are leading to increased demand for water and energy. Increased energy demands from rising temperatures mean higher demands placed on electrical grids and people using more electricity to cool their homes. This can increase the likelihood of urban fire/structural collapses.

4.6.8 Relationship to other Hazards

According to the 2014 State of North Dakota Multi-Hazard Mitigation Plan, winter weather can have a major effect on the number of fires that occur. Increasing costs of electricity, natural gas, propane, and fuel oil has led many people to look for alternative heating methods for their homes. Consequently, the use of space heaters, fireplaces, wood-burning stoves, and even continued use of coal stoves has created an increased fire hazard. Most people have limited experience with wood burners. Wood burning for heating has a poor safety record. Codes for the installation of stoves and chimneys may not be followed strictly, leading to an increased fire risk. Many communities in North Dakota have not adopted building codes. Other energy sources include portable LP (propane) gas or kerosene heaters with self-contained fuel supplies; these are hazardous appliances, even when used according to manufacturer's instructions. Open flames and the leakage of fuel from containers are fire hazards and could cause explosions. Winter storms, such as blizzards or ice storms, may also impair the movement of response vehicles and decrease response time to urban fire/structural collapses. The reduced response time could potentially increase the amount of damage.

Summer storms are also related because lightning strikes may ignite an urban fire/structural collapse. Windstorms that result in structural damage to structures increases the fuel load, which may escalate the risk of an urban fire/structural collapse. Flood, tornado, and high winds may also cause urban fire/structural collapses in their aftermath. Downed power lines, natural gas leaks or other sources of ignition initiated by natural hazards may spark a fire in structures. Routes to structures may be restricted due to flooding or debris from storms.

4.7 Communicable Disease

The 2014 Multi-Hazard Mitigation Plan for the State of North Dakota provided the following description of communicable diseases. Diseases affect humans, animals, and plants continuously. Each species has its own natural immune system to ward off most diseases. The causes and significance of diseases vary. Of significance in the emergency, management realm is communicable diseases with the potential for high infection rates in humans or those which might necessitate the destruction of livestock or crops. Such diseases can devastate human populations and the economy.

Disease transmission may occur naturally or intentionally, as in the case of bioterrorism, and infect populations rapidly with little notice. New diseases regularly emerge or mutate. Known diseases, such as influenza, can be particularly severe in any given season. Terrorism experts also theorize about the possibility of attacks using biological agents.

Human epidemics may lead to quarantines, large-scale use of the medical care system, and mass fatalities. Typically, the elderly, young children, and those with suppressed immune systems are at greatest risk from communicable diseases. The following biologic agents are considered the highest bioterrorism threats (Category A) due to their ease of dissemination or person-to-person transmission, high mortality rate with potential for major public health impacts, and potential for public panic and social disruption: Anthrax, Botulism, Plague, Smallpox, Tularemia, and Viral Hemorrhagic Fevers. (Centers for Disease Control and Prevention, 2010)

In addition to global disease and bioterrorism concerns, naturally occurring diseases can threaten communities. Natural illnesses of particular concern include Influenza, Meningitis, Pertussis (Whooping Cough), Measles, Norwalk Virus, Severe Acute Respiratory Syndrome (SARS), and foodborne illnesses such as E. coli and Salmonella outbreaks, among others. These diseases can infect populations rapidly, particularly through groups of people in close proximity such as schools, assisted living facilities, and workplaces.

Other disasters, such as those resulting in the loss or contamination of water supplies, may result in an increased probability of disease. In fact, following most major disasters, the disease is a primary concern due to the lack of sanitation. More specifically, long-term power outages can lead to household food contamination, and flooded properties often develop mold or mildew toxins. Standing water frequently contains hazardous bacteria and chemicals.

Animal and plant diseases, particularly those that infect livestock or crops, can distress the agricultural community. Such diseases could lead to food shortages and negative economic impacts, depending on the animals or plants infected and the geographic extent of the disease.

Of most concern are those diseases that spread rapidly and cause widespread economic losses. The North Dakota Department of Agriculture is charged with conducting regular and emergency inspections and licensure of animal and plant producers and shippers. The effects of these regulatory activities are to mitigate any effects from contaminated or suspect products entering the food chain.

4.7.2 Communicable Disease Risk

While the probability of communicable diseases is Highly Likely in Traill County, its relative impact is low

and thus the overall risk for communicable diseases in Traill County is little to No. The risk for communicable diseases for each of the cities is the same because data was not available by individual city. In assessing communicable diseases for 2015 updated, data from 2013 for the Traill County was used to determine this risk. The table provided below provides the name of each of the cities in the County, the probability that communicable disease will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

Table 68: Communicable Disease Risk by City in Traill County

Communicable Disease			
City	Probability	Impact	Risk
Buxton	Highly Likely	Low	Little to No
Clifford	Highly Likely	Low	Little to No
Galesburg	Highly Likely	Low	Little to No
Grandin	Highly Likely	Low	Little to No
Hatton	Highly Likely	Low	Little to No
Hillsboro	Highly Likely	Low	Little to No
Mayville	Highly Likely	Low	Little to No
Portland	Highly Likely	Low	Little to No
Reynolds	Highly Likely	Low	Little to No
Traill County	Highly Likely	Low	Little to No
Total	Highly Likely	Low	Little to No

4.7.3 Communicable Disease History in Traill County

The following information and data was provided by the North Dakota Department of Public Health for Traill County from 2009-2016. The 2016 data is year-to-date data.

Table 69: Communicable Disease History in Traill County

Disease	2009	2010	2011	2012	2013	2014	2015	2016 (YTD)	Total
Anaplasma phagocytophilum	0	0	0	0	0	0	0	0	0
Anthrax	0	0	0	0	0	0	0	0	0
Arbovirus	0	0	0	0	0	0	0	0	0
Avian Influenza	0	0	0	0	0	0	0	0	0
Babesiosis	0	0	0	0	0	0	0	0	0
Botulism	0	0	0	0	0	0	0	0	0
Brucellosis	0	0	0	0	0	0	0	0	0
Campylobacteriosis	0	0	1	0	0	1	1	0	3

Disease	2009	2010	2011	2012	2013	2014	2015	2016 (YTD)	Total
Pertussis	0	1	1	0	0	0	1	1	4
Plague	0	0	0	0	0	0	0	0	0
Polio	0	0	0	0	0	0	0	0	0
Psittacosis	0	0	0	0	0	0	0	0	0
Q fever	0	0	0	0	0	0	0	0	0
Rabies - human	0	0	0	0	0	0	0	0	0
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	0	0	0	0	1	1	0	1	3
Scabies (institutional outbreaks)	0	0	0	0	0	0	0	0	0
Shigellosis	0	0	0	0	0	0	0	0	0
Smallpox (Variola)	0	0	0	0	0	0	0	0	0
Staphylococcal enterotoxin B intoxication	0	0	0	0	0	0	0	0	0
Staphylococcus aureus (MRSA, VISA, VRSA, TSS)	0	0	0	0	0	0	0	0	0
Staphylococcus aureus, resistant (MRSA, VISA, VRSA)	2	1	0	0	1	0	3	0	6
Streptococcus infection, invasive	0	0	4	2	0	2	1	3	12
Streptococcus pneumoniae, invasive	1	0	0	1	0	1	1	0	4
Syphilis	0	0	0	0	0	0	0	0	0
TB-Active	0	0	0	0	0	0	0	0	0
TB-LTBI	0	0	0	0	0	0	0	0	0
Tetanus	0	0	0	0	0	0	0	0	0
Trichinella spiralis	0	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0	0
Typhoid Fever (Salmonella Typhi)	0	0	0	0	0	0	0	0	0
Vancomycin Resistant	1	0	2	4	3	2	6	4	22

Disease	2009	2010	2011	2012	2013	2014	2015	2016 (YTD)	Total
Enterococcus									
Vibrio cholerae (O1 and O139) and other vibrio sp.	0	0	0	0	0	0	0	0	0
West Nile Infection	0	0	0	2	0	0	0	2	4
Yellow Fever	0	0	0	0	0	0	0	0	0
Yersiniosis	0	0	0	0	0	0	0	0	0
Influenza Season	10-Sep	11-Oct	12-Nov	13-Dec	13-14	14-15	15-16	16-17	
Influenza Case Counts	33	66	2	5	3	56	24	0	189

4.7.4 Presidential Declared Disasters for Communicable Disease

There have been no presidentially declared disasters for infectious disease in the past five years.

4.7.5 Mitigation Actions in the Past Five Years

Mitigation actions for communicable diseases from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for communicable diseases. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for communicable diseases are provided below.

Table 70: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Buxton	Clean silt and debris from city storm water drain ditches and re-grade ditches for better drainage.	The project would allow for faster stormwater runoff from the city streets reducing flooding and minimize the ponding of water in the ditches where mosquito breeding has been a problem. Would minimize property damage and	\$80,000 / City of Buxton	Communicable Disease, Summer storms, flooding	Estimated completion 2013	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		reduce disease exposure to residents.				
Clifford (city lagoon)	Upgrade city's sanitary sewer system by replacing badly deteriorated switching valve and associated piping.	The project would prevent a highly possible failure of the city's sanitary sewer system that would allow the backup of raw sewage in resident's basements causing property damage, contamination, and potential health risks to residents.	\$5,000 / City of Clifford	Communicable Disease, Flooding, Summer storms, Winter storms	Estimated completion 2013	Low
Clifford	Replace approximately 15-20 city-owned septic tanks at occupied residences and businesses in the city. These are part of the city's sanitary sewer system and some have deteriorated to a dangerous level of potential failure very soon. Sizes vary from 1,000-1,500 gallons.	The project would substantially reduce the potential of soil and groundwater contamination caused by a failure of one or more of these underground tanks. These underground tanks are an essential part of the city's sanitary sewer system allowing for the settling and breakdown of solids before entering the lagoon.	\$95,000 to \$137,000 / City of Clifford	Communicable Disease, Shortage of Critical Materials	Estimated completion 2013	Medium
Clifford (Lincoln Ave., Garfield Ave. E., etc.)	Clear city storm water drains ditches from debris and silt deposits, re-grade or replace some of the ditch culverts, and	The project would allow for more efficient drainage of storm water reducing	\$5,000 to \$7,000 / City of Clifford	Communicable Disease, Flooding, Transportation Accidents	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	re-grade the slope of ditch walls to reduce rollover hazard when mowing grass.	flooding damage, eliminate breeding grounds for mosquitoes, and reduce the risk of a rollover accident when moving the ditches.				
Clifford (City Lagoon – Sprinkler Field)	Repair and/or replace 18 discharge sprinkler heads and associated underground piping from lagoon cells.	Some underground piping to sprinkler heads has caused cave-ins of soil, contamination of soil, and accident potentials for workers.	\$4,500 / City of Clifford	Communicable Disease	Estimated completion 2013	Low
Clifford (City Lagoon)	Repair security fence around sewage lagoon. Replace gate, lock, and broken posts.	Would keep unauthorized persons out of the area and prevent animals from entering. Would also prevent contamination by the unauthorized dumping of hazardous materials, vandalism, and drowning potential.	\$500 / City of Clifford	Homeland Security, Hazardous Materials, Communicable Disease	Estimated completion 2013	Low
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods around town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires,	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
				Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding		
Trail County	Purchase and install the remainder of 911 signage needed for the county and township roads.	The project would enable first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	\$100,000 / Trail County Sheriff's Office and County Commission	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Medium
Galesburg	Purchase portable emergency generator to power city's sanitary sewer lift station during power outages.	The project would allow the continued operation of the city's sanitary sewer lift station during a power outage preventing the backup of raw sewage in resident's basements.	\$30,000.00 / City of Galesburg	Communicable Disease, Shortage of Critical Materials	Estimated completion 2013	High
Hatton	Purchase and install transfer switch and emergency power panel for city fire station emergency generator.	The project would allow the emergency generator (already purchased) to be connected to the local fire department building to provide electricity	\$10,000 / City of Hatton	Shortage of Critical Materials, Communicable Disease	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		during times of extended power outages allowing the building to be designated a community shelter.				
Hillsboro	Installation of 8,000 ft. of 10" underground pipe for a secondary sanitary sewer force main discharge line to the lagoon.	The project would allow increased flows in the sanitary sewer system during heavy rains to be pumped to the lagoon and not diverted to the Goose River preventing unnecessary contamination of the river.	\$230,000 / City of Hillsboro	Communicable Disease, Summer storms	Estimated completion 2013	High
Hillsboro	Purchase and install six emergency generators to support city infrastructure. Three – 300kw three phase, two – 60kw three phase, one – 15kw three phase. Cost includes transfer switches and installation	The project would allow continued operation of the city's two sanitary lift stations, city wells, city hall, city shop, and emergency shelter during periods of extended power outages preventing sanitary sewer backup in community basements, and provide a safe community shelter for residents during emergencies.	\$210,000 / City of Hillsboro	Shortage of Critical Materials, Communicable Disease	Estimated completion 2013	High
Hillsboro (Hillsboro Medical Center)	Provide funding to enhance the hospital's ability to safely and effectively decontaminate	The project would allow timely set up of emergency decontamination	\$3,711 / City of Hillsboro and Hillsboro	Hazardous Materials, Communicable Disease	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	patients exposed to hazardous materials/chemicals. This would include plumbing provisions to provide a tempered water supply to the decontamination shower in the garage and a keyed frost proof wall hydrant outside the garage providing access to tempered water to allow for victim decontamination outside also, and a portable compressed air cylinder to inflate the decontamination shower enclosure in the ER garage	n shower and the ability to effectively clean contaminated victims with tempered water as recommended by regulatory agencies ensuring the best conditions for cleansing skin and preventing hyperthermia. Clean victims will prevent hospital staff from exposure to hazardous materials, Increased safety for both patients and hospital staff	Medical Center			
Mayville (Union Hospital-MeritCare)	Install a fuel line from the 11,000 gal. underground fuel storage tank to the large 350kw standby generator unit.	The project would allow the hospital to run on generator power for several days if needed allowing the facility to stay open continuing to care for patients during an extended power outage. Standby generator only has a 650 gal. fuel tank	\$38,900 / City of Mayville and Union Hospital - Meritcare	Communicable Disease, Shortage of Critical Materials	Estimated completion 2013	High
Portland	Purchase and install a new tower, antenna, repeater, 200 new pagers, and reprogram 200 existing pagers to a new frequency and	The project would provide more efficient emergency notification paging to first responders for	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous Materials, Transportation Accidents,	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	repeater for county paging system for Fire and EMS first responders.	timely response to emergencies. The current system has become congested causing delays in transmitting critical paging out of first responders. Also, this is needed to meet the new narrow band frequency regulation effective January 1, 2013		Summer storms, Winter storms, Homeland Security, Flooding, Communicable Disease		

4.7.6 Vulnerability

The 2014 Multi-Hazard Mitigation Plan for the State of North Dakota indicated the most significant impacts of communicable disease are to the population affected and the healthcare organizations involved. The disease can spread rapidly through schools, health facilities, and communities. As stated in the Community Profile section of this document, Traill County has a total population of 8,121, with 6.3 percent under the age of 5 and 18.7 percent over the age of 65. These populations are at a higher risk than other aged populations in Traill County.

Although infectious diseases are not subject to geographic boundaries, several populations in North Dakota are specifically at higher risk of infectious diseases. Communicable diseases are most likely to spread quickly in institutional settings such as dormitories, long-term care facilities, day care facilities, schools, correctional institutions, etc. The number of infections and fatalities in the state depends on the transmission and mortality rates. The statewide economy relies heavily on the agriculture, health care, travel, and utility industries, and therefore, human or livestock diseases would negatively affect the economy. With respect to human diseases, an outbreak would most certainly limit travel and impact the service and tourism industries. The trickle-down economic impacts to nearly all industries could be overwhelming. Workers that become ill, need to care for loved ones, or are fearful of contracting the disease may not show up for work. The impact to critical industries and services could be severe. Examples of industries and services that could be significantly impacted in North Dakota include health care, education, utility services, and emergency response.

4.7.7 Infectious Disease and Climate Change

According to the World Health Organization, changes in infectious disease transmission patterns are a likely major consequence of climate change. There are three categories of research into the linkages between climatic conditions and infectious disease transmission. The first examines evidence from the recent past of associations between climate, variability, and infectious disease occurrence. The second

looks at early indicators of already-emerging infectious disease impacts of long-term climate change. The third uses the above evidence to create predictive models to estimate the future burden of the infectious disease under projected climate change scenarios.

Types of diseases which are impacted by climate change are vector-borne and water-borne diseases. Important determinants of vector-borne disease transmission include vector survival and reproduction, the vector's biting rate, and the pathogen's incubation rate within the vector organism. Vectors, pathogens, and hosts each survive and reproduce within a range of optimal climatic conditions: temperature and precipitation are the most important, while sea level elevation, the wind, and daylight duration are also important. Human exposure to waterborne infections occurs by contact with contaminated drinking water, recreational water, or food. This may result from human actions, such as improper disposal of sewage wastes, or be due to weather events. Rainfall can influence the transport and dissemination of infectious agents, while temperature affects their growth and survival.

Additionally, a report from The Center for Integrative Environmental Research indicated there is an increased incidence of asthma, heat-related diseases, and other respiratory ailments which may result from climate change, affecting human health and well-being.

4.7.8 Relationship to other Hazards

Flood and drought conditions are associated with infectious disease because food and waterborne disease outbreaks can be sparked by flood and drought conditions. Food and water can become contaminated during flood and drought conditions, which can negatively impact the public's health. Norovirus, Salmonella, and E. coli are also associated with waterborne illness outbreaks, which are usually caused by drinking water contaminated by animal or human waste. Additionally, standing water from flooding can cause the mosquito population to increase, making West Nile Virus more likely.

4.8 Hazardous Material

Hazardous materials are any substances posing an unreasonable risk to safety and health, the environment, and the property of North Dakota citizens. The term hazardous materials envelops a vast array of products, from the relatively innocuous types, such as creosote, to highly toxic or poisonous types, such as anhydrous ammonia and phosgene gas. The severity of potential hazards caused by these materials is varied, but the primary reason for the designation is their risk to public safety.

The Federal Motor Carrier Safety Administration has nine categories of hazardous materials that are:

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

Hazardous material incidents are categorized as uncontrolled releases occurring during transportation (truck or pipeline) or at a fixed source such as a manufacturing or storage facility. Accidental releases may be due to equipment failure, human error, or a natural or man-made hazard event. Although the listed hazardous materials are classified essentially the same in both transportation and fixed facility incidents, the U.S. Department of Transportation is responsible for determining hazardous materials associated with transportation, including pipelines, and the U.S. Environmental Protection Agency (EPA) determines which materials are considered hazardous in fixed facility releases.

Generally, with a fixed facility, the hazards are pre-identified, and the facility is required by law to prepare a risk management plan and provide a copy to the local emergency planning committee (LEPC) and local fire departments.

4.8.1 Hazardous Materials Risk

The overall probability for that a hazardous material event will occur each year in Traill County is Possible and its relative impact is Low, and thus the overall risk for Traill County is Little to No. The risk for a hazardous material event for each of the cities was determined based upon the specific data collected and outlined in the history section of this hazard profile. In assessing hazardous material data for the 2015 update, data from 2009 to 2014 was used to determine the risk for each of the cities and the county as a whole. Most are the cities of Hatton, Hillsboro and the unincorporated areas of Traill County because they are at a likely probability. The table provided below provides the name of each of the cities in the county, the probability that hazardous materials will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

Table 71: Hazardous Materials Risk by City for Traill County

Hazardous Material			
City	Probability	Impact	Risk
Buxton	Unlikely	Low	Little to No
Clifford	Unlikely	Low	Little to No
Galesburg	Unlikely	Low	Little to No
Grandin	Unlikely	Low	Little to No
Hatton	Likely	Low	Little to No
Hillsboro	Likely	Low	Little to No
Mayville	Unlikely	Low	Little to No
Portland	Possible	Low	Little to No
Reynolds	Unlikely	Low	Little to No
Traill County	Likely	Low	Little to No
Total	Possible	Low	Little to No

*Note frequency data was only available from 1982-2014

4.8.2 Hazardous Material History in Traill County

The data from Traill County for hazardous material incidence from the Right To Know Network for the years of 2009-2014 was gathered as part of this report. During those years there were four reported incidents. Of these four incidents, there were no reported fatalities, hospitalizations, injuries, evacuations or damages incurred. The four incidents took place in Hillsboro (two incidents), Hatton and for one of the incidents, there was no city reported. A comprehensive list of the hazardous incidents from the past 50 years in Traill County can be found in Appendix B.

There were no reported hazardous materials incidences in 2014 for Traill County according to the Right To Know Network.

4.8.3 Declared Disasters for Hazardous Material

There have not been any presidentially declared disasters related to hazardous material for Traill County.

4.8.4 Mitigation Actions in the Past Five Years

Mitigation actions for hazardous materials from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for hazardous materials. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for hazardous materials are provided below.

Table 72: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Trail County	Communications Backup/ Generator		\$50,000 / Sheriff's Office	Severe Summer Winter, Terrorism Hazmat, Mass Casualty	Completed 2005	High
Trail County	Backup Repeater	Provide dispatch with necessary contact for response times	\$50,000 / Sheriff's Office	Severe Summer Winter, Terrorism Hazmat, Mass Casualty	Estimated completion 2015	Medium
Clifford (City Lagoon)	Repair security fence around sewage lagoon. Replace gate, lock, and broken posts.	Would keep unauthorized persons out of the area and prevent animals from entering. Would also prevent contamination by the unauthorized dumping of hazardous materials, vandalism, and drowning potential.	\$500 / City of Clifford	Homeland Security, Hazardous Materials, Communicable Disease	Estimated completion 2013	Low
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods around town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Low
Trail County	Purchase and install the remainder of 911	The project would enable	\$100,000 / Trail	Summer storms, Winter	Estimated completion	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	signage needed for the county and township roads.	first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	County Sheriff's Office and County Commission	storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	2013	
Hillsboro (Hillsboro Medical Center)	Provide funding to enhance the hospital's ability to safely and effectively decontaminate patients exposed to hazardous materials/chemicals. This would include plumbing provisions to provide a tempered water supply to the decontamination shower in the garage and a keyed frost proof wall hydrant outside the garage providing access to tempered water to allow for victim decontamination outside also, and a portable compressed air cylinder to inflate the decontamination shower enclosure in the ER garage	The project would allow timely set up of emergency decontamination shower and the ability to effectively clean contaminated victims with tempered water as recommended by regulatory agencies ensuring the best conditions for cleansing skin and preventing hyperthermia. Clean victims will prevent hospital staff from exposure to hazardous materials, Increased safety for both patients and hospital staff	\$3,711 / City of Hillsboro and Hillsboro Medical Center	Hazardous Materials, Communicable Disease	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Mayville (Fire Department)	Provide funding to remove existing body and install new body on fire rescue truck	Project would allow the fire department to respond more efficiently to emergencies by having the sufficient storage capacity on the rescue truck for critical rescue equipment that may be needed for a variety of responses (hazardous materials equipment)	\$50,000 / Mayville Fire Department and City of Mayville	Hazardous Materials, Rural Fires, Urban Fires, Wildland Fires, Transportation Accidents	Estimated completion 2013	Low
Portland	Purchase and install a new tower, antenna, repeater, 200 new pagers, and reprogram 200 existing pagers to a new frequency and repeater for county paging system for Fire and EMS first responders.	The project would provide more efficient emergency notification paging to first responders for timely response to emergencies. The current system has become congested causing delays in transmitting critical paging out of first responders. Also, this is needed to meet the new narrow band frequency regulation effective January 1, 2013	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous Materials, Transportation Accidents, Summer storms, Winter storms, Homeland Security, Flooding, Communicable Disease	Estimated completion 2013	High

SARA Title III

The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as SARA Title III, was enacted in November 1986 to enable state and local governments to adequately prepare and plan for chemical emergencies. Facilities that have spilled hazardous substances, or that store, use, or release

certain chemicals are subject to various reporting requirements. Common EPCRA topics include emergency planning; hazardous chemical inventory reporting; chemical information; toxic chemical release reporting; risk management plans, and the toxics release inventory (TRI) database. The TRI database includes facilities that manufacture (including importing), process, or otherwise use a listed toxic chemical above threshold quantities. Facilities covered by EPCRA must submit an emergency and hazardous chemical inventory form to the Local Emergency Planning Committee (LEPC), the State Emergency Response Commission (SERC) and the local fire department annually. This report, also called a Tier I or Tier II report, includes basic information including facility identification: employee contact information for emergencies and non-emergencies and site specific information including facility description, chemical types and descriptions, releases or incidents, and chemical storage capacity, capabilities, and locations.

4.8.5 Vulnerability

Within Traill County, there are areas which are more susceptible to hazardous material spills. Transportation routes, such as roadways and railways, within Traill County are more vulnerable. Trains and trucks can carry various hazardous materials, which if there was a derailment or crash could pose a threat to those motorists or residents within the area. The areas within the county surrounding pipelines are also vulnerable. Land used for agricultural purposes also has the potential to be more vulnerable because of hazardous material that may be used to treat the land.

The impacts to people are often greater than the structural impacts as a result of a hazardous material incident. Depending on the material, the health impacts to humans can be the long and short term. A hazardous material incident could have a greater impact on those areas with higher population concentrations such as cities, special needs facilities, and businesses, than more rural areas. In a hazardous material release, those in the immediate isolation area would have little to no warning, whereas, the population further away in the dispersion path may have some time to evacuate, depending on the weather conditions, material released, and public notification.

Vulnerabilities to public water supplies also threaten jurisdictions, and contamination could come from sources outside of North Dakota. Surface waters, such as rivers and reservoirs, and underground aquifers used as drinking water sources could each be threatened by releases from fixed facilities, pipelines, and transportation.

4.8.6 Hazardous Material Release and Climate Change

There is no documented link between hazardous material and climate change.

4.8.7 Relationship to other Hazards

Hazardous material incidences can have an impact on public health. Any hazardous material release or spill has the potential to have an impact on public health or safety. Additionally, hazardous material releases occur as a result of multiple causes but are often initiated by a transportation accident. Almost any hazard that destroys infrastructure can lead to a hazardous material release. For example, floods can wash out bridges or roadways causing transportation accidents as well as infiltrate storage facilities causing a hazardous material release at a fixed facility. Strong winds, poor visibility, or slippery roadways may also instigate a transportation accident. Hazardous material releases can also be intentional, as is the case with a terrorist act. A release could also be caused by an accidental domestic incident such as a methamphetamine lab. Hazardous material releases during any hazard event will most certainly compound the complexity of the event.

4.9 Severe Summer Weather

Severe summer storms can result in loss of life, injuries, and damage to property and crops. Although thunderstorms affect relatively small areas when compared to other hazards such as winter storms, all thunderstorms are dangerous. Every thunderstorm produces lightning, which kills more people each year than tornadoes. Heavy rain from thunderstorms can lead to flash flooding (see Section 5.4 for more information on this hazard). Strong winds, hail, and tornadoes are also dangers associated with some thunderstorms.

Of the estimated 100,000 thunderstorms that occur each year in the United States, only about 10 percent are classified as severe. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. The National Weather Service considers a thunderstorm severe if it produces hail at least 1 inch in diameter, winds of 58 mph or stronger, or a tornado. Thunderstorms are most likely to happen in the spring and summer months during the afternoon and evening hours, but they can occur year-round and at all hours. Annually, the central and northern parts of North Dakota may have an average of 10 to 30 days with thunderstorm activity, while the southern part of the state averages between 30 to 50 days.

Thunderstorms form when moisture, unstable air, and lift are present in the atmosphere. Thermal instability, fronts, and the sun's heat are capable of lifting the air to help form thunderstorms.

Table 73: National Weather Service Warning Terminology

National Weather Service Warning Terminology	
Severe Thunderstorm Watch	A Severe Thunderstorm Watch means that strong thunderstorms capable of producing winds of 58 mph or higher and/or hail 3/4 inches in diameter or larger are possible. Severe Thunderstorm Watches are generally issued for 6-hour periods.
Severe Thunderstorm Warning	A Severe Thunderstorm Warning means that thunderstorms capable of strong winds and/or large hail are occurring or could form at any time. Severe Thunderstorm Warnings are generally in effect for an hour or less.
Flash Flood Watch	A Flash Flood Watch means heavy rain leading to flash flooding is possible. Flash Flood Watches may be issued up to 12 hours before flash flooding is expected to begin and may last as long as 48 hours.
Flash Flood Warning	A Flash Flood Warning means that flooding is occurring or will develop quickly.

Hail

Hail is precipitation in the form of a lump of ice. Hail occurs when strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. The ice particles grow in size, finally becoming too heavy to be supported by the updraft and fall to the ground. Hailstones are usually round but can be conical or irregular in shape. They can range from pea size to the size of a grapefruit, and large hailstones can fall at speeds faster than 100 mph. Hail tends to fall in swaths that range from a few acres to an area ten miles wide and one hundred miles long (National Severe Storms Laboratory, 2007). Most hail events, however, affect only relatively small areas.

Lightning

Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause a separation of electrical charges. Positively charged ice particles rise to the top of the cloud and negatively charged ones fall to the middle and lower sections of the cloud. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye, the negatively charged area of the cloud sends a charge called a stepped leader toward the ground. Once it gets close enough, a channel develops between the cloud and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder. (National Weather Service, 2007)

Lightning occurs with all thunderstorms and averages 80 to 93 deaths and 300 injuries in the United States each year. Lightning also causes several hundred million dollars in damage to property and forests annually. Most lightning deaths and injuries occur when people are caught outdoors, especially under or near tall trees, in or on water, or on or near hilltops. Between 1984 and 1994, over 15,000 lightning induced fires nationwide resulted in several hundred million dollars in damages and the loss of two million acres of forest.

Extreme Heat

Extreme Heat According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat.

4.9.1 Severe Summer Weather Risk

The overall risk for severe summer weather in Traill County is Low, and the probability that severe summer weather will occur each year is likely. Data from 2009 to July 2015 was used to determine the risk for each of the cities, towns and communities and the county as a whole. The cities of Buxton, Hillsboro and Portland are at a higher risk. The unincorporated areas of the county are also at higher risk.

Table 74: Severe Summer Weather Risk by City in Traill County

Severe Summer Weather			
City	Probability	Impact	Risk
Buxton	Highly Likely	Moderate	Moderate
Clifford	Likely	Moderate	Low
Galesburg	Likely	Moderate	Low
Grandin	Unlikely	Low	Little to No
Hatton	Likely	Moderate	Low
Hillsboro	Highly Likely	Moderate	Moderate
Mayville	Possible	Low	Little to No
Portland	Highly Likely	Moderate	Moderate
Reynolds	Likely	Low	Little to No
Traill County	Highly Likely	Moderate	Moderate

Severe Summer Weather			
City	Probability	Impact	Risk
Total	Likely	Moderate	Low

4.9.2 Severe Summer Weather in Traill County

Severe summer weather can occur anywhere in the world and at any time of the day; however, in Traill County, severe summer weather is most likely to occur between the months of May and August. The severe summer weather reported for Traill County includes excessive heat, hail, heavy rain, strong/high wind, lightning and thunderstorm wind. The history of severe summer weather events in Traill County was provided by National Oceanic Atmospheric Administration (NOAA). From 2009 to July 2015, there have been 29 recorded events of severe thunderstorms in Traill County. The table below lists these 29 events with the location they occurred within Traill County. Other information included is the date, time, magnitude, and any deaths/injuries or damage incurred. A comprehensive list of the last 50 years of data can be found in Appendix B.

Table 75: Severe Summer Weather in Traill County from 2009 to July 2015

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	20.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/31/2009	12:21	CST-6	High Wind	40 kts. MS	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/26/2009	20:12	CST-6	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/26/2009	20:14	CST-6	Thunderstorm Wind	59 kts. MG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/20/2009	05:15	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/23/2009	20:40	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
PORTLAND	TRAILL CO.	ND	05/24/2010	17:00	CST-6	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
CUMMINGS	TRAILL CO.	ND	05/24/2010	17:45	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	06/08/2010	16:05	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/08/2010	16:35	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	06/08/2010	16:45	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	10/26/2010	16:27	CST-6	High Wind	58 kts. MG	0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	10/27/2010	16:27	CST-6	High Wind	50 kts. MG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	05/30/2011	20:29	CST-6	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	05/30/2011	21:02	CST-6	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/04/2011	19:32	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	07/16/2011	12:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/23/2011	02:20	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/23/2011	02:29	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	08/01/2011	02:05	CST-6	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	08/04/2011	18:20	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/11/2011	14:08	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
ALTON	TRAILL CO.	ND	08/11/2011	14:20	CST-6	Heavy Rain		0	0	0.00K	20.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
TRAILL (ZONE)	TRAILL (ZONE)	ND	10/07/2011	15:00	CST-6	High Wind	35 kts. MS	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/07/2012	17:29	CST-6	Hail	1.25 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/07/2012	17:50	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/19/2012	17:30	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/19/2012	17:35	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/19/2012	17:50	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/20/2013	16:45	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/20/2013	16:50	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BLANCHARD	TRAILL CO.	ND	06/20/2013	17:05	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	06/20/2013	17:40	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/26/2013	00:00	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/21/2013	22:37	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/21/2013	22:40	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	07/21/2013	22:40	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/21/2013	23:00	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	06/21/2014	15:00	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	06/21/2014	15:00	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
ALTON	TRAILL CO.	ND	06/21/2014	15:10	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	06/21/2014	15:30	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/21/2014	15:30	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/21/2014	15:44	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/21/2014	18:44	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
HILLSBORO ARPT	TRAILL CO.	ND	06/21/2014	18:55	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/21/2014	19:00	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/28/2014	12:32	CST-6	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
VOLGA	TRAILL CO.	ND	07/05/2014	22:25	CST-6	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/05/2014	22:35	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/21/2014	19:25	CST-6	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/21/2014	19:40	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/21/2014	19:49	CST-6	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	07/21/2014	22:00	CST-6	High Wind	52 kts. EG	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	09/20/2014	11:50	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MURRAY	TRAILL CO.	ND	06/24/2015	15:50	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	06/24/2015	16:03	CST-6	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/27/2015	17:00	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	07/23/2015	22:50	CST-6	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	07/23/2015	23:00	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	20.00K

4.9.3 Major Declared Disasters for Severe Summer Weather

Of the aforementioned severe summer weather events, there have been 14 severe summer weather events in the last 50 years in Traill County which have been declared a disaster by FEMA. All of these disaster declarations were major declared disasters, which is when the President believes the storm has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. The beginning and ending date of the incident are included for these declared disasters, as well as information on the type of assistance program that was provided.

Table 76: Major Declared Disasters for Severe Summer Weather for Traill County

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaster Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
Yes	No	Yes	Yes	3/24/2009	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING	3/13/2009	8/10/2009	
No	No	Yes	Yes	6/5/2006	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/30/2006	4/30/2006	11/15/2012
No	No	Yes	Yes	7/22/2005	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, AND GROUND SATURATION	6/1/2005	7/7/2005	8/8/2012
No	No	Yes	Yes	5/5/2004	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/26/2004	6/14/2004	7/19/2012
No	No	Yes	Yes	9/10/2002	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, AND TORNADOES	6/8/2002	8/11/2002	6/8/2010
No	No	Yes	Yes	5/28/2001	DR	Flood	SEVERE STORMS, FLOODING, & GROUND SATURATION	3/1/2001	8/9/2001	4/4/2012

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaster Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
No	Yes	Yes	Yes	6/27/2000	DR	Severe Storm(s)	SEVERE STORMS, FLOODING AND GROUND SATURATION	4/5/2000	8/12/2000	8/10/2010
No	Yes	Yes	Yes	6/8/1999	DR	Flood	SEVERE STORMS, FLOODING, SNOW, ICE, GROUND SATURATION, LANDSLIDES, MUDSLIDES, AND TOR	3/1/1999	7/19/1999	6/24/2010
No	No	Yes	Yes	6/5/1996	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, & ICE JAMS	3/12/1996	6/21/1996	7/19/2002
No	Yes	Yes	Yes	5/16/1995	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/1/1995	7/5/1995	7/16/2001
No	Yes	Yes	Yes	7/26/1993	DR	Flood	SEVERE STORMS & FLOODING	6/22/1993	9/24/1993	3/6/2006
No	Yes	Yes	Yes	4/26/1979	DR	Flood	SEVERE STORMS, SNOWMELT & FLOODING	4/26/1979	4/26/1979	10/24/1984
No	Yes	Yes	Yes	7/11/1975	DR	Flood	SEVERE STORMS & FLOODING	7/11/1975	7/11/1975	4/16/1981
No	Yes	Yes	Yes	6/5/1970	DR	Flood	SEVERE STORMS & FLOODING	6/5/1970	6/5/1970	5/16/1972

4.9.4 Mitigation Actions in the Past Five Years

Mitigation actions for severe summer weather from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for severe summer weather. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for severe summer weather is provided below.

Table 77: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Traill County	Communications Backup/ Generator		\$50,000 / Sheriff's Office	Severe Summer/ Winter, Terrorism Hazmat, Mass Casualty	Completed 2005	High
Traill County	Tree Trimming		\$15,000 / Parks Depts.	Severe Summer/Winter Shortage of Critical Materials	On-going	Medium
Traill County	Backup Repeater	Provide dispatch with necessary contact for response times	\$50,000 / Sheriff's Office	Severe Summer Winter, Terrorism Hazmat, Mass Casualty	Estimated completion 2015	Medium
Buxton (Ives St. and Pacific Ave.)	Purchase and install outdoor warning siren with multiple tone capability.	The project would provide early warning to city residents of severe weather, fires, or other emergencies giving them adequate time to seek shelter or respond as needed.	\$30,000 / City of Buxton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Buxton	Clean silt and debris from city storm water drain ditches and re-grade ditches for better drainage.	The project would allow for faster stormwater runoff from the city streets reducing flooding and minimize the ponding of water in the ditches where mosquito	\$80,000 / City of Buxton	Communicable Disease, Summer storms, flooding	Estimated completion 2013	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		breeding has been a problem. Would minimize property damage and reduce disease exposure to residents.				
Clifford (city lagoon)	Upgrade city's sanitary sewer system by replacing badly deteriorated switching valve and associated piping.	The project would prevent a highly possible failure of the city's sanitary sewer system that would allow the backup of raw sewage in resident's basements causing property damage, contamination, and potential health risks to residents.	\$5,000 / City of Clifford	Communicable Disease, Flooding, Summer storms, Winter storms	Estimated completion 2013	Low
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods around town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Low
Clifford	Purchase 25kw 3 phase portable generator and shore power connection to	The project would help provide a safe, warm city	\$30,000 / City of Clifford	Summer storms, Winter storms, Shortage of	Estimated completion 2013	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	support heat and lights at city-owned community emergency shelter. Also used to power emergency water pumps in the city	emergency shelter and provide the resources needed to run emergency water pumps to assist in keeping the city dry.		Critical Materials		
Clifford (Memorial Hall – Fire Hall)	Replace (4) old single 44"x44" wood-framed windows in the city-owned building that houses fire department and post office with triple pane thermo-sealed vinyl windows with wind resistant coating.	The project would prevent energy loss, increase the security of the building, and promote a "green" environment.	\$3,200 / City of Clifford	Homeland Security, Summer storms, Winter storms	Estimated completion 2013	Low
Trall County	Purchase and install the remainder of 911 signage needed for the county and township roads.	The project would enable first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	\$100,000 / Trall County Sheriff's Office and County Commission	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Medium
Galesburg	Purchase materials and construct a storage shed with secure locks for the portable emergency generator.	Project would protect the emergency generator from the elements ensuring its readiness when needed, also to prevent access by securing the housing	\$1,000 / City of Galesburg	Homeland Security, Winter storms, Summer storms	Estimated completion 2013	Low
Hatton	Purchase and install	The project	\$28,000 /	Winter storms,	Estimated	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	new outdoor warning siren for the city	would allow early warning of severe weather and/or early notification of local fire by having the ability to remotely activate the siren by the county dispatchers. This would give residents the time needed to seek shelter or respond to the fire department saving time, lives and property.	City of Hatton	Summer Storms, Rural, Urban, and Wildfires	completion 2012	
Hillsboro	Installation of 8,000 ft. of 10" underground pipe for a secondary sanitary sewer force main discharge line to the lagoon.	The project would allow increased flows in the sanitary sewer system during heavy rains to be pumped to the lagoon and not diverted to the Goose River preventing unnecessary contamination of the river.	\$230,000 / City of Hillsboro	Communicable Disease, Summer storms	Estimated completion 2013	High
Hillsboro	Purchase and install two additional outdoor warning sirens in the city	The project would provide the capability for all the city residents to hear sirens giving them early warning of severe weather or other emergency allowing them time to safely seek	\$58,000 / City of Hillsboro	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		appropriate shelter. City's three existing sirens cannot be heard throughout entire city				
Portland	Purchase and install a new tower, antenna, repeater, 200 new pagers, and reprogram 200 existing pagers to a new frequency and repeater for county paging system for Fire and EMS first responders.	The project would provide more efficient emergency notification paging to first responders for timely response to emergencies. The current system has become congested causing delays in transmitting critical paging out of first responders. Also, this is needed to meet the new narrow band frequency regulation effective January 1, 2013	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous Materials, Transportation Accidents, Summer storms, Winter storms, Homeland Security, Flooding, Communicable Disease	Estimated completion 2013	High
Trall County	Inform the public through media, exercises, and literature of the proper tornado drill procedures.	Inform the public of the importance of adopting plans and procedures for tornado drills.	Staff time / Trall County Emergency Management	Summer Storms	On-going	Low
Trall County	Use of media, workshops, exercises and literature to inform the public of the hazards of a summer storm.	To make the public aware of the hazards of a summer storm	Staff time / Trall County Emergency Management	Summer Storms	On-going	Low
Trall County (Bridge #408 - 1mile west and 2 miles south of Clifford Sec. 5	Replacement of existing structure and cleaning existing channel of debris and sediment	This would allow water to move more efficiently and would reduce	\$125,000 / Trall County Highway Department	Summer Storms, Flooding, Winter Storms	Estimated completion 2013	Medium

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
and 6 Galesburg Twp. 144N-53W		the backup of water during spring runoff and heavy rains				

4.9.5 Vulnerability

All residents within Traill County are potentially vulnerable to severe summer weather, especially those who live in a trailer or mobile homes and who are in areas without shelter. Severe summer weather happens each year in Traill County and has the potential to produce high winds, conditions for tornadoes, hail, and lightning. The 2014 State of North Dakota Multi-Hazard Mitigation Plan indicated the overall rankings for severe summer weather vulnerability by county. The following table shows how the rankings were determined. Overall, Traill County had a vulnerability rating of Low to Moderate for Tornado, Hail, Thunderstorm Wind, Lightning and Overall Ranking. Traill County had a Moderate ranking for Extreme Heat.

Table 78: Rankings for Overall Severe Summer Weather Vulnerability

Hazard	Low	Low-Moderate	Moderate	Moderate-High	High
Tornado	14-22	23-31	32-40	41-49	50-59
Hail	15-22	23-30	31-38	39-46	47-55
Extreme Heat	14-19	20-25	26-31	32-37	38-42
Thunderstorm Winds	10-17	18-25	26-33	34-41	42-50
Lightning	12-17	18-23	24-29	30-36	37-43

What follows is the demonstrated linkage between each participating jurisdiction's hazards, risk, and vulnerabilities. The findings of this section are meant to inform and assist mitigation actions (see Section 6). Note, for this document, vulnerability is defined as any weakness that can be exploited to make an asset susceptible to hazard damage.

Table 79: Vulnerability Analysis by Jurisdiction for Severe Summer Weather

Jurisdiction	Vulnerability Analysis
Buxton	Currently, there is not a large use of weather radios in Buxton and a mitigation project is to increase the use of weather radios in Buxton to help warn and prepare citizens for severe summer weather. There is critical infrastructure within Buxton (school and fire department) which if damaged from severe summer weather, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Buxton in order to provide a warning to the citizens for severe summer weather.
Clifford	Currently, there is not a large use of weather radios in Clifford and a mitigation project is to increase the use of weather radios in Clifford to help warn and prepare citizens for severe summer weather. Clifford is in need of purchase and installation of generators in the event that severe summer weather cause a power outage. There is critical infrastructure within Clifford (fire department) which if damaged from severe summer weather, could cause disruption to the citizens and surrounding

Jurisdiction	Vulnerability Analysis
	jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Clifford in order to provide a warning to the citizens for severe summer weather.
Galesburg	Currently, there is not a large use of weather radios in Galesburg and a mitigation project is to increase the use of weather radios in Galesburg to help warn and prepare citizens for severe summer weather. There is critical infrastructure within Galesburg (fire department) which if damaged from severe summer weather, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Galesburg in order to provide a warning to the citizens for severe summer weather.
Grandin	There is no critical infrastructure located in Grandin; however, if there is severe summer weather, emergency responders need to be able to access citizens in Grandin, so it is imperative that roadways are being cleared of debris.
Hatton	Currently, there is not a large use of weather radios in Hatton and a mitigation project is to increase the use of weather radios in Hatton to help warn and prepare citizens for severe summer weather. There is critical infrastructure within Hatton (school and fire department) which if damaged from severe summer weather, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Hatton in order to provide a warning to the citizens for severe summer weather.
Hillsboro	Currently, there is not a large use of weather radios in Hillsboro and a mitigation project is to increase the use of weather radios in Hillsboro to help warn and prepare citizens for severe summer weather. Hillsboro is in need of purchase and installation of generators in the event that severe summer weather cause a power outage. There is critical infrastructure within Hillsboro (school, hospital, ambulance service, sheriff's office and fire department) which if damaged from severe summer weather, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Hillsboro in order to provide a warning to the citizens for severe summer weather.
Mayville	Currently, there is not a large use of weather radios in Mayville and a mitigation project is to increase the use of weather radios in Mayville to help warn and prepare citizens for severe summer weather. There is critical infrastructure within Mayville (school, hospital, ambulance service and fire department) which if damaged from severe winter weather, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Mayville in order to provide a warning to the citizens for severe summer weather.
Portland	Currently, there is not a large use of weather radios in Portland and a mitigation project is to increase the use of weather radios in Portland to help warn and prepare citizens for severe summer weather. There is critical infrastructure within Portland (fire department) which if damaged from severe summer weather, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Portland in order to provide a warning to the citizens for severe summer weather.
Reynolds	Currently, there is not a large use of weather radios in Reynolds and a mitigation project is to increase the use of weather radios in Reynolds to help warn and prepare citizens for severe summer weather. Additionally, outdoor sirens need to be

Jurisdiction	Vulnerability Analysis
	monitored and installed in Reynolds in order to provide a warning to the citizens for severe summer weather.
Traill County	Traill County needs to continue working with the National Weather Services to improve storm warning and awareness because the current warning system is not adequately preparing citizens. Across Traill County there is critical infrastructure which needs alternative power methods should there be a power outage caused by severe summer weather. There are two emergency routes (Neillsville Bridge #412 and County Road 17) which need to be repaired to allow for emergency responders to get to where they need to in the event of a medical emergency during severe summer weather. There is also a need to encourage all trailer courts within Traill County to have either on-site shelter or an evacuation plan to a nearby shelter to keep all the residents safe.

4.9.6 Summer Storms and Climate Change

Changing extremes in precipitation are projected across all seasons, including higher likelihoods of both increasing heavy rain and snow events and more intense droughts and spring precipitation and very heavy precipitation events are both projected to increase in the northern portions of the area, leading to increased runoff and flooding that will reduce water quality and erode soils. Increased snowfall, rapid spring warming, and intense rainfall can combine to produce devastating floods, as is already common along the Red River. More intense rains will also contribute to urban flooding.

The 2014 National Climate Assessment also indicated that future climate change projections include more precipitation in the Northern Great Plains and less in the Southern Great Plains. In 2011, such a pattern was strongly manifest, with exceptional drought and record-setting temperatures in Texas and Oklahoma and flooding in the Northern Great Plains.

According to the Federal Advisory Committee Draft National Climate Assessment (NCA), other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

4.9.7 Relationship to other Hazards

Urban fire/structural collapses have the potential to be related to summer storms because lightning strikes may ignite an urban fire/structural collapse. Flood, tornado, and high winds may also cause structural fires in their aftermath. Downed power lines, natural gas leaks or other sources of ignition initiated by natural hazards may spark a fire in structures. Routes to structures may be restricted due to flooding or debris from storms. Flooding also can be related, because heavy rain from summer storms can cause flooding from frequent storms or storms causing high levels of rainfall during a short period of time. Tornadoes develop out of thunderstorms, where there's already a steady, upward flow of warm, low-pressure air to get things started. Hail can also occur as part of thunderstorms and can cause damage depending on the size and duration of the hail.

4.10 Subsidence

Traill County's June 2010 Multi-Jurisdictional Pre-Disaster All Hazard Mitigation Plan indicated North Dakota has a minimal land subsidence hazard, usually only related to mining activities and is typically recognized and mitigated. Traill County does not have a history of any declared state or federal land subsidence disasters.

There are three types of potential problems associated with the existence or formation of sinkholes: subsidence, flooding, and pollution. Subsidence is defined as the gradual caving in, or sinking of an area of land. Subsidence commonly involves a gradual sinking, but it could also result in an instantaneous or catastrophic collapse. North Dakota does have expansive soils, including clay with swelling potential, but the impacts of such are generally limited to a small scale; good building practices generally mitigate damages from expansive soils.

The change in the local environment affecting the soil mass causing subsidence and sinkholes collapse is called a triggering mechanism. Water is the main factor affecting the local environment that causes subsidence. The main triggering mechanisms for subsidence are water level decline, changes in groundwater flow, increased loading, and deterioration (abandoned coal mines). Water level decline can happen naturally or be human induced. Factors in water decline are pumping water from wells, localized drainage from construction, dewatering, and drought. Changes in the groundwater flow include an increase in the velocity of groundwater movement, increase in the frequency of water table fluctuations, and increased or reduced recharge. Increased loading causes pressure in the soil, leading to failure of underground cavities and spaces. Vibrations caused by an earthquake, vibrating machinery, and blasting can cause structural collapse followed by surface settlement.

4.10.1 Subsidence Risk

The overall probability for that a subsidence event will occur each year in Traill County is Unlikely and its relative impact is Low, and thus the overall risk for Traill County is Little to No. The risk for a subsidence event for each of the cities was determined based upon the specific data collected and outlined in the history section of this hazard profile. In assessing subsidence data for the 2015 update, data from 2009 to 2014 was used to determine the risk for each of the cities and the county as a whole. The table provided below provides the name of each of the cities in the county, the probability that wildfire will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

Table 80: Subsidence Hazard Risk Assessment

Subsidence			
City	Probability	Impact	Risk
Buxton	Possible	Low	Little to No
Clifford	Unlikely	Low	Little to No
Galesburg	Unlikely	Low	Little to No
Grandin	Unlikely	Low	Little to No
Hatton	Unlikely	Low	Little to No

Subsidence			
City	Probability	Impact	Risk
Hillsboro	Unlikely	Low	Little to No
Mayville	Unlikely	Low	Little to No
Portland	Unlikely	Low	Little to No
Reynolds	Unlikely	Low	Little to No
Traill County	Unlikely	Low	Little to No
Total	Unlikely	Low	Little to No

4.10.2 Subsidence History in Traill County

According to the 2014 State of North Dakota Multi-Hazard Mitigation Plan, North Dakota does have expansive soils, including clay with swelling potential, but the impacts of such are generally limited to a small scale; good building practices generally mitigate damage from expansive soils. Most mine, drilling, and energy production disasters do not cause significant losses to area communities and are limited to occupational hazards but collapses, fires, and explosions are all possible.

4.10.3 Presidential Declared Disasters for Subsidence

There were no declared disasters related to subsidence in Traill County.

4.10.4 Mitigation Actions in the Past Five Years

There was no mitigation actions specific to subsidence from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan.

4.10.5 Vulnerability

There is one construction sand and gravel pit in Buxton, which could potentially be vulnerable to subsidence events. Additionally, any land near a body of water has the potential to be more vulnerable to subsidence events.

4.10.6 Subsidence and Climate Change

Changes in climate have the potential to impact subsidence in Traill County. Periods of excessive and prolonged rainfall can cause ground water levels to rise and swell prone soils, particularly cohesive soils with high clay content (and to a lesser extent silt); these soils are particularly susceptible to volumetric change. Conversely, excessive and prolonged dry periods cause shrinkage. In winter, the waterlogged ground can move further by frost heave.

4.10.7 Relationship to Other Hazards

Subsidence can be related to other hazards such as summer storms, because they can cause excessive or prolonged periods of rain which can cause the ground to become susceptible to volumetric change. Drought also has the potential to be related to subsidence, because periods of drought can cause shrinkage of soils, which can impact subsidence. Additionally, flooding can cause excessive water on the ground which can cause volumetric changes.

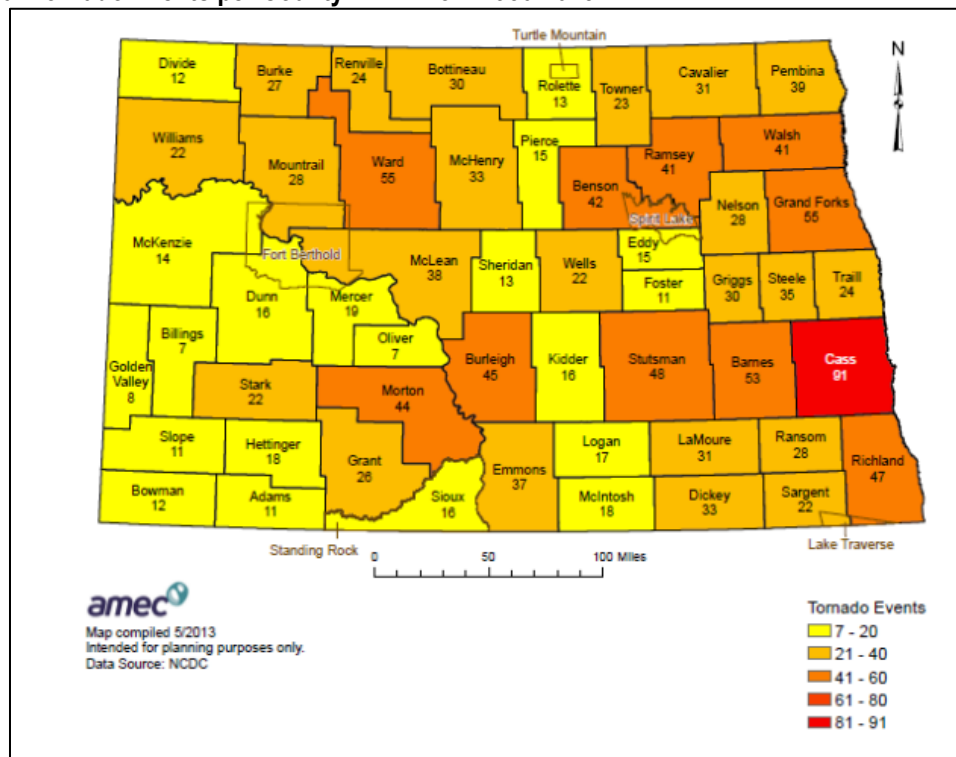
4.11 Tornado

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. A tornado is initially a cloud within the thunderstorm, composed of condensed water vapor. A tornado forms when a change in wind direction and increase in wind speed with increasing height creates a horizontal spinning effect in the lower atmosphere. This area of rotation may be two to six miles wide, extending through much of the storm. Most tornadoes form within this area of strong rotation when the rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical. Tornadoes may appear nearly transparent until the circulating wind in the funnel reaches the ground and picks up debris that eventually darkens the whole funnel.

Tornadoes are nature's most violent windstorm. In an average year, the United States experiences an average of 1,200 tornadoes that result in an average of 70 to 80 deaths and 1,500 injuries. Most fatalities occur when people are struck by flying debris or do not leave mobile homes and automobiles.

Tornadoes can vary greatly in shape, size, and wind speed. Most tornadoes, 88 percent, have wind speeds of less than 110 mph and a lifetime of fewer than ten minutes. These weak tornadoes result in less than five percent of tornado deaths. The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. The average forward speed is 30 mph but may vary from nearly stationary to 70 mph. Approximately 11 percent of all tornadoes have wind speeds between 110 and 205 mph and result in nearly 30 percent of all tornado deaths. These strong tornadoes may last 20 minutes or longer. Less than one percent of all tornadoes have resulted in 70 percent of all tornado deaths. These violent tornadoes can be over a mile wide with documented rotating winds of more than 250 mph, and they can have lifetimes exceeding one hour and stay on the ground for over 50 miles.

Figure 20: Tornado Events per County in ND from 1950-2013



4.11.1 Tornado Risk

The overall risk for tornadoes in Traill County is Low, and the probability that a tornado will occur each year is likely. Data from 2009 to July 2015 was used to determine the risk for each of the cities and the county as a whole. There are certain cities, such as Buxton, Hatton, Mayville, Hillsboro and Portland which are at an increased probability and risk due to the history of tornadoes affecting these cities.

Table 81: Tornado Risk by City in Traill County

Tornado			
City	Probability	Impact	Risk
Buxton	Likely	Moderate	Low
Clifford	Possible	Low	Little to No
Galesburg	Possible	Low	Little to No
Grandin	Possible	Low	Little to No
Hatton	Highly Likely	Moderate	Moderate
Hillsboro	Likely	Moderate	Low
Mayville	Highly Likely	Moderate	Moderate
Portland	Highly Likely	Moderate	Moderate
Reynolds	Possible	Low	Little to No
Traill County	Likely	Moderate	Low
Total	Likely	Moderate	Low

4.11.2 Tornado History in Traill County

Tornadoes in North Dakota peak in the months of June and July. The typical time of day for tornadoes ranges between 4:00 P.M. and 7:00 P.M. Most of these are minor tornadoes, with wind speeds under 125 miles per hour. The history of tornado events in Traill County was provided by National Oceanic Atmospheric Administration (NOAA). From 2009 to 2015, there were seven recorded events of a tornado in Traill County. A comprehensive list of the last 50 years of data can be found in Appendix B.

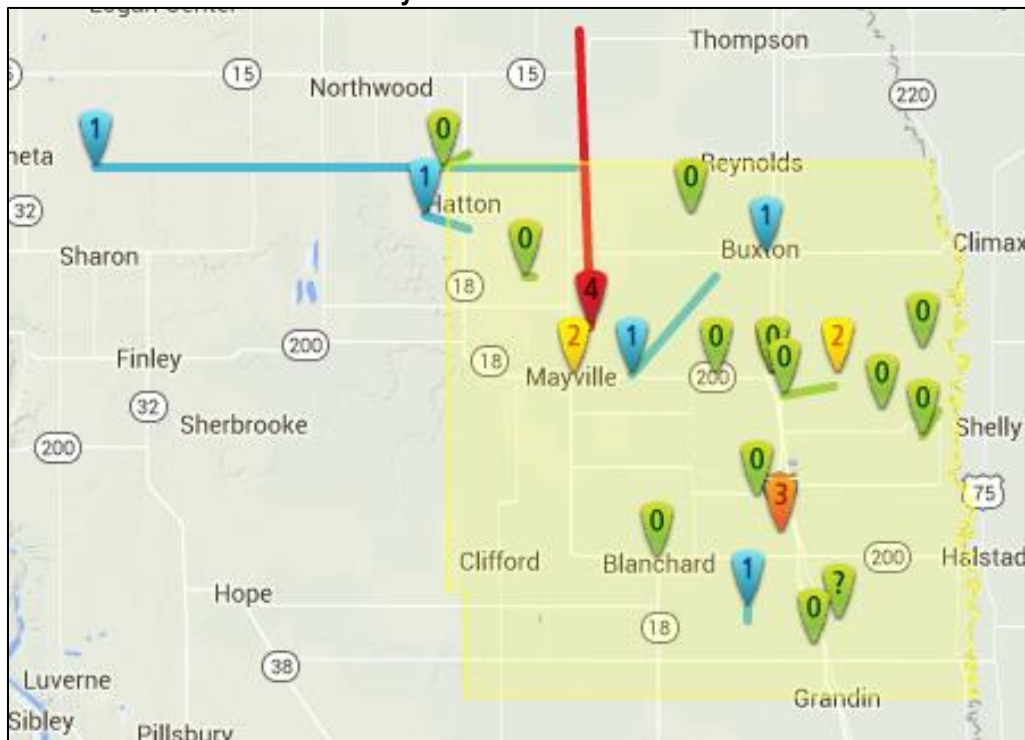
The strongest tornado to hit Traill County in the past five years was in 2010 at Portland Junction. According to the National Climatic Data Center, the tornado occurred on June 17, 2010. This tornado tracked northward for nearly nine miles to about twelve miles north of Mayville by 4:05 pm and crossed into Grand Forks County. It then continued for another 8 miles to around 10 miles west of Thompson by 4:18 PM CDT, for a total track length of nearly 17 miles. Trees in shelterbelts and farmsteads were snapped, uprooted, or sheared off. One well-constructed house near Holmes was completely swept from its foundation and destroyed. Peak winds were estimated at 185 mph. A farm shop about five and one-half miles north of Mayville was hit by the tornado, destroying the shop. A man inside survived with cuts on his hand.

Table 82: Tornado Events in Traill County from 2009-2015

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
BUXTON	TRAILL CO.	ND	06/26/2009	19:35	CST-6	Tornado	EF1	0	0	150.00K	0.00K
TAFT	TRAILL CO.	ND	06/26/2009	20:12	CST-6	Tornado	EF0	0	0	5.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/26/2009	20:50	CST-6	Tornado	EF0	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	06/17/2010	14:49	CST-6	Tornado	EF4	0	1	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/04/2011	20:15	CST-6	Tornado	EF1	0	0	20.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	07/12/2015	15:07	CST-6	Tornado	EF0	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	07/23/2015	22:51	CST-6	Tornado	EF1	0	0	0.00K	0.00K
Totals:								0	1	175.00K	0.00K

The following image shows the tornado track for the tornadoes which have occurred in the county from 1953 to 2011. There have been 24 reported tornadoes in Traill County during this time frame, with no fatalities and one injury. The numbers on the map correspond to the Fujita Scale number for each tornado, with 0 being the least severe and 5 being the most severe.

Figure 21: Tornado Track for Traill County



Source: Tornado History Project for Traill County, ND

4.11.3 Major Declared Disasters for Tornado

Of the aforementioned tornado events, there has been one tornado event in the last 50 years in Traill County which has been declared a disaster by FEMA. This disaster declaration was a major declared disaster, which is when the President believes the storm has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration

provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. The beginning and ending date of the incident are included for these declared disasters, as well as information on the type of assistance program that was provided.

Table 83: Major Declared Disasters for Tornadoes for Traill County

IH Program Declared	IA Program Declared	PA Program Declared	HM Program Declared	Declaration Date	Disaste r Type	Incident Type	Title	Incident Begin Date	Incident End Date	Disaster Close Out Date
No	No	Yes	Yes	9/10/2002	DR	Severe Storm(s)	SEVERE STORMS, FLOODIN G, AND TORNADO ES	6/8/2002	8/11/2002	6/8/2010

4.11.4 Mitigation Actions for the Past Five Years

There were no mitigation actions specific to tornadoes from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan. However, there are numerous mitigation actions related to severe summer weather which may apply to tornadoes. Please see the section above on severe summer weather for a list of mitigation actions specific to severe summer weather from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan.

4.11.5 Vulnerability

In an average year in North Dakota, there are 23 reported tornadoes resulting in about \$2.7 million in combined property and crop damage and 5 injuries. Fatalities are possible, averaging one every other year over the past 63 years. For tornadoes, even though only a few counties have experienced F5/EF5 tornadoes, all counties could experience tornadoes of this magnitude. Traill County has not experienced an F5/EF5 tornado but has experienced an F4/EF4 magnitude tornado.

Many of the critical and special needs facilities, although adequate for most events may not be able to withstand 160-200 mph tornadic or severe thunderstorm winds, as recommended by the Federal Emergency Management Agency (Federal Emergency Management Agency, 2004). Most structures should be able to provide adequate protection from hail, but the structures could suffer broken windows and dented exteriors. Even if a structure performs well in the high winds, flying debris and falling trees may damage the building.

Above ground infrastructure, namely overhead power lines, communications towers and lines, and structures are very susceptible to tornadoes, severe thunderstorms, and lightning. High winds and falling trees can damage this type of infrastructure and disrupt services. Therefore, even an indirect hit by a tornado or thunderstorm winds could disrupt regional electricity and possibly telephone services.

The 2014 State of North Dakota Multi-Hazard Mitigation Plan attempted to refine and assess the relative vulnerability of each North Dakota county to tornadoes. Ratings were assigned to pertinent factors that were examined at the county level. These factors included: social vulnerability index, prior events, prior annualized property damage, building exposure valuation, population density, livestock exposure, crop exposure, and annualized crop loss. A rating value of 1-10 was assigned to the data obtained for each factor and then weighted equally and factored together to obtain overall vulnerability scores for each

comparison and to determine the most vulnerable counties. The Social Vulnerability Index normally ranges from 1-5. To give the Social Vulnerability Index the same weight as the other factors, the numbers were multiplied by two. Overall vulnerability scores were sorted into rankings from low, low-moderate, moderate, moderate-high, and high. Traill County had an overall ranking of Low-Moderate for Tornado.

What follows is the demonstrated linkage between each participating jurisdiction's hazards, risk, and vulnerabilities. The findings of this section are meant to inform and assist mitigation actions (see Section 6). Note, for this document, vulnerability is defined as any weakness that can be exploited to make an asset susceptible to hazard damage.

Table 84: Vulnerability Analysis by Jurisdiction for Tornado

Jurisdiction	Vulnerability Analysis
Buxton	Currently, there is not a large use of weather radios in Buxton and a mitigation project is to increase the use of weather radios in Buxton to help warn and prepare citizens for tornadoes. There is critical infrastructure within Buxton (school and fire department) which if damaged from tornadoes, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Buxton in order to provide a warning to the citizens for tornadoes.
Clifford	Currently, there is not a large use of weather radios in Clifford and a mitigation project is to increase the use of weather radios in Clifford to help warn and prepare citizens for tornadoes. Clifford is in need of purchasing and installing generators in the event that a tornado causes a power outage. There is critical infrastructure within Clifford (fire department) which if damaged from the tornado, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Clifford in order to provide a warning to the citizens for a tornado.
Galesburg	Currently, there is not a large use of weather radios in Galesburg and a mitigation project is to increase the use of weather radios in Galesburg to help warn and prepare citizens for a tornado. There is critical infrastructure within Galesburg (fire department) which if damaged from a tornado, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Galesburg in order to provide a warning to the citizens for tornadoes.
Grandin	There is no critical infrastructure located in Grandin, however, if there is a tornado, emergency responders need to be able to access citizens in Grandin, so it is imperative that roadways are being cleared of debris.
Hatton	Currently, there is not a large use of weather radios in Hatton and a mitigation project is to increase the use of weather radios in Hatton to help warn and prepare citizens for tornadoes. There is critical infrastructure within Hatton (school and fire department) which if damaged from tornadoes, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Hatton in order to provide a warning to the citizens for a tornado.
Hillsboro	Currently, there is not a large use of weather radios in Hillsboro and a mitigation project is to increase the use of weather radios in Hillsboro to help warn and prepare citizens for a tornado. Hillsboro is in need of purchase and installation of generators in the event that a tornado causes a power outage. There is critical infrastructure within Hillsboro (school, hospital, ambulance service, sheriff's office and fire

Jurisdiction	Vulnerability Analysis
	department) which if damaged from a tornado, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Hillsboro in order to provide a warning to the citizens for tornadoes.
Mayville	Currently, there is not a large use of weather radios in Mayville and a mitigation project is to increase the use of weather radios in Mayville to help warn and prepare citizens for tornadoes. There is critical infrastructure within Mayville (school, hospital, ambulance service and fire department) which if damaged from a tornado, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Mayville in order to provide a warning to the citizens for a tornado.
Portland	Currently, there is not a large use of weather radios in Portland and a mitigation project is to increase the use of weather radios in Portland to help warn and prepare citizens for a tornado. There is critical infrastructure within Portland (fire department) which if damaged from a tornado, could cause disruption to the citizens and surrounding jurisdictions. Additionally, outdoor sirens need to be monitored and installed in Portland in order to provide a warning to the citizens for a tornado.
Reynolds	Currently, there is not a large use of weather radios in Reynolds and a mitigation project is to increase the use of weather radios in Reynolds to help warn and prepare citizens for tornadoes. Additionally, outdoor sirens need to be monitored and installed in Reynolds in order to provide a warning to the citizens for a tornado.
Traill County	Traill County needs to continue working with the National Weather Services to improve storm warning and awareness because the current warning system is not adequately preparing citizens. Across Traill County there is critical infrastructure which needs alternative power methods should there be a power outage caused by severe summer weather. There are two emergency routes (Neillsville Bridge #412 and County Road 17) which need to be repaired to allow for emergency responders to get to where they need to in the event of a medical emergency a tornado. There is also a need to encourage all trailer courts within Traill County to have either on-site shelter or an evacuation plan to a nearby shelter to keep all the residents safe.

4.11.6 Tornado and Climate Change

According to the National Center for Atmospheric Research, the main climate change connection to tornadoes is via the basic instability of the low-level air that creates the convection and thunderstorms in the first place. Warmer and moister conditions are the keys for unstable air and the oceans are warmer because of climate change. However, some studies state that trends in severe storms, including the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds, are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

4.11.7 Relationship to Other Hazards

Tornadoes can relate to other hazards such as water contamination, flooding, and fires. Damage incurred by a tornado can lead to water contamination, which can pose serious threats to plants, animals, and humans. Tornadoes can also be part of a large storm system which has the potential to cause a flood or

flash flood conditions. Additionally, tornadoes cause high winds, which can cause damage to power lines or cause gas leaks which could lead to fires or hazardous conditions for residents in Traill County. A tornado has the potential to cause structural and/or wildland fires in Traill County.

4.12 Wildfires

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires can be human-caused through acts such as arson or campfires or can be caused by natural events such as lightning. Wildfires can be categorized into four types. The first type is wildfires, which are fueled primarily by natural vegetation in grasslands, brushlands and forests. The second types are firestorms, which occur during extreme weather (e.g., high temperatures, low humidity, and high winds) with such intensity that fire suppression is virtually impossible. These events typically burn until the conditions change or the fuel is exhausted. The third types are interface or intermix fires, which occur in areas where both vegetation and structures provide fuel. The fourth and final type are prescribed fires and prescribed natural fires which are intentionally set or natural fires that are allowed to burn for beneficial purposes.

According to the North Dakota Forest Service, the state experiences over 700 wildfires that burn in excess of 35,000 acres annually on average. The primary factors influencing these wildland fires include type, amounts, and conditions of fuel supply (vegetation), temperature, the wind, precipitation patterns, humidity levels, topography, and the levels of human activity on the land.

The general wildfire season runs from April 1st through October 31st. There are three critical periods during wildfire season: early spring prior to green-up, late summer due to higher temperatures, and fall following heavy frosts until snowfall. The first peak occurs during the spring before vegetation turns green. This tends to be a very critical time due to the fuel buildup from the previous growing season, drying winds, decreasing humidity, warmer temperatures, and increased human activity outdoors. In general, the month of April accounts for about 20% of the wildfire starts and over a third of the total acreage burned. The second peak in the fire season coincides with the increase in harvesting activities during mid to late summer. Temperatures remain hot, humidity is at its lowest, and precipitation has declined significantly. The third and final peak in fire season occurs between September 1st and October 31st when wildland fuels are fully dried out due to hard frosts, winds are frequent and high, humidity is low, and human activity remains high. Forty percent of the annual fire starts occur in this third peak, accounting for 50% of the annually burned acreage. This third fire season typically extends until a season-ending snowfall.

4.12.1 Wildfire Risk

The overall probability that wildfires will occur each year in Traill County is possible and its relative impact is low, and thus the overall risk for Traill County is little to no. The risk for a wildfire event for each of the cities was determined based upon the specific data collected and outlined in the history section of this hazard profile. In assessing severe winter weather data for the 2015 update, data from 2009 to 2014 was used to determine the risk for each of the cities and the county as a whole. The table provided below provides the name of each of the cities in the county, the probability that wildfire will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

The 2014 North Dakota State Multi-Hazard Mitigation Plan indicated the wildland fire risk to jurisdictions for each county in the state. Traill County was listed as a Low risk according to the State Multi-Hazard Mitigation Plan.

Table 85: Wildfire Hazard Risk Assessment

Wildfire			
City	Probability	Impact	Risk
Buxton	Possible	Low	Little to No
Clifford	Possible	Low	Little to No
Galesburg	Possible	Low	Little to No
Grandin	Possible	Low	Little to No
Hatton	Possible	Low	Little to No
Hillsboro	Possible	Low	Little to No
Mayville	Possible	Low	Little to No
Portland	Possible	Low	Little to No
Reynolds	Possible	Low	Little to No
Traill County	Likely	Low	Low
Total	Possible	Low	Little to No

4.12.3 History of Wildfires/Wildland Fires in Traill County

Most rural fires result from acts of human carelessness during activities such as controlled burns of sloughs, ditches, and fields by landowners; recreational activity such as camping, hunting, and other off-road vehicle travel; and use of fireworks preceding and immediately following the 4th of July. A history of rural fires is available from the North Dakota Forest Service.

Wildfire will continue to be a low-risk hazard for Traill County. The potential for loss of life and property from urban structure fires is greatest in places where large groups of people gather, such as offices, stores, hotels, and theaters. Uses which may suffer large monetary losses due to a major fire include businesses, factories, and shopping areas. The history of wildfires is depicted in the tables below.

According to the State of North Dakota 2014 Multi-Hazard Mitigation Plan, Traill County has had six wildland fires during the years of 2009 to 2012. These six wildland fires burned 55 acres of land in Traill County.

Additionally, the 2014 Multi-Hazard Mitigation Plan for North Dakota included information on crop insurance claims as a result of fire from the years of 2003 to 2012. Traill County was included on this list for a fire to a sugar beets crop with an identity amount of \$149,694 in 2003.

4.12.4 Declared Disasters for Wildland Fire

There have been numerous statewide declared disasters related to wildfires in North Dakota, however, none have been specific to Traill County in the last 5 years. The state declared disasters for two wildland fires in North Dakota in May and September of 2012. This data was provided by the North Dakota Department of Emergency Services as part of the 2014 Multi-Hazard Mitigation Plan.

4.12.5 Mitigation Actions in the Past Five Years

Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for wildfires. The city or county affected, cost, status/timeframe and priority of each of the

mitigation projects for wildfires are provided below.

Table 86: Mitigation Actions in the Past Five Years

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Buxton (Ives St. and Pacific Ave.)	Purchase and install outdoor warning siren with multiple tone capability.	The project would provide early warning to city residents of severe weather, fires, or other emergencies giving them adequate time to seek shelter or respond as needed.	\$30,000 / City of Buxton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Clifford	Purchase and install approx. (18) - 911 street signs throughout the city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods around town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Low
Trall County	Purchase and install the remainder of 911 signage needed for the county and township roads.	The project would enable first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	\$100,000 / Trall County Sheriff's Office and County Commission	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Medium
Hatton	Purchase and install new outdoor warning siren for the city	The project would allow early warning of severe weather and/or early notification of local fire by having the ability to remotely activate the siren by the county dispatchers. This	\$28,000 / City of Hatton	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2012	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		would give residents the time needed to seek shelter or respond to the fire department saving time, lives and property.				
Hillsboro	Purchase and install two additional outdoor warning sirens in the city	The project would provide the capability for all the city residents to hear sirens giving them early warning of severe weather or other emergency allowing them time to safely seek appropriate shelter. City's three existing sirens cannot be heard throughout entire city	\$58,000 / City of Hillsboro	Winter storms, Summer Storms, Rural, Urban, and Wildfires	Estimated completion 2013	High
Mayville (Fire Department)	Provide funding to remove existing body and install new body on fire rescue truck	Project would allow the fire department to respond more efficiently to emergencies by having the sufficient storage capacity on the rescue truck for critical rescue equipment that may be needed for a variety of responses (hazardous materials equipment)	\$50,000 / Mayville Fire Department and City of Mayville	Hazardous Materials, Rural Fires, Urban Fires, Wildland Fires, Transportation Accidents	Estimated completion 2013	Low
Portland	Purchase and install a new tower, antenna, repeater, 200 new pagers, and reprogram 200 existing pagers to a new frequency and repeater for county paging system for Fire and EMS first responders.	The project would provide more efficient emergency notification paging to first responders for timely response to emergencies. The current system has become congested causing delays in transmitting critical paging out of first responders. Also, this is needed to	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous Materials, Transportation Accidents, Summer storms, Winter storms, Homeland Security, Flooding, Communicable Disease	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
		meet the new narrow band frequency regulation effective January 1, 2013				

The North Dakota Cooperative Fire Protection Initiative

The North Dakota Cooperative Fire Protection Initiative provides critical financial, technical and educational assistance to rural fire departments for wildland fire prevention, suppression, and mitigation. In addition to helping ensure North Dakota's first responders are prepared, the initiative will provide funding to complete hazardous fuels treatments designed to protect local communities from wildland fire and reduce the risk of fire in the future. Protecting forests from harm by restoring fire-adapted lands and reducing the risk of wildfire impacts are long-term strategies identified in the North Dakota Statewide Assessment of Forest Resources and Forest Resource Strategy.

The North Dakota Cooperative Fire Protection Initiative will provide technical, financial and educational assistance to prevent, suppress and mitigate wildland fires. The initiative will support: (1) suppression and mutual aid support for the state's rural fire departments, (2) the implementation of planning and preparedness practices with local jurisdictions, (3) educational outreach to communities, landowners and managers on fires practices and fire prevention, (4) fire training at the local, regional and statewide level for emergency responders, and (5) grants to at-risk communities and fire departments for equipment, hazardous fuels reduction projects and fire prevention/outreach programs. Project implementation will be achieved through collaboration with local, state, federal and tribal partners.

The North Dakota Cooperative Fire Protection Initiative will assist communities and fire departments in developing and implementing fire suppression and preparedness plans through risk assessments, wildland urban interface planning, and implementation of emergency response strategies utilizing the State Emergency Operations Plan. The initiative will assist private landowners and natural resource managers with reducing the risk of wildfire threats to homes and property. Funds will be used to conduct risk assessments, provide firewire planning documents and conduct thinning and hazardous fuels reduction projects. The effectiveness of the planning and preparedness projects will be highlighted through field demonstration sites, landowner interaction, emergency response training and development of tactical decision-making materials for use in training sessions.

Rural fire departments across the state need financial and technical assistance to address wildfire planning and mitigation of hazards as more and more people move into their protection districts. The types of wildfires on the landscape are growing in both size and intensity, based on increasing fuel loads and drier weather patterns. Figure 22 illustrates the Wildfire Risk by County in North Dakota. The majority of the state is in the medium and high-risk categories.

4.12.6 Vulnerability

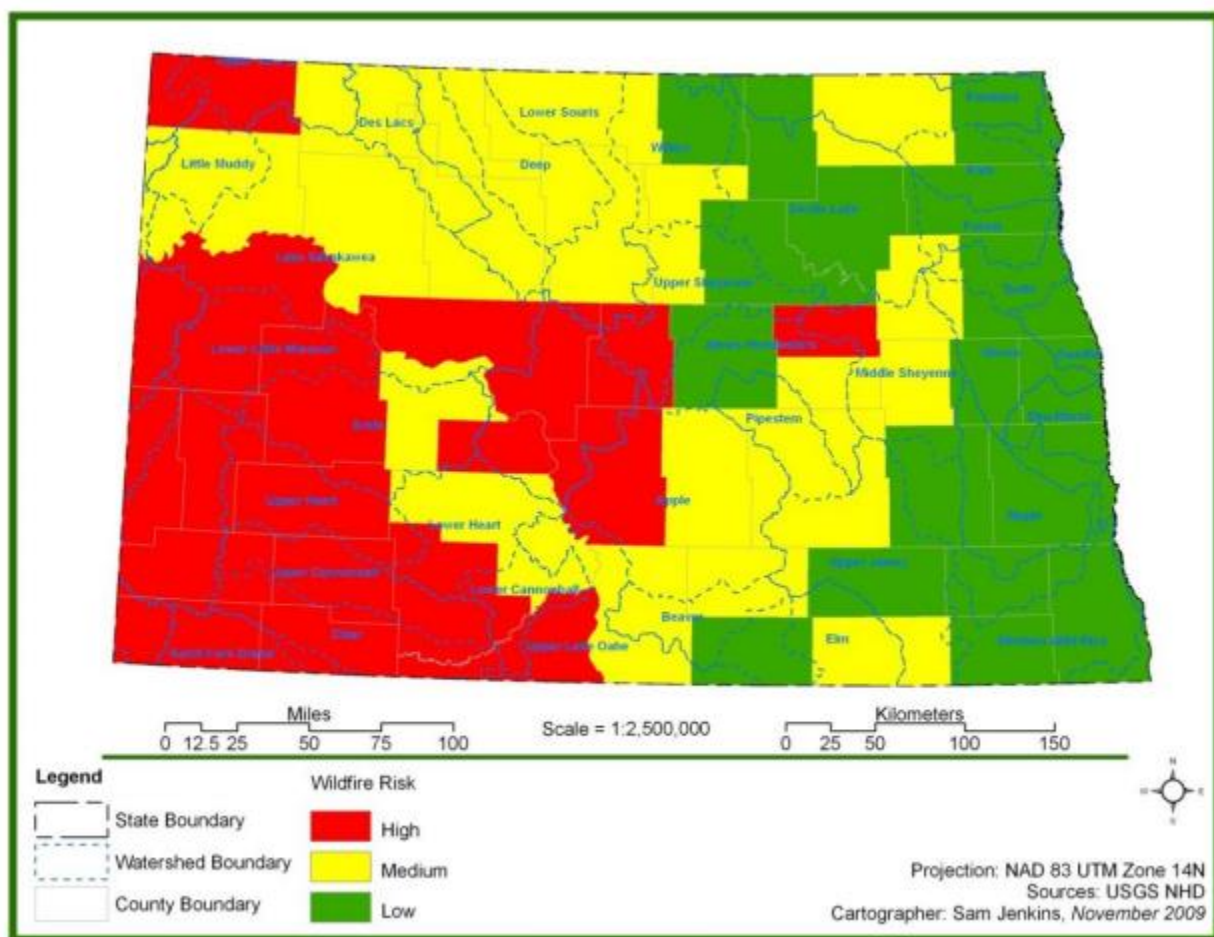
Humans and human activity cause most of the wildland fires in North Dakota based on historical data. Many human acts of carelessness are demonstrated by loss of fire containment while attempting controlled burns of fields, ditches, and sloughs. Other sources of fire are related to recreational activities such as

hunting, camping, off-road vehicle travel, when conditions are right, occasionally along railroad right-of-ways, and through the annual use of fireworks around the 4th of July. There are also natural causes of wildland fires such as lightning.

Wildfire potential is mapped in a variety of ways. Since many factors play into wildfire risk, components are often mapped individually. The Land Use section shows the general land cover for North Dakota. Land cover demonstrates the type of fuels available for wildfires. In the case of agriculture, the flammability depends on the crop and its condition at that point in the growing season. Grasslands and shrublands are not usually managed significantly and may contain a build-up of flashy fuels year round. Timber areas in the Turtle Mountains, the Pembina Hills, the area around Devils Lake, and the limited river bottom areas of the Missouri, Red, and Sheyenne Rivers can be seen on this map. The widespread prairie grasslands in the western part of the state and scattered in other parts of the state can also be visually depicted.

The North Dakota Cooperative Fire Protection Initiative provided a map from the North Dakota Forest Service, 2010 of the wildfire risk by the county for each county in North Dakota. The figure below shows the wildfire risk for Traill County is in the Low range.

Figure 22: Wildfire Risk by County in North Dakota



In addition, the 2014 State of North Dakota Multi-Hazard Mitigation Plan included the population and

housing units in high and moderate risk threat zones. Traill County was listed as having zero population or housing units in the High-Risk area. There was a population total of fifteen housing units in the Moderate Risk area. The source for this information was from the SILVIS Lab Wildland Urban Interface Data.

What follows is the demonstrated linkage between each participating jurisdiction's hazards, risk, and vulnerabilities. The findings of this section are meant to inform and assist mitigation actions (see Section 6). Note, for this document, vulnerability is defined as any weakness that can be exploited to make an asset susceptible to hazard damage.

Table 87: Vulnerability Analysis for Wildland Fire

Jurisdiction	Vulnerability Analysis
Buxton	Buxton is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Clifford	Clifford is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Galesburg	Galesburg is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Grandin	Grandin is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Hatton	Hatton is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Hillsboro	Hillsboro is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Mayville	Mayville is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Portland	Portland is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Reynolds	Reynolds is a small agro-service center dependent largely upon the stability of agriculture for growth and wildland fires could damage crops or agricultural land.
Traill County	The agriculturally dependent economy within Traill County makes agricultural lands throughout the county particularly vulnerable to wildland fire. Traill County needs to maintain and create wind breaks which will help minimize the spread of wildland fires.

4.12.7 Wildfire and Climate Change

According to the National Climate Assessment, North Dakota is part of the Great Plains region and impacts of climate change are occurring across the state. With all the environmental shifts taking place in North Dakota, wildland fires are expected to become both more frequent and more severe. Fires are becoming an even bigger part of the landscape as the impacts of climate change take root. On average, the western fire season is now 78 days longer each year compared with the period between 1970 and 1985 and has been accompanied by a four-fold increase in the number of large fires (>1000 acres) and a six-fold increase in the number of acres burned each year.

Major factors in this increased frequency and severity include significantly earlier snowmelt and hotter summer temperatures (which results in reduced soil moisture). Additionally, the longer fire season as well as the expanded vulnerable area of high-elevation forests (largely due to the earlier snowmelt) are

combining to produce the increase in frequency and severity of wildfires.

4.12.8 Relationship to other Hazards

Wildfires are associated with other hazards such as summer storms, drought, flood, and winter storms. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on the state and national forest lands. Drought is an associated hazard because drought conditions cause high temperatures and dry conditions, which can increase the risk of fires.

4.13 Transportation Accidents

According to the 2014 North Dakota Hazard Mitigation Plan, a transportation accident is any large-scale vehicular, railroad, or aircraft accident involving mass casualties. Mass casualties can be defined as an incident resulting in a large number of deaths and/or injuries that reach a magnitude that overtaxes the ability of local resources to adequately respond. In most disasters, death and injury represent one of the effects of the hazard, while in transportation accidents, mass casualties are often the primary impact and focus of the event.

Transportation accidents in North Dakota are the same as most states. Passenger and cargo trains, bus and other highway vehicles, and passenger and cargo airplanes pose the highest risks. Since North Dakota has vast areas containing sparse population, even an incident involving a small number of deaths and/or injuries could overwhelm local resources. A large event such as a commercial passenger plane crash could possibly overwhelm state resources.

Railroads in North Dakota include Amtrak for passenger service and 3,346 freight railroad miles operated by BNSF Railway, Canadian Pacific Railway, Dakota, Missouri Valley and Western Railroad (DMVW), Dakota Northern Railroad, Northern Plains Railroad, Otter Trail Valley, Yellowstone Valley and Red River Valley and Western Railroad for the transportation of goods.

North Dakota has 89 public airports with 72 paved and 17 grass surfaces. There are eight that provide scheduled commercial passenger service located in Bismarck, Devils Lake, Dickinson, Fargo, Grand Forks, Jamestown, Minot, and Williston. Aviation accidents can occur for a multitude of reasons from mechanical failure to poor weather conditions to intentional causes. The size of accidents also varies widely from single engine accidents to large commercial crashes. The location of the accident, such as a remote area versus a populated location, also plays an important role in the amount of destruction.

Probably the most significant and common hazard associated with transportation accidents is the release of hazardous materials. Many hazardous material releases occur as an element of a transportation accident. Any transportation accident involving the release of hazardous materials significantly increases the complexity and potential damages from such an accident. Transportation accidents can also occur independently due to poor operator judgment or equipment problems.

Many times, weather hazards lead to transportation accidents. Examples include winter weather when snow and ice make roadways slick. Blizzards, smoke, and dust storms can lead to reduced visibilities and increase the probability of an accident. Floods may damage the infrastructure of transportation networks. Summer storms can cause confusion, reduce visibilities, damage infrastructure, and knock down trees and poles, blocking roadways. Terrorists have used transportation, particularly mass transportation, as a method of delivering their attacks throughout the world. Should above-ground electric or telephone infrastructure be damaged in a transportation accident, it could lead to a long-term utility or communication outage. Almost any hazard can cause or aggravate a mass casualty transportation incident.

The following information was provided in the Community Profile Section of this plan and the portions which relate to the Transportation Accidents Hazard Profile are included below.

Airports

Traill County has 2 community airports: Mayville Municipal Airport and Hillsboro Municipal Airport. Both of these airports have paved landing strips available. The nearest major airline facilities are located in adjacent Cass County.

Railroads

In Traill County, the BNSF runs through and near the cities of Reynolds, Cummings, Buxton, Kelso, Hatton, Mayville, and Galesburg.

Highways

Because of its rural nature, the county is highly dependent upon its network of federal, state, and county roads and highways. State Highway 200 is the major east-west route across the county. Interstate Highway I-29 and State Highway 18 are the major north-south routes. These state and federal highways along with the hard surfaced and graveled county and township roads provide a good transportation network.

4.13.1 Transportation Accidents History in Traill County

Vehicle Crash History

The 2014 North Dakota Crash Summary Report is produced annually by the North Dakota Department of Transportation (NDDOT), Safety Division. The summary identifies and describes the trends and effects of traffic crashes in North Dakota. The statistics within the North Dakota Crash Summary describe factors that contribute to the occurrence of crashes, crash-related injuries, and fatalities. This summary is designed to heighten awareness about traffic safety by allowing safety program specialists, public health personnel, and other interested individuals to identify areas where programs may be focused in an effort to reduce traffic-related injuries and fatalities. Data for Traill County indicated that there were 87 crashes which resulted in property damage only. There were 37 crashes reported which caused injury in 2014 in Traill County. There were 6 fatal crashes and 8 total fatalities in Traill County. The total number of crashes in 2014 in Traill County was 130. Data on total vehicle miles traveled per county is also provided. Traill County had a total of 219,001,507 vehicle miles travel in 2014.

The North Dakota Crash Summary Report from 2014 also included information on the number of motorcycle vehicle registrations and licensed drivers. There were 455 registrations and 743 licensed drivers. There were 2 crashes involving a motorcycle in 2014 in Traill County.

Other Transportation Accidents

The National Transportation Safety Board Aviation Accident Database provided data on accident and incidents for Traill County from 2009 to 2015. During the years of 2009-2015, there were no reported crashes in Traill County. The most recent aviation accident for Traill County was on July 7, 2005 in Buxton. The aircraft was a Schweizer G-164B, registration: N6631Q and there were no reported injuries. It was reported that the airplane collided with the terrain during a forced landing following a loss of engine power during takeoff from a private airstrip. The pilot stated that he was initiating the aerial application flight with 265 gallons of fungicide on board when the accident occurred. He reported that he performed an engine run-up, which was normal. He stated that just after lifting off, the engine began to lose power and he did not have enough runway left to land back on the runway. The pilot stated that he was able to clear a ditch and a north/south road at the end of the runway and decided to attempt to land on an east/west road in front of him. He stated that the airplane contacted the south side of the road at which time the left gear

collapsed. The airplane then slid across the road and came to rest in a ditch on the north side of the road. A post-accident inspection of the airplane revealed the magnetos fired when tested and continuity was established throughout the engine. The National Transportation Safety Board determined the probable cause of this accident was a loss of engine power on takeoff due to undetermined reasons. A factor was the ditch that the airplane contacted during the forced landing.

4.13.2 Transportation Incident Risk for Traill County

The overall probability that a transportation incident will occur each year in Traill County is highly likely and its relative impact is Low and thus the overall risk for Traill County is Little to No. The risk for a transportation incident for each of the cities is the same because data was only available on the county-wide level. In assessing transportation incident data for the 2015 update, data from 2009 to 2014 was used to determine the risk. The table provided below provides the name of each of the cities in the County, the probability that a transportation incident will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determined probability and impact ratings.

Table 88: Transportation Incident Hazard Risk Assessment

Transportation Incident			
City	Probability	Impact	Risk
Buxton	Highly Likely	Low	Little to No
Clifford	Highly Likely	Low	Little to No
Galesburg	Highly Likely	Low	Little to No
Grandin	Highly Likely	Low	Little to No
Hatton	Highly Likely	Low	Little to No
Hillsboro	Highly Likely	Low	Little to No
Mayville	Highly Likely	Low	Little to No
Portland	Highly Likely	Low	Little to No
Reynolds	Highly Likely	Low	Little to No
Traill County	Highly Likely	Low	Little to No
Total	Highly Likely	Low	Little to No

4.13.3 Mitigation Actions for Transportation Accidents in Traill County in the Past Five Years:

Mitigation actions for transportation accidents from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for transportation accidents. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for transportation accidents are provided below.

Table 89: Mitigation Actions for Transportation Accidents

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Clifford (Lincoln Ave., Garfield Ave. E., etc.)	Clear city storm water drains ditches from debris and silt deposits, re-grade or replace	The project would allow for more efficient drainage of storm water reducing flooding damage,	\$5,000 to \$7,000 / City of Clifford	Communicable Disease, Flooding, Transportation Accidents	Estimated completion 2013	Low

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	some of the ditch culverts, and re-grade the slope of ditch walls to reduce rollover hazard when mowing grass.	eliminate breeding grounds for mosquitoes, and reduce the risk of a rollover accident when moving the ditches.				
Clifford	Purchase and install approx. (18) - 911 street signs throughout city.	Would expedite emergency response throughout the city saving lives and property. Would also expedite delivery of goods round town.	\$2,400 / City of Clifford	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Low
Trail County	Purchase and install the remainder of 911 signage needed for the county and township roads.	Project would enable first responders to reach victims quicker saving lives and property. Would also aid visitors to find county destinations.	\$100,000 / Traill County Sheriff's Office and County Commission	Summer storms, Winter storms, Hazardous materials, Shortage of Critical materials, Rural fires, Urban Fires, Wildland Fires, Communicable Disease, Homeland Security, Drought, Transportation Accidents, Flooding	Estimated completion 2013	Medium
Mayville (Fire Department)	Provide funding to remove existing body and install new body on fire rescue truck	Project would allow the fire department to respond more efficiently to emergencies by having the sufficient storage capacity on the rescue truck for critical rescue equipment that may be needed for a variety of responses (hazardous materials equipment)	\$50,000 / Mayville Fire Department and City of Mayville	Hazardous Materials, Rural Fires, Urban Fires, Wildland Fires, Transportation Accidents	Estimated completion 2013	Low
Portland	Purchase and install new tower, antenna,	Project would provide more efficient	\$200,000 / City of Portland	Rural fires, Urban fires, Wildland fires, Hazardous	Estimated completion 2013	High

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
	repeater, 200 new pagers, and reprogram 200 existing pagers to new frequency and repeater for county paging system for Fire and EMS first responders.	emergency notification paging to first responders for timely response to emergencies. Current system has become congested causing delays in transmitting critical paging out of first responders. Also , this is needed to meet the new narrow band frequency regulation effective January 1, 2013		Materials, Transportation Accidents, Summer storms, Winter storms, Homeland Security, Flooding, Communicable Disease		

4.13.4 Vulnerability to Residents in Traill County

Included in the 2014 North Dakota Hazard Mitigation Plan was a state risk assessment which provided a transportation analysis by county and reservation. The hazard rating was determined based on presence of the following infrastructure in each county and reservation as follows:

- High: Jurisdiction has a major airport, interstate, and railroad infrastructure.
- Moderate-High: Jurisdiction has a major airport or interstate and railroad infrastructure.
- Moderate: Jurisdiction has railroad infrastructure and U.S. highways.
- Low-Moderate: Jurisdiction has railroad infrastructure or U.S. highways.
- Low: Jurisdiction has only state highways.

The risk assessment for Traill County indicated the overall risk was Moderate.

Hazard vulnerabilities for Traill County from the June 2010 Hazard Mitigation Plan include mass casualty accidents, which are likely to occur with little or no warning. They involve a large number of people and require special types of equipment and emergency medical personnel. The following areas in Traill County pose potential vulnerabilities.

- Railroad: Amtrak operates one east-west route on the Burlington Northern line which includes the cities of Williston, Minot, Devils Lake, Grand Forks, Hillsboro, and Fargo. Amtrak does operate within the county.
- Bus service: Bus service in the county can constitute school or mass transit buses. Due to the proximity of I-29 between two of the largest cities in the state (Fargo and Grand Forks), tour buses from Winnipeg, and rural school children being bused into population centers, this constitutes the most likely mass casualty event.
- Airlines: There are two municipal airport and several grass fields in the county. Traill County is also in the flight path of Grand Forks AFB and the University of ND Aviation program. The aviation

program results in most of the airplane accidents due to the inexperienced nature of the pilots. Overall the state of North Dakota has had 403 aircraft accidents with 34 fatalities in the last twenty years.

4.13.5 Transportation Accidents and Climate Change in Traill County

According to the September 2008 Economic Impacts of Climate Change on North Dakota Report, while climate impacts will vary on a regional scale, it is at the state and local levels where critical policy and investment decisions are made for the very systems most likely to be affected by climate change – water, energy, transportation and public health systems, as well as important economic sectors such as agriculture, fisheries, forestry, manufacturing, and tourism. Yet, much of the focus to date has been on the perceived high cost of reducing greenhouse gas emissions. The costs of inaction are frequently neglected and typically not calculated. These costs include such expenses as rebuilding or preparing infrastructure to meet new realities and the ripple economic impacts on the state's households, the agricultural, manufacturing, and commercial and public service sectors. Additionally, it stated that there are already considerable costs to society associated with infrastructures, agricultural and silvicultural practices, land use choices, transportation and consumptive behaviors that are not in synch with past and current climatic conditions. These costs are likely to increase as climate change accelerates over this century.

4.13.6 Relationship to Other Hazards in Traill County

Hazardous material incidences are generally associated with transportation accidents or accidents at fixed facilities. All highways and railroads associated with transport and anywhere that hazardous material is used or stored is susceptible to a spill. In addition, tornadoes, windstorms and winter storms all have the potential to cause high winds or damage to infrastructure which could make roadways impassable. Winter storms also have the potential to make roadways slippery with icy and snowy conditions. Whiteout conditions are also a possibility with winter storms, which could lead to increased transportation accidents. Natural hazards, such as tornadoes, windstorms, winter storms, hail and lightning, also could cause an increase in railroad or air accidents because of conditions which make it difficult to navigate or cause hazardous conditions.

4.14 Dam / Levee Failure

According to the 2014 North Dakota Hazard Mitigation Plan, a dam is any artificial barrier, including appurtenant works, which impounds or diverts water. Dam failure is defined as a sudden, rapid, and uncontrolled release of impounded water that can create a potentially significant downstream hazard. The purpose of dams includes storage of water for irrigation, hydroelectric power generation, flood control, water supply, fire protection, recreation, and wildlife habitat. Should a dam fail, the consequences can be devastating or minimal depending on the dam's characteristics and regional attributes.

Pursuant to North Dakota Century Code, the North Dakota State Engineer and the North Dakota State Water Commission have the power, authority, and general jurisdiction to regulate, control, and supervise the construction and operation of dams within the state of North Dakota. As such, the Dam Safety Program is administered by the North Dakota State Water Commission.

Most dams are classified based on the potential hazard to life and property should the dam suddenly fail. Note the hazard rating is not an indicator of the condition of the dam or its probability of failure. The following hazard categories have been established for North Dakota according to the North Dakota Dam Design Handbook (North Dakota State Engineer, June 1985, page 3):

- Low Hazard: These dams are located where there is little possibility of future development such as rural or agricultural areas. Failure of low hazard dams may result in damage to agricultural land, township and county roads, and non-residential farm buildings. No loss of life is expected if failure occurs.
- Medium (Significant) Hazard: These dams are located in predominately rural or agricultural areas where failure may damage isolated homes, main highways, railroads, or cause interruption of minor public utilities. The potential for the loss of a few lives exists if the dam fails.
- High Hazard: These are dams located upstream of developed and urban areas where failure may cause serious damage to homes, industrial and commercial buildings, and major public utilities. There is a potential for the loss of more than a few lives if the dam fails.

According to the North Dakota State Water Commission, as of April 2013, there were 3,051 dams in North Dakota's dam inventory. Of these, 44 dams are classified as high hazard and 90 are classified as medium hazard. The remaining 2,917 are classified as low hazard or undetermined hazard.

4.14.1 Dam Failure Risk in Traill County

The overall probability that dam failure will occur each year in Traill County is possible and its relative impact is Moderate and thus the overall risk for Traill County is Low. The risk for dam failure for each of the cities is different based upon the data available by individual city and their proximity to dams with higher hazard potential. In assessing dam failure data for the 2015 update, data from 2009 to 2014 Traill County was used to determine the overall risk of dam failure. The table provided below provides the name of each of the cities in the County, the probability that dam failure will have an impact on that jurisdiction, the impact potential, as well as the overall risk calculated by the determine probability and impact ratings.

Table 90: Dam Failure Hazard Risk Assessment

Dam Failure			
City	Probability	Impact	Risk
Buxton	Unlikely	Low	Little to No
Clifford	Unlikely	Low	Little to No
Galesburg	Likely	High	Moderate
Grandin	Unlikely	Low	Little to No
Hatton	Unlikely	Low	Little to No
Hillsboro	Possible	Moderate	Low
Mayville	Possible	Moderate	Low
Portland	Possible	Moderate	Low
Reynolds	Unlikely	Low	Little to No
Traill County	Possible	Moderate	Low
Total	Possible	Moderate	Low

4.14.2 Dam Failure History in Traill County:

Traill County has not experienced any significant dike, dam, or embankment failures to date.

Water Control Structures

Table 91 lists the 5 water control structures that have been classified as dams by the DNR, all of which have been assigned a hazard potential. A dam's hazard potential is rated low to significant. According to the table, a majority of the dams in the County have been classified as having a hazard potential rating low (the safest rating).

Table 91: Traill County Dams

Dam	Max Volume	Pool	Federal Class	Hazard	Location
Augustadt Dam	6040		Significant		Galesburg
Portland Dam	165		Low		Mayville North
Hillsboro Dam	285		Low		Hillsboro
Mayville Dam 2	123		Low		Mayville South
Elm River Number 2	325		Low		Galesburg

*Source: State of North Dakota Water Commission, Dams within the Jurisdiction of the State of North Dakota

Figure 23: Traill County Map of Dams with Largest Max Pool Volume



4.14.3 Mitigation Actions for Dam Failure in Past Five Years in Traill County:

Mitigation actions for dam failure from Traill County's June 2010 Multi-Jurisdictional All Hazard Pre-Disaster Mitigation Plan stated the following mitigation actions for dam failure. The city or county affected, cost, status/timeframe and priority of each of the mitigation projects for dam failure is provided below.

Table 92: Mitigation Actions for Dam Failure

City or County	Project	Purpose	Cost / Funding Source	Category	Status / Timeframe	Priority
Traill County	Augustadt Dam EAP		\$10,000 / Traill Co WRD	Dam Failure	Estimated completion 2010	High

4.14.4 Vulnerability of Jurisdictions within Traill County

Dams are categorized according to the potential hazard for loss of life and property damage, should the dam suddenly fail. Existing development must be considered when categorizing a dam. The hazard category is based on potential hazard from failure and not on the selected design criteria or storage capacity.

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

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

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

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

If a high hazard dam fails, there is a potential for the loss of many lives. All federal dams in the state are required to have emergency action plans. In addition, emergency action plans are required for the nonfederal dams greater than 1,000 acre-feet of storage in North Dakota.

There is one high hazard or significant hazard dam located in Traill County. At this time, no emergency action plans are on file at the State Water Commission, but they are currently being developed by the respective dam owners. The EAP for Augustadt Dam will be completed by 2010; it is currently a mitigation project for the county.

There have been no occurrences of dam failure within Traill County.

According to the North Dakota State Water Commission, dam safety related concerns for dams across North Dakota include lack of maintenance, aging dams, funding for repairs, and hazard creep downstream of existing dams. Currently, dams with a storage capacity greater than 1,000 acre-feet are required to have

an Emergency Action Plan, in accordance with the ND Century Code and ND Administrative Code. Of the 90 Medium Hazard Dams, 42 have Emergency Action Plans (EAPs). There is no EAP required for 36 of the Medium Hazard Dams due to their size, leaving 12 that are required to have an EAP, but do not have one. Since the 2011 update to the State Hazard Mitigation Plan, progress has been made relating to Emergency Action Plans (EAP) on file for High hazard dams. In 2011, of High Hazard Dams that required an EAP, seven did not have one. As of April 2013, five dams for which an EAP is required did not have a final version on file. However, of those, four are in progress. There are three dams currently classified as high hazard that by law are not required to have an EAP. As of the time of the 2014 North Dakota Hazard Mitigation Plan, Traill County did not have an EAP for the high hazard dam within the County lines, Acorn Ridge Dam.

What follows is the demonstrated linkage between each participating jurisdiction's hazards, risk and vulnerabilities. The findings of this section are meant to inform and assist mitigation actions (see Section 6). Note, for this document, vulnerability is defined as any weakness that can be exploited to make an asset susceptible to hazard damage.

Table 93: Vulnerability Analysis for Dam Failure

Jurisdiction	Vulnerability Analysis
Buxton	There are no dams within close proximity to Buxton.
Clifford	There are no dams within close proximity to Clifford.
Galesburg	Galesburg has a significant hazard class dam in the jurisdiction. Any failure or damage to the Augustadt Dam could cause potentially catastrophic damage to the area. Galesburg also has the Elm River Number 2 Dam within its jurisdiction. Damage or failure of this dam could also potentially cause damage to the citizens or critical infrastructure. Critical infrastructure that lies within Galesburg is a fire department.
Grandin	There are no dams within close proximity to Grandin.
Hatton	There are no dams within close proximity to Hatton.
Hillsboro	Hillsboro has a dam in the jurisdiction. Damage or failure of this dam could potentially cause damage to the citizens or critical infrastructure. Critical infrastructure that lies within Hillsboro includes a school, hospital, fire department, Sherriff's office and ambulance service.
Mayville	Mayville has two dams in the jurisdiction. Damage or failure of these dams could potentially cause damage to the citizens or critical infrastructure. Critical infrastructure that lies within Mayville includes a school, hospital, fire department, and ambulance service.
Portland	There are no dams within close proximity to Portland.
Reynolds	There are no dams within close proximity to Reynolds.
Traill County	Portions of Traill County, as detailed in this table, could be potentially highly vulnerable there would be any failure or damage to dams or embankments within close proximity. Inundation could have potentially catastrophic consequences to the built environment as well as the population of the county.

4.14.5 Dam Failure and Climate Change in Traill County

Dams are designed based on assumptions about a river's annual flow behavior that will determine the volume of water behind the dam and flowing through the dam at any one time. Changes in weather

patterns due to climate change may change the hydrograph, or expected flow pattern. Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events are a mechanism that also results in increased discharges downstream. It is conceivable that bigger rainfalls at earlier times in the year could threaten a dam's designed margin of safety, causing dam operators to release greater volumes of water earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream. While climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures. Climate change is adding a new level of uncertainty that needs to be considered with respect to assumptions made during the dam construction.

4.14.6 Relationship to Other Hazards in Traill County

Dam or levee failures can have a greater environmental impact than that associated with a flood event. Large amounts of sediment from erosion would alter the landscape changing the ecosystem. Hazardous materials are carried away from flooded out properties and distributed throughout the floodplain. Industrial and agricultural chemicals and wastes, solid wastes, raw sewage, and common household chemicals comprise the majority of hazardous materials spread by flood waters along the flood zone, polluting the environment and contaminating everything they come in contact with, including the community's water supply. The soil loss from erosion and scouring would be significantly greater because of a large amount of fast moving water affecting a small localized area, which would likely change the ecosystem.

4.15 Risk Assessment Summary

Trail County is still at risk to hazards despite its efforts to mitigate natural hazards. Within Trail County and its participating jurisdictions, flooding and summer storms are the hazards that have had the highest number of disaster declarations. Flooding and summer storms have also had the highest amount of mitigation actions, so one can recognize that Trail County is taking steps towards mitigating the impact and risk of flooding and summer storms on the county.

This mitigation plan update identified 11 hazards as having a potential impact on Trail County. In taking a more in-depth look at each of the hazards and determining the frequency with which they occur in Trail County and calculating the impact and risk potential on the community, mitigation actions can be identified and prioritized accordingly. Of the 11 hazards in Trail County, the hazards with the highest impact potential are severe winter weather, flood, and urban fire or structure collapse. These hazards are highly likely to occur in Trail County each year and have a moderate risk potential for the community. Other hazards, such as communicable disease and transportation accidents have a highly likely probability of occurring each year, but their impact on the community is not as significant and there is less risk potential related to these hazards.

Through Trail County's risk analysis, it was determined that the cities of Buxton, Hatton, Portland and Hillsboro had the highest number of moderate risk analysis ratings compared to other cities in the county, with four moderate risk hazards for each of these cities. Buxton has a moderate impact and risk analysis for severe summer weather, severe winter weather, flood, and urban fire or structure collapse. Hatton had moderate risk analysis for severe winter weather, flood, tornado, and urban fire or structure collapse. Hillsboro had moderate risk analysis for severe summer weather, severe winter weather, flood, and urban fire or structure collapse. Portland has a moderate risk analysis for severe summer weather, severe winter weather, tornado, and urban fire or structure collapse. This is important information for mitigation actions and prioritizing these four cities among the other cities in the county. A more detailed look at the jurisdictions and which hazards were at the High, Moderate, and Low-level prioritization can be seen in tables 94-104 below.

Table 94 shows the hazard prioritization for Trail County as a whole, while tables 95 through 104 show the hazard prioritization for each individual city in Trail County including Buxton, Clifford, Galesburg, Grandin, Hatton, Hillsboro, Mayville, Portland, Reynolds, and unincorporated Trail County.

The hazard prioritization was developed using the best possible information concerning risks and vulnerabilities.

Table 94: Traill County Hazard Prioritization

Traill County Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Flood • Severe Winter Weather • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Severe Summer Weather • Communicable Disease • Hazardous Material • Dam Failure • Tornado • Transportation Accidents • Wildland Fire

Table 95: City of Buxton Hazard Prioritization

City of Buxton Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Summer Weather • Severe Winter Weather • Flood • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Communicable Disease • Hazardous Material • Dam Failure • Tornado • Transportation Accidents • Wildland Fire

Table 96: City of Clifford Hazard Prioritization

City of Clifford Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Winter Weather • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Tornado • Dam Failure • Severe Summer Weather • Flood • Communicable Disease • Hazardous Material • Transportation Accidents • Wildland Fire

Table 97: City of Galesburg Hazard Prioritization

City of Galesburg Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Dam Failure • Severe Winter Weather • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Tornado • Flood • Communicable Disease • Transportation Accidents • Severe Summer Weather • Hazardous Material • Wildland Fire

Table 98: City of Grandin Hazard Prioritization

City of Grandin Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Winter Weather • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Tornado • Flood • Dam Failure • Severe Summer Weather • Hazardous Material • Communicable Disease • Transportation Accidents • Wildland Fire

Table 99: City Hatton Hazard Prioritization

City of Hatton Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Winter Weather • Flood • Urban Fire or Structure Collapse • Tornado
Low	<ul style="list-style-type: none"> • Geologic Hazards • Transportation Accidents • Communicable Disease • Hazardous Material • Dam Failure • Severe Summer Weather • Wildland Fire

Table 100: City of Hillsboro Hazard Prioritization

City of Hillsboro Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Winter Weather • Severe Summer Weather • Flood • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Communicable Disease • Hazardous Material • Dam Failure • Tornado • Transportation Accidents • Wildland Fire

Table 101: City of Mayville Hazard Prioritization

City of Mayville Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Winter Weather • Urban Fire or Structure Collapse • Tornado
Low	<ul style="list-style-type: none"> • Geologic Hazards • Flood • Communicable Disease • Hazardous Material • Dam Failure • Severe Summer Weather • Transportation Accidents • Wildland Fire

Table 102: City of Portland Hazard Prioritization

City of Portland Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Summer Weather • Severe Winter Weather • Urban Fire or Structure Collapse • Tornado
Low	<ul style="list-style-type: none"> • Geologic Hazards • Flood • Communicable Disease • Hazardous Material • Dam Failure • Transportation Accidents • Wildland Fire

Table 103: City of Reynolds Hazard Prioritization

City of Reynolds Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Severe Winter Weather • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Geologic Hazards • Flood • Severe Summer Weather • Communicable Disease • Hazardous Material • Dam Failure • Tornado • Transportation Accidents • Wildland Fire

Table 104: Unincorporated Hazard Prioritization for Traill County

Unincorporated Traill County Hazard Prioritization	
Level	Hazard
High	<ul style="list-style-type: none"> • None
Moderate	<ul style="list-style-type: none"> • Flood • Severe Summer Weather • Severe Winter Weather • Urban Fire or Structure Collapse
Low	<ul style="list-style-type: none"> • Tornado • Geologic Hazards • Communicable Disease • Hazardous Material • Dam Failure • Transportation Accidents • Wildland Fire

For more information on these determinations, see the risk assessment methodology and individual hazard profiles.

As with any assessment involving natural or human-caused hazards, not all potential events may be represented and an actual incident may occur in a vastly different way than described. This assessment, however, will be used, where possible, to minimize damages from these events in the future. Every type of event is different, ranging from population to property to economic impacts. Incidents also have different probabilities and magnitudes even within hazards. For example, a light snowstorm will be different from a blizzard and a moderate flood will be different from both of those. Some hazards have estimates of dollar losses and population impacts whereas others are more qualitatively assessed based on the information available during the risk assessment process.

Section 5: Capability Assessment

5.1 What Is A Capability Assessment?

The purpose of conducting a capability assessment is to determine the ability of a given jurisdiction to implement mitigation strategies. More specifically, the capability assessment helps to determine which mitigation actions are likely to be successfully implemented given the fiscal, technical, administrative, and political framework of a jurisdiction. A capability assessment also provides an opportunity to assess existing plans, policies and current processes already in place. A capability assessment is required for plan approval. This chapter outlines how the mitigation capabilities of Traill County and the jurisdictions participating were assessed, the results of the assessment, and recommendations to improve.

5.1.1 Conducting the Capability Assessment

To yield insight into the jurisdiction's capability to mitigate hazards, the Hazard Mitigation Planning Team administered a multi-part self-assessment that consisted of two surveys. The first survey collected information regarding existing local plans, policies, programs and ordinances. Additionally the survey asked the participants to assess how much influence various mitigation elements (plans, policies, programs, and ordinances) had on the governance of their jurisdictions. The second survey consisted of questions regarding the fiscal, technical, administrative and political will of the participating jurisdiction. Participants were asked to determine their capability with regard to the various administrative categories. Representatives from Traill County and the jurisdictions identified as participating in the plan update were invited to participate.

5.1.2 Hazard Mitigation Plans, Policies, Programs and Ordinances

An evaluation of existing plans, programs, and policies was conducted as a means to provide insight into how mitigation activities were achieved in the past and how they might be achieved in the future. An assessment was conducted to determine if and/or what plans exist and if they were utilized in the governance of the jurisdiction's mitigation activities. Finally, participants were asked to rank their capability with regard to mitigation and how comprehensive (interconnected) the identified local plans, policies, programs, and ordinances were. The following is the result of the self-assessment.

Table 105: Plans Policies Programs and Ordinances in Place

Evaluation of Existing Plans, Policies and Ordinances																		
<ul style="list-style-type: none"> • HMP: Hazard Mitigation Plan • DRP: Disaster Recovery Plan • CLUP: Comprehensive Land Use Plan • FMP: Floodplain Management Plan • SMP: Storm water Management Plan • EOP: Emergency Operations Plan • COOP: Continuity of Operations Plan • SARA: SARA Title III Emergency Response Plan • TRANS: Transportation Plan 									<ul style="list-style-type: none"> • CIP: Capital Improvements Plan (that regulates infrastructure in hazard areas) • COMP: comprehensive PLAN • REG-PL: Regional Planning • HPP: Historic Preservation Plan • ZO: Zoning Ordinance • FDPO: Flood Damage Prevention Ordinance • NFIP: National Flood Insurance Program • BC: Building Codes 									
Plans	HMP	DRP	CULP	FMP	SMP	EOP	COOP	SARA	TRANS	CIP	COMP	REG-PL	HPP	ZO	FDPO	NFIP	BC	Score
Jurisdiction																		
Traill County	X	X		X	X	X		X				X		X		X	X	M
Buxton	X			X		X						X		X		X	X	L
Clifford	X			X		X						X		X		X	X	L
Galesburg	X			X		X						X		X			X	L
Hillsboro	X	X		X	X	X		X				X		X		X	X	M
Hatton	X			X		X						X		X		X	X	L
Mayville	X	X		X	X	X		X				X		X		X	X	M
Portland	X			X		X						X		X		X	X	L
Reynolds	X			X		X						X		X		X	X	L

NOTE: The Hazard Mitigation Planning Team completed these assessments with the each of the local jurisdictions approving the findings.

The first part of the capability assessment survey indicated that there is generally a moderate to low degree of existing plans, policies, and ordinances used to conduct mitigation. However, the survey results indicated that jurisdictions did not associate the hazard mitigation plan, and/or the actions listed in it, with the actual mitigation that had occurred. Due to the lack of a comprehensive mitigation programs, many of the participating jurisdictions indicated that they have minimum capabilities with regard to the use of local plans, policies, programs, and ordinances used to mitigate hazards. It was further suggested that the level of communication between and within agencies only occurred during the last mitigation plan update or after a significant event, like a winter storm or flood. All indications suggest that Traill County should institute actions that will enhance its ability to support a comprehensive mitigation program.

5.1.3 Recommendations

As cities have engaged in buyouts, participated in the National Flood Insurance Program, and requested assistance for mitigation projects, it is obvious that mitigation actions are occurring across Traill County and within the participating jurisdictions. Unfortunately, these activities seem to be occurring independently with

little to no regard to the last iteration of the hazard mitigation. Actions seem to be fragmented across several local plans, policies, programs and ordinances. As such, it is recommended that efforts should be made to unify Traill County and participating jurisdictions so that mitigation efforts are coordinated and reporting of these activities is centralized. Furthermore, Traill County and jurisdictions should agree on a management process and establish a governance committee to oversee the mitigation planning process, evaluate mitigation actions, reporting of mitigation actions for inclusion of plan updates, and other activities that will help to support a comprehensive mitigation plan program. Finally, this update should reflect the noted recommendations by including a management strategy to strengthen capabilities and ensure the county's mitigation program is a treated and managed as a true existing program.

5.2 Fiscal, Technical, Administrative and Political Capabilities

As part of the capability assessment, each jurisdiction self-assessed their unique technical, fiscal, administrative, and political will to conduct mitigation projects. The Assessment of Local Capability table provides an overview of each jurisdiction's rankings. An "L" indicates Low capability; an "M" indicated Moderate capability; and an "H" indicates High capability. The results of the self-assessment are listed below.

Table 106: Assessment of Local Capability

Assessment of Local Capability— multi Jurisdictional Hazard Mitigation Plan				
An "L" indicates low capability; an "M" indicated moderate capability; and an "H" indicates high capability.				
Jurisdiction	Technical Capability	Fiscal Capability	Administrative Capability	Political Capability
Traill County	M	M	M	M
Buxton	L	L	M	M
Clifford	L	L	L	L
Galesburg	L	L	L	L
Hillsboro	L	L	M	M
Hatton	L	L	L	L
Mayville	M	M	M	M
Portland	L	L	M	M
Reynolds	L	L	M	M

5.2.1 Technical Capability

With regard to the Traill County Hazard Mitigation Plan, "Technical Capability" was defined as possessing the skills and tools needed for making decisions regarding mitigation activities, programs, and policies. The concept of "technical" was left to the participants to self-define; however, several examples were provided to assist the participant in completing the survey. For instance, having access to and/or being able to use geographic information systems (GIS) and database management capabilities would be an indication of possessing the technical capabilities needed to make informed decisions regarding mitigation activities. Not having the ability to manage grants and not having a working knowledge of mitigation programs would be an indication of not possessing the technical capabilities needed to make informed decisions regarding mitigation programs or policies.

The analyses of the responses to the capability assessment indicated that there is a moderate to low technical capability, less the county itself (Traill County and the city of Mayville = Moderate). The result of the technical capability assessment highlights the notion that the existing capability of most jurisdictions could be improved.

5.2.2 Recommendations

Local Mitigation Action Plans should include strategies that will strengthen the technical capabilities of the jurisdictions within the county. While there is a wide range of technical resources across the county and municipal governments, the development of a systematic protocol for sharing resources could significantly increase the level of technical capability to analyze natural hazards and develop meaningful actions to reduce their impact. The development of regional mitigation actions could also be used to assist in this effort. In all, Traill County and its cities should rely on its existing partners (waters districts, electrical cooperatives, and other regional partners, etc.) and local and county departments to ensure those without resources are successful.

5.2.3 Fiscal Capability

With regard to the Traill County Hazard Mitigation Plan, fiscal capability was defined as having the fiscal resources available to implement mitigation policies and projects. It was noted that fiscal capability might take the form of grants received, locally based revenue sources, or other means to fund mitigation activities. For instance, the costs associated with mitigation policy and project implementation varies widely. In some cases, policies are tied primarily to staff costs associated with the creation and monitoring of a given program. In other cases, money is linked to a project, such as property acquisition, which can require a substantial commitment from local, state and federal funding sources. The analyses of the responses to the capability assessment indicated that there is a moderate to low fiscal capability at the county and respective municipal levels.

5.2.4 Recommendations

To evaluate the fiscal capabilities needed to successfully implement mitigation policies and projects, jurisdictions should ask several basic questions:

- Does the action require a monetary commitment?
- Does the action require staff resources?
- Can jurisdictions combine resources with other counties or municipalities to address identified problems?
- Is the jurisdiction willing to commit local revenue on a sustained or onetime basis?

In order to implement mitigation projects and policies, some monetary commitment or staff resources will be required. Resources may take the form of a non-federal match requirement or the costs associated with staff time devoted to mitigation policy development and implementation. County and municipal governments should consider combining financial and staff resources to achieve efficiencies in implementing mitigation activities to address hazards across the region. It is important to consider that hazards tend to impact regions and not just individual jurisdictions; thus, combining resource is often a benefit to multiple jurisdictions.

Finally, if local governments have access to ongoing sources of revenue, a comprehensive and sustained effort can be achieved. As such, jurisdictions are encouraged to create mitigation based revenue

resources. For example, a storm-water management fee or the development of a budgetary line item that specifically addresses hazard mitigation could be adopted.

5.3 Administrative Capability

With regard to the Traill County Hazard Mitigation Plan, administrative capability was defined as the ability to complete the necessary administrative elements of typical mitigation activities and projects. Examples include availability of jurisdictional staffing, ability to document mitigation progress, grant reporting, and the existing organizational resources needed to implement mitigation strategies.

The analysis of the Administrative Capability Assessment indicated there is a low to moderate administrative capability throughout Traill County. As the data suggests, the administrative capability is not related to the size of the jurisdictions, and the administrative capability assessment differed from the other noted assessments. Unlike the other listed capabilities, a jurisdiction's administrative capability is dependent upon the makeup up and relationships of the jurisdiction rather than the resources or population of the jurisdiction.

5.3.1 Recommendations

The enhancement of administrative capability may be achieved through county/municipal training, outreach, and mentoring. Specifically, sharing resources within jurisdictions might improve jurisdictions administrative capabilities. In addition, efforts to demonstrate the impacts of mitigation across a jurisdiction's governmental functions might increase awareness and buy in. Finally, training of jurisdictional personnel with regard to mitigation related programs and/or the purpose of mitigation can increase specific knowledge skills and abilities.

5.4 Political Capability

One of the most difficult and sensitive capabilities to evaluate involves the political will of a jurisdiction to enact meaningful mitigation policies and projects. With regard to the Traill County Hazard Mitigation plan, fiscal capability was defined as the level of interest that both the citizens and government officials of a given jurisdiction have in conducting mitigation projects. Examples of a political capability include the existence of special interest groups organized around disaster and or hazed related causes, the fact of a jurisdiction having recently had a significant or reoccurring event, the jurisdiction's history of conducting mitigation projects, and the willingness of elected officials to allocate resources to hazard, disaster and/or mitigation projects.

According to the results of the self-assessment, Traill County and its participating jurisdictions had contrasting levels of political capability to enact meaningful and proactive mitigation actions. Some comments provided in the self-assessment concerning county and municipal government officials indicated that while there is an interest in disaster mitigation activities, there appears to be a lack of local commitment to take the steps necessary to implement mitigation activities.

5.4.1 Recommendations

Political support from elected officials can prove to be critically important. Past events, including flooding, tornadoes, and major winter storms, should be used to better educate elected officials regarding the merits of mitigation planning. When possible, local governments who have implemented hazard mitigation

projects should attempt to assess their effectiveness following future events.

Documenting mitigation projects and policies that work is a high priority among FEMA officials. Therefore, local government staff should work with North Dakota Department of Emergency Services (DES) and FEMA officials following disasters to evaluate past mitigation projects. The results should be presented to local elected officials in order to provide real world examples of how mitigation can protect lives and property.

Finally, county extension offices are a good resource for training, education and validation. Working with North Dakota State University (the State Land Grant University) and county extension offices can provide a wealth of knowledge concerning hazard impact and the steps taken to mitigate them.

5.5 Conclusions on Local Capability

The capabilities of jurisdictions in Traill County vary from jurisdiction to jurisdiction, with like sized jurisdictions often claiming the same capabilities. As such, county-level government and the larger municipal governments typically scored higher than the smaller municipalities. Thus, an important consideration in this plan update should be the concept of comprehensive planning with integration of mitigation planning efforts made both between and within the participating jurisdictions.

In addition to ensuring mitigation-planning efforts are integrated, strategies should be crafted to match the respective jurisdiction's reality. For example, if a jurisdiction does not have the political will to mitigate the harm caused by high winds, i.e., building a storm shelter, strategies directly stating that the jurisdiction is to build a storm shelter will not be as successful as strategies aimed at fostering education and building consensus. As such, strategies should use a building block approach, starting at the lowest achievable goal and building up to larger goals and eventually achieving the ultimate goal. For example, create awareness for the need of a storm shelter, identify partners and build consensus regarding those who deem a storm shelter a worthy endeavor, identify funding concerning how to pay for the project, and then finally build the storm shelter.

The Traill County Hazard Mitigation Plan provides the vehicle to begin the process of having a true mitigation program. However, in order to succeed, it will require clearly articulating the benefits of participating in and sustaining the mitigation planning process and related mitigation based programs. One of the best ways to obtain local buy-in and long-term success is the education, identification, and implementation of achievable mitigation actions. Thus, while promoting the mitigation plan is the responsibility of all agencies, it is highly recommended that the Traill County Emergency Manager lead this effort. As such, it is recommended that a plan consisting of goals, timeframes and milestones be created for the Traill County Emergency Manager to create a legitimate mitigation program.

5.6 Linking the Capability Assessment, the Risk Assessment, and the Mitigation Strategy

The conclusion of the Capability Assessment and Risk Assessment serves as the foundation for a meaningful hazard mitigation strategy. During the process of identifying the goals and mitigation actions, each jurisdiction must consider not only their level of hazard risk, but also their existing capability to minimize or eliminate that risk. In jurisdictions where the overall hazard risk is considered to be

MODERATE, and local capability is considered LIMITED, then specific mitigation actions that account for these conditions should be considered. This may include less costly actions, such as minor ordinance revisions or public awareness activities. If necessary, specific capabilities may need to be improved in order to better address recurring threats. Similarly, in cases where the hazard vulnerability is Low and overall capability is Moderate, more emphasis can be placed on actions that may affect future vulnerability such as guiding development away from known hazard areas.

Section 6: Mitigation Goals, Objectives, & Strategies

The Mitigation Goals, Objectives, and Strategy section describes how Traill County intends to reduce or eliminate potential losses. The Mitigation Goals, Objectives, and Strategies section provides a framework for the county and participating jurisdictions to mitigate the effects of natural hazard events on their population, economy, and property. The mitigation strategy is the coordinated effort of agencies and partners to develop and implement a comprehensive range of inventive and effective natural hazard mitigation actions.

Mitigation Strategy Approach

- Establish mitigation goals and objectives that aim to reduce or eliminate long-term vulnerability to natural hazard events
- Identify and analyze a comprehensive range of hazard-specific mitigation strategies that aim to achieve the goals and objectives of the mitigation strategy
- Describe how Traill County and participating jurisdictions will prioritize, implement, and administer mitigation strategies

The Mitigation Goals, Objectives, and Strategy section is an extension of the previous sections of this report, and incorporates the findings of the hazards risk assessment to assist in prioritizing mitigation actions. In addition, the Mitigation Goals, Objectives, and Strategies section provides consideration of the findings of the capability assessment to identify mitigation actions that are manageable and address potential capability gaps. Finally, a maintenance and management section describes how the strategies are to be managed and accounted for in future updates.

FEMA Requirements Addressed in this Section

The Hazard Mitigation Planning Team developed the mitigation strategy consistent with the process and steps presented in the Federal Emergency Management Agency's (FEMA) How-To-Guide: Developing the Mitigation Plan (FEMA 386-3).

§201.6(c)(3) The plan shall include the following: A *mitigation strategy* that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.

§201.6(c) (3) (i) The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

§201.6(c) (3)(ii) The hazard mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and

continued compliance with NFIP requirements, as appropriate.

§201.6(c) (3) (iii) The hazard mitigation strategy shall include an action plan, describing how the action identified in paragraph (c) (3) (ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

§201.6(c) (3) (iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

6.1 Mitigation Goals, Objectives, & Development

While Traill County and its cities have engaged in several mitigation actions over the past five years, the area remains at risk. As noted in the past iterations of the Traill Hazard Mitigation Plan, those hazards posing the most risk due to frequency and impact include flood and severe winter/summer storms. While this plan still focuses on those priorities, new to this plan iteration is the emphasis placed on hazardous material incidents. Another area of emphasis new to this iteration of the Traill County's Hazard Mitigation Plan is its focus on comprehensive practices. Many of the projects were created with an emphasis on incorporating plans and projects from multiple agencies/jurisdictions. Finally, this plan and its projects are a reflection of both existing and future development. Many of the projects of this plan were created to ensure Traill County and participating jurisdictions are infusing resilience and sustainability into their future endeavors.

The update includes the creation of five new all-encompassing mitigation goals verses the four hazard specific goals that were listed in the immediate past iteration of the Traill Hazard Mitigation Plan. In addition, this update eliminates completed projects from the past plan, reassesses the validity of past projects, as well as adds new projects. The mitigation projects were derived from the updated community profile, hazard profile, a robust 28-point risk assessment, and with input of the local governments and citizens.

6.2 Strategies/Projects

The process of creating new mitigation projects officially commenced on March 2015 with the Hazard Mitigation Planning Team meeting with each of the jurisdictions. Based on the concepts found in FEMA Publication 386-3, this meeting included a mitigation tutorial, an overview of what mitigation projects are, how to identify potential projects, a review the past plan, and an overview of the purpose of the mitigation plan as set by FEMA, the State of ND and the Mitigation Steering Committee. Attendees were instructed to review the existing mitigation goals, objectives, and strategies of the previous plan to determine what had been accomplished over the past five years, what projects were currently relevant, and what new projects should be added to the update. Subsequently, the Mitigation Steering Committee, key stakeholders, and public attendees discussed the current mitigation goals, objectives, and strategies, and provided feedback on where modifications to the goals, objectives, and projects were needed.

In the evaluation of mitigation strategies, stakeholders were instructed to consider the following criteria:

- Funding Options & Cost

- Staff Time
- Feasibility ((the findings of the capability assessment)
- Population Benefit
- Property Benefit
- Values Benefit
- Maintenance
- Hazard Rating

In the evaluation and creation of projects, stakeholders were asked to assess each potential project in terms of eliminating risk and probability of success. Stakeholders were also requested to consider and provide direct and indirect costs and benefits, with indirect costs and benefits being defined as intangible things such as social effects.

Upon completion of the mitigation project creation/evaluation process, the stakeholders provided a comprehensive list of desired strategies to the Hazard Mitigation Planning Team, who subsequently organized the lists into common themes as well as evaluated and prioritized the submitted projects. Once the projects were arranged, the mitigation strategies were shared with stakeholders. Stakeholders were asked to accept, reject, modify, and/or re-rank/prioritize the projects.

Once the data from all of the jurisdictions was returned, the Hazard Mitigation Planning Team again reorganized the data into a comprehensive list of strategies. The Hazard Mitigation Planning Team, who refined the list by eliminating duplication, providing succinctness, and generally organizing the strategies into a comprehensive and workable format, then reviewed the list. Once the refinement was complete, the mitigation strategies list was again shared with the participating jurisdictions and stakeholders for additional comment. After all of the comments were received and incorporated, a final list of strategies was made public for review and comment. The final comment and review section lasted approximately two months, ending at the end of April 2016.

The following is a summary of the mitigation update planning process:

- 1) New Goals
- 2) Prioritization Criteria
- 3) Implementation Process
- 4) Projects
- 5) Mitigation Strategy Implementation and Administration

For this update, the mitigation goals were reorganized to be more general and all encompassing. The mitigation goals were chosen and created by the Mitigation Steering Committee with input from those wishing to participate. The new changes now are more aligned with the current state of Traill County and participating jurisdictions and the ambitions of the Mitigation Steering Committee, Traill County Emergency Manager, and elected officials.

6.2.1 Mitigation Goals

- Increase community understanding of emergency management and build support for hazard mitigation
- Develop, promote, integrate and track mitigation strategies
- Continue to improve and enhance the county's emergency management program

- Increase the economic stability, core values, and quality of services of the participating jurisdictions
- Increase mitigation resources to eliminate or minimize harm done to people, property, jobs, and natural resources in Traill County by natural and manmade hazards

6.3 Hazard/Project Relationship

The hazard project relationship table establishes that each of the hazards has at least one project assigned to it. Most hazards have multiple projects assigned to them. Several of the projects are carried over from the previous plan as they are to be continued or were not completed. Likewise some projects were completed and, as such, are no longer reflected on the provided list. Finally, new projects were added to reflect the latest risk assessment, needs, and desires of the represented communities.

Table 107: Hazards Mitigated by Each Proposed Project

[illegible]

Projects	Flooding	Dam Failure	Wild Land Fire	Windstorm	Severe Summer Weather	Sever Winter Storm	Geologic Hazards	Communicable diseases	Urban Fire or structure Collapse	Hazardous Material Incidents	Transportation accidents
slope of ditch											
Purchase and install 911 street signs	X	X	X	X	X	X	X		X	X	X
Purchase and install generators	X			X	X	X			X		
Purchase and install transfer switch and emergency power panel for city fire station emergency generator.	X	X		X	X	X					
Installation of underground pipe for a secondary sanitary sewer force main discharge line to the lagoon.	X							X			
Install an underground fuel lines. Generator unit.	X						X				
Repair Neillsville bridge (# 412) for emergency route	X	X	X	X	X	X	X		X	X	X
Repair County Road 17 as an Emergency Route	X	X	X	X	X	X	X		X	X	X
Demolition of abounded and depilated properties								X			
Integrate and fund a complete Mosquito management								X			

Projects	Flooding	Dam Failure	Wild Land Fire	Windstorm	Severe Summer Weather	Sever Winter Storm	Geologic Hazards	Communicable diseases	Urban Fire or structure Collapse	Hazardous Material Incidents	Transportation accidents
program											
Continue working with the National Weather Service to improve storm warning and awareness	X			X	X	X			X		
Increase weather radio use	X	X	X	X	X	X			X	X	X
Replace maintaining and upgrade first responder equipment.	X	X	X	X	X	X			X	X	X
Enforce any set fire or burning or water usage bans			X								
Create and implement a water shortage plan			X						X		

6.4 Project Prioritization

To ensure continuity from the immediate past iteration of the mitigation plan, the Mitigation Steering Committee decided that the action prioritization methodology would remain the same. Thus, the philosophy and methodology remained intact from the immediate past iteration of the Traill County Hazard Mitigation Plan. As such, it is again noted that each of the proposed projects has value, however, time and financial constraints do not permit all of the proposed actions to be implemented immediately. By prioritizing the actions, the most critical, cost effective projects can be achieved in the short term. The prioritization of the projects serves as a guide for choosing and funding projects, however, depending on the funding sources, some actions may be best achieved outside the priorities established here.

To ensure that community goals and other factors are taken into account when prioritizing projects, a prioritization model that uses the following factors was again used: cost, staff time, feasibility, population benefit, property benefit, values benefit, maintenance, and hazard rating.

- **Cost** considers the direct expenses associated with the project such as material and contractor expenses.
- **Staff time** evaluates the amount of time needed by a local government employee to complete or coordinate the project.
- **Feasibility** assesses the political, social, and/or environmental ramifications of the project and the likelihood such a project would proceed through permitting, public review processes, and/or private business implementation.
- **Population benefit** considers the possible prevention of deaths and injuries through the project's implementation.
- **Property benefit** estimates the reduction of property losses, including structures and infrastructure, from the hazard being mitigated.
- **Values benefit** considers the economic, ecologic, historic, and social benefits of the project.
- **Maintenance** rates the amount of work required to keep the mitigation measure effective and useful.
- **Hazard rating** is based on the results of the risk assessment and is a measure of the history, probability, severity, and vulnerabilities of the hazard.

Each of the factors was ranked qualitatively for each of the projects. The methods used to assign a category and the associated score is defined in table 109. The highest possible score is 30. Some factors have a greater range than others, thus indicating a higher weighting. These weightings allow for appropriate prioritization of the project. More specifically, 11 of 30 points account for benefits (population benefit, property benefit, and values benefit), 11 of 30 points account for direct and indirect costs (cost, staff time, and maintenance), 5 of 30 points account for the hazard rating (incorporates hazard probability and impacts; see Section 4.5), and 3 of 30 points account for project feasibility.

Table 108: Prioritization Criteria

Factor	Threshold	Rating	Score
Cost (Range: 1-5)	Little to no direct expenses	Low	5
	Less than \$5,000	Low-Moderate	4
	\$5,000-\$25,000	Moderate	3
	\$25,001-\$100,000	Moderate-High	2
	Greater than \$100,000	High	1
Staff Time (Range: 1-3)	Less than 10 hours of staff time	Low	3
	10-40 hours of staff time	Moderate	2
	Greater than 40 hours of staff time	High	1
Feasibility (Range: 1-3)	Positive support for the project	High	3
	Neutral support for the project	Moderate	2
	Negative support for the project	Low	1
Population Benefit (Range: 1-4)	Potential to reduce more than 20 casualties	Very High	4
	Potential to reduce 6-20 casualties	High	3
	Potential to reduce 1-5 casualties	Moderate	2

	No potential to reduce casualties	Low	1
Property Benefit (Range: 1-4)	Potential to reduce losses to more than 20 buildings or severe damages to infrastructure	Very High	4
	Potential to reduce losses to 6-20 buildings or substantial damages to infrastructure	High	3
	Potential to reduce losses to 1-5 buildings or slight damages to infrastructure	Moderate	2
	No potential to reduce property losses	Low	1
Values Benefit (Range: 1-3)	Provides significant benefits to economic, ecologic, historic, or social values	High	3
	Provides some benefits to economic, ecologic, historic, or social values	Moderate	2
	No or very little benefit to economic, ecologic, historic, or social values	Low	1
Maintenance (Range: 1-3)			
	Requires very little or no maintenance	Low	3
	Requires less than 10 hours per year	Moderate	2
	Requires more than 10 hours per year	High	1
Hazard Rating (Range: 1-5)	Based on Hazard Ranking	High	3
	Based on Hazard Ranking	Moderate	2
	Based on Hazard Ranking	Low	1

The following table provided an overview of all of the projects and priority scorecard. As previous noted, the scorecard allows one to determine the feasibility of a project and other wise prioritize projects.

Table 109: Project Score Card

Affected Areas	Projects	Cost	Staff Time	Feasibility	Population Benefit	Property Benefit	Values Benefit	Maintenance	Hazard Rating	TOTAL SCORE
Traill County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Educate Citizens about hazards and mitigation efforts	4	2	3	4	1	1	3	5	23

Affected Areas	Projects	Cost	Staff Time	Feasibility	Population Benefit	Property Benefit	Values Benefit	Maintenance	Hazard Rating	TOTAL SCORE
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Clean Drains	3	2	3	1	2	1	1	4	17
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Monitor and install outdoor warning siren.	3	2	3	4	1	2	2	5	22
City of Clifford	Replace city-owned septic tanks	3	2	3	1	2	2	3	2	18
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Clear storm water drain/ditches from debris and silt deposits	3	2	3	1	2	1	1	2	15
City of Buxton	Re-grade or replace some of the ditch culverts, and re-grade the slope of ditch	3	2	3	2	1	2	1	3	17
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Purchase and install 911 street signs	3	2	3	4	4	3	2	5	26
Clifford and Hillsboro	Purchase and install generators	2	2	3	3	1	2	2	5	20
Hatton	Purchase and install transfer switch and emergency power panel for city fire station emergency generator.	3	2	3	4	1	3	2	5	23
Hillsboro	Installation of underground pipe for a secondary sanitary sewer force main discharge line to the lagoon.	2	2	3	1	1	3	2	1	16
Mayville	Install underground fuel lines. Generator unit.	3	2	3	3	1	2	2	5	21
Trail County	Repair Neillsville bridge (# 412) for	1	1	3	4	4	1	1	5	20

Affected Areas	Projects	Cost	Staff Time	Feasibility	Population Benefit	Property Benefit	Values Benefit	Maintenance	Hazard Rating	TOTAL SCORE
	emergency route									
Trail County	Repair County Road 17 as an Emergency Route	1	1	3	4	4	1	1	5	20
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Demolition of abandoned and depilated properties	4	2	3	1	1	3	3	1	18
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Integrate and fund a complete Mosquito management program	3	2	3	4	1	3	2	3	21
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Continue working with the National Weather Service to improve storm warning and awareness	5	3	3	4	1	1	3	3	23
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Increase weather radio use	5	3	3	4	1	1	3	3	23
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Replace maintaining and upgrade first responder equipment.	3	3	3	4	1	2	2	5	23
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Enforce any set fire or burning or water usage bans	5	3	3	4	4	3	3	4	29
Trail County	Create and implement a water shortage plan	5	3	3	1	1	2	3	2	20

Affected Areas	Projects	Cost	Staff Time	Feasibility	Population Benefit	Property Benefit	Values Benefit	Maintenance	Hazard Rating	TOTAL SCORE
	Post adequate signage on all railroad crossings	4	3	3	3	1	1	2	2	19
Trail County & the cities of Mayville and Hillsboro	Provide maps and available routes information to first responders.	4	3	3	3	4	2	3	3	25
Trail County & the cities of Mayville and Hillsboro	Incorporate mitigation based on private partners (nursing homes, hospitals and electrical Cooperatives),	4	3	3	3	4	2	3	3	24
Trail County & The Cities of Mayville; Hillsboro; Hatton; Portland; Buxton; Galesburg; Reynolds & Clifford	Encourage trailer courts to have either an on-site shelter or an evacuation plan to a nearby shelter	5	3	3	3	1	1	3	2	16

6.5 Implementation Process

A critical component of any mitigation program is the implementation of the mitigation projects. The proposed and prioritized projects are shown in table 110 with the associated responsible stakeholders, resources needed, and goal timeframes for the projects. The timeframes are defined as follows:

- Near Term: Within 0-3 years
- Mid Term: Within 3-6 years
- Long Term: Within 7-10 years
- Ongoing: Initiated in the near, mid, or long term and continuing

Note: Some projects may be best achieved outside of the goal timeframes depending on the funding and staff resources available. Others may not be feasible in the goal timeframe due to financial, staff, or political limitations. This prioritized list, however, allows the county, city, and towns to focus on the projects with the greatest benefits. The following is a table of complete actions in order of their priority score. The table also illustrates the jurisdiction(s) owning the project, coordinating agency, resources and the goal frame of each project.

6.5.1 Mitigating Projects

Mitigation strategies are the foundation of a truly effective emergency management program.

- Mitigation creates safer communities by reducing losses of life and property
- Mitigation enables individuals and communities to recover more rapidly from disasters
- Mitigation lessens the financial impact of disasters on individuals, the treasury, state, local and tribal communities

The county and participating jurisdictions recognize the importance of incorporating mitigation into the overlapping emergency management functions (prepare, respond, recover), existing local and state building codes, zoning ordinances, and various plans (land use, community development, water improvement development, etc.). For this reason, the aforementioned comprehensive all-hazard mitigation strategies also identified strategies that would, and will, improve the county's and participating jurisdiction's emergency management capabilities, while creating communities that are resilient in the face of disaster.

Table 110: Mitigation Projects

Jurisdictions	Projects	Status of project from the last Mitigation plan Update	Coordinating Agencies and Partners	Resources Needed	Goal Timeframe	TOTAL CBA SCORE
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds;	Purchase and install 911 street signs	This is a new action modified from last iteration of the plan	County Cities and First Responder Agencies	Staff Time	Near term	26

Jurisdictions	Projects	Status of project from the last Mitigation plan Update	Coordinating Agencies and Partners	Resources Needed	Goal Timeframe	TOTAL CBA SCORE
Portland; Buxton; Galesburg & Clifford						
Traill County & the cities of Mayville and Hillsboro	Incorporate mitigation based on private partners (nursing homes, hospitals and electrical Cooperatives),	This is a new action	Emergency Management	Staff Time	Long-Term	24
Traill County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Continue working with the National Weather Service to improve storm warning and awareness	This action is continued form the previous plan & is considered on-going	Emergency Response Personnel, NWS	Staff Time	Ongoing, Long-Term	23
Traill County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Increase weather radio use	This action is continued form the previous plan & is considered on-going	Emergency Response Personnel, NWS	Staff Time	Ongoing, Long-Term	23
Traill County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Replace maintaining and upgrade first responder equipment.	This is a new action	Emergency Response Personnel	County Budget, HMGP, Grants	Ongoing, Long-Term	23
Traill County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg &	Monitor and install outdoor warning siren.	This action is continued form the previous plan & is considered on-going	Cities, Emergency Management	Staff Time	Ongoing, Long-Term	22

Jurisdictions	Projects	Status of project from the last Mitigation plan Update	Coordinating Agencies and Partners	Resources Needed	Goal Timeframe	TOTAL CBA SCORE
Clifford						
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Identify and provide critical infrastructure that needs alternative power methods (Courthouse EOC etc.)	This action is continued from the previous plan & is considered on-going	County, Cities, Emergency Management	City Budget, HMGP	Short-Term	21
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Integrate and fund a complete Mosquito management program	This is a new action	Emergency Management, Cities	Staff Time	Short-Term	21
Mayville	Install an underground fuel lines. Generator unit.	50% complete	City of Mayville	Staff Time	Short-Term	21
Clifford and Hillsboro	Purchase and install generators	45% complete	Emergency Management, Cities	Staff Time	Short-Term	20
Trail County	Repair Neillsville bridge (# 412) for emergency route		Trail County, NDDOT, Watersheds	Staff Time, City/County Budget, HMGP, FEMA, State	Ongoing, Short-Term	20
Trail County	Repair County Road 17 as an Emergency Route	This is a new action	Trail County, NDDOT, Watersheds	Staff Time, City/County Budget, HMGP, FEMA, State	Ongoing, Short-Term	20
Trail County	Create and implement a water shortage plan	This is a new action	Trail Emergency Management	Staff Time	Long-Term	20
Trail County	Post adequate signage on all railroad crossings	This is a new action	Cities, Railroad Companies	Railroad Budget	Ongoing, Long-Term	19

Jurisdictions	Projects	Status of project from the last Mitigation plan Update	Coordinating Agencies and Partners	Resources Needed	Goal Timeframe	TOTAL CBA SCORE
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Provide maps and available routes information to first responders.	This is a new action	First Responder agencies	County/Dept. Budget, Grants, FEMA, HMGP	Ongoing, Long-Term	19
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Demolition of abandoned and depilated properties	This action is continued from the previous plan & is considered on-going	Cities	City Budgets	Short-Term	18
City of Clifford	Replace city-owned septic tanks	35% Complete	City of Clifford	City Budgets	Short-Term	18
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Clean Drains	This action is continued from the previous plan & is considered on-going	County and cities	Budgets, Grants	Ongoing, Long-Term	17
City of Buxton	Re-grade or replace some of the ditch culverts, and re-grade the slope of ditch	This action is continued from the previous plan & is considered on-going	City of Buxton	Budgets, Grants	Ongoing, Long-Term	17
Hillsboro	Installation of underground pipe for a secondary sanitary sewer force main discharge line to the lagoon.	This is a new action	2	2	3	16
Trail County &	Encourage trailer	This is a new	Trailer Courts	Staff Time	Long-Term	16

Jurisdictions	Projects	Status of project from the last Mitigation plan Update	Coordinating Agencies and Partners	Resources Needed	Goal Timeframe	TOTAL CBA SCORE
The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	courts to have either an on-site shelter or an evacuation plan to a nearby shelter	action				
Trail County & The Cities of Mayville; Hillsboro; Hatton; Reynolds; Portland; Buxton; Galesburg & Clifford	Clear storm water drain/ditches from debris and silt deposits	This action is continued from the previous plan & is considered on-going	County and City Budgets	Short-Term	Ongoing, Short-Term	15

Note: Action/Projects that were not carried over from the previous plan were either completed or are no longer a priority.

6.5.2 Existing and New Plan Implementation

The development of this plan has provided Traill County and participating jurisdictions with a unique opportunity to assess current capabilities, identify gaps, and evaluate the strategies needed to improve the ability to protect the county and participating jurisdictions. As such, Traill County feels that it is imperative to make mitigation a way of life for its participating jurisdictions, agencies, and general community. In order to implement sustainable and resilient strategies, it is essential to integrate mitigation into other community planning initiatives. As such, existing planning mechanism were used to assist the Mitigation Steering Committee and local jurisdictions in identifying areas where hazard mitigation information and/or actions may be incorporated.

During the planning process, the county and participating jurisdictions were asked to investigate opportunities to incorporate mitigation measures that would meet the goals and objectives of the Traill County Hazard Mitigation Plan. In addition, the county and participating jurisdictions were asked to ensure the implementation and alignment of the Traill Hazard Mitigation Plan into existing programs/policies as outlined in table 112 shown below (see Capability Assessment).

Table 111: Programs/Policies/Plans

Programs/Policies/Plans	Mitigation Integration/ Alignment Required	Represented Jurisdictions
Land Use plan	On going	Traill County and the cities of

Programs/Policies/Plans	Mitigation Integration/ Alignment Required	Represented Jurisdictions
Disaster Recovery Plan	On going	Traill County and the cities of Hillsboro & Mayville
Strom Water Management Plan	On going	Traill County and the cities of Hillsboro & Mayville
NFIP	On going	Traill County and the cities of Buxton, Hillsboro, Reynolds, Mayville & Portland
Traill Emergency Operations	On going	All Participating Jurisdictions
Hazard Mitigation Plan	On going	All Participating Jurisdictions
Flood Management Plan	On going	All Participating Jurisdictions
Zoning Ordinances	On going	All Participating Jurisdictions
Building Codes	On going	All Participating Jurisdictions
North Dakota State Multi-Hazard Mitigation Plan	Yes I/A	All Participating Jurisdictions
North Dakota State Building Code	Yes I/A	All Participating Jurisdictions

NOTE: This table represents areas where the Traill County Hazard Mitigation Plan update may be incorporated. The actual implementation process is outlined below.

One of the implementation steps of the Traill County Hazard Mitigation Plan is to revise all of the aforementioned plans to incorporate the mitigation actions identified in this document. To accomplish the integration of mitigation actions, the Traill County Emergency Manager will contact the individuals responsible for the above listed plans, and request that those documents incorporate or reference relevant portions of the Traill County Hazard Mitigation Plan when and where appropriate.

Revisions to these documents will follow the revision or amendment guidelines established for each plan. In addition, the Traill County Emergency Manager will send a letter to the pertinent organizations to ensure the incorporation of the noted documents with the Traill County Hazard Mitigation Plan.

Table 112: Jurisdictional Process for Mitigation Incorporation

Jurisdictional Process for Mitigation Incorporation		
Jurisdiction	Form of Governance	Point of Contact
Traill County	Thomas Eblen	Commissioner
Buxton	Gene Rosholt	Mayor
Galesburg	Rick Halvorson	Mayor
Hillsboro	Mark Forseth	Mayor
Mayville	Donald Moen	Mayor
Reynolds	Lloyd Kennedy	Mayor
Portland	Sven Mickels	Mayor

As Traill County and its cities develop new plans, such as capital improvement plans, and existing plans are updated, the new plans and updates will utilize the hazard information and projects identified in the Traill County Hazard Mitigation Plan for consideration and inclusion. Given that limited planning mechanisms exist in the county and jurisdictions, the information in the Traill County Hazard Mitigation Plan will be valuable for future planning efforts. Table 113 shows examples of projects and how they can be incorporated into existing and future planning documents. Note that some proposed mechanisms may not be feasible at this time due to the staff, technical expertise, and financial resources need to implement the

program.

Table 113: Mitigation Strategies

Existing or Anticipated Plan	Mitigation Strategies	Estimated Revision or Creation Timeframe
Building Codes	Adopt building codes that require disaster resistance to hazards such as severe thunderstorms, wind, tornadoes, floods, wildfire, winter storms, terrorism, and earthquakes.	Near Term*
Capital Improvement Plans	When developed, consider and include projects related to hazard mitigation, such as transportation and public utility infrastructure improvements, in the capital improvements schedule.	Long Term*
Ordinances	Adopt ordinances that create disaster resistance such as mowing and fire reduction ordinances and flood ordinances.	Mid Term
Zoning	Update or create zoning ordinances to limit development in high hazard areas.	Near Term*
Traill Emergency Operations Plan	Integrate the operational, response, training, and preparedness needs that are not directly tied to mitigation into the county's emergency operation plan	Mid Term
Traill Growth Policy	Incorporate elements of the risk assessment and mitigation strategy into the county's growth policy, considering sustainability and disaster resistance a top priority.	Near Term
Traill Subdivision Regulations	Include elements of the risk assessment and mitigation strategy in the county's subdivision regulations, considering sustainability and disaster resistance a top priority.	Near Term

Note: Some activities such as building codes and land use regulations are more easily implemented by some communities than others because of the community, planning, and enforcement resources available.

Section 7: Monitor and Maintenance

The Plan Maintenance section of the Traill County Hazard Mitigation Plan describes the formal process that will ensure the mitigation plan remains an effective and relevant document. This section establishes the method and schedule for monitoring, evaluating, and updating the Traill County Hazard Mitigation Plan during a five-year plan-update cycle. It also establishes how Traill County and the participating jurisdictions will maintain community involvement in the Traill County Hazard Mitigation Plan.

Maintenance Approach

- Incorporate hazard mitigation actions into existing planning mechanisms
- Determine how mitigation projects and actions will be monitored
- Establish indicators of effectiveness or success
- Develop an evaluation and revision schedule to ensure the Traill County Hazard Mitigation Plan is up-to-date at the end of the five-year-cycle
- Establish a process for public input and community involvement during the planning cycle

FEMA Requirements Addressed in this Section

The Traill County Hazard Mitigation Steering Committee created the Traill County Hazard Mitigation Plan maintenance strategy consistent with the process and steps presented in the Federal Emergency Management Agency's (FEMA) How-To Guide: Bringing the Plan to Life (FEMA 386-4). The following FEMA requirements are addressed in this section:

- Requirement §201.6(c) (4) (i): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
- Requirement §201.6(c)(4)(ii): The plan shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans where appropriate.
- Requirement §201.6(c) (4) (iii): The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

7.1 Development and Acceptance

Maintaining the Traill County Hazard Mitigation Plan is crucial if Traill County is to have a comprehensive mitigation program. As such, this section creates a maintenance timeline, assigning accountability, and creating oversight and governance.

The Hazard Mitigation Planning Team created the Monitor and Maintenance section of the Traill County Hazard Mitigation Plan. The section was presented to the Traill County Emergency Manager for comment and buy in. Then, this section was accepted by the Hazard Mitigation Steering Committee and participating jurisdictions for inclusion into the plan.

7.2 Process

During the five-year planning cycle, the Traill County Emergency Manager will undertake the following initiatives:

- Collect annual information from the agencies involved in implementing mitigation projects or activities identified in the Mitigation Strategy section of this plan
- Maintain and update the mitigation action table
- Conduct site visits and obtain reports of completed or initiated mitigation actions to incorporate in the Traill County Hazard Mitigation Plan revisions as needed
- Research and document new natural disaster information pertaining to Traill County during the planning cycle and incorporate into a revised risk assessment section as needed
- Organize (at a minimum) annual meetings with each of the participating jurisdictions and county commissioners to discuss relevant hazard mitigation issues, provide status updates, and discuss available grant opportunities
- Organize biannual meetings with Mitigation Steering Committee members to discuss relevant hazard mitigation issues, provide status updates, and discuss available grant opportunities
- Coordinate, compile, and disseminate hazard mitigation funding information and applications
- Convene a meeting of the Mitigation Steering Committee within a timely period following a natural disaster, when funding is announced to prioritize and submit potential mitigation actions for funding and/or at the direction of the Traill County Emergency Manager

The above activities outline plan maintenance during the four years leading up to the fifth year of the planning cycle (2016-2021). Beginning in August 2017, the Traill County Emergency Manager will reconvene the Planning Committee to discuss and update the status of the mitigation actions listed in the Traill County Hazard Mitigation Plan. The Traill County Emergency Manager will be responsible for ensuring the compilation, documentation, and incorporation of all changes derived from the activities listed above into a revised document.

7.3 Evaluation

The Traill County Hazard Mitigation Plan will be evaluated annually to determine the effectiveness of its projects, programs, and policies. The Traill County Emergency Manager will be responsible for scheduling and organizing the planning meetings, collecting, analyzing and incorporating annual reports, and providing revised drafts to the Hazard Mitigation Steering Committee. Each year, Hazard Mitigation Steering Committee members will assess the current version of the Traill County Hazard Mitigation Plan and determine the improvements necessary for the update. The Traill County Emergency Manager will evaluate the Hazard Mitigation Steering Committee to determine if other agencies should be added.

A thorough examination of the Traill County Hazard Mitigation Plan will take place during the fifth year of the process to ensure Traill County has an updated hazard mitigation plan at the end of the planning cycle. The Hazard Mitigation Steering Committee will review the goals and action items to determine their relevance to changing situations in the county, as well as changes in state or federal policy, and to ensure they are addressing current and expected conditions. The Hazard Mitigation Steering Committee will look at any changes in county resources that may influence the plan implementation (such as funding), and program changes to determine need for reassignment. The Hazard Mitigation Steering Committee will

review all portions of the Traill County Hazard Mitigation Plan to determine if this information should be updated or modified given any new available data.

7.4 Evaluation Criteria

- Are the mitigation actions effective?
- Are there any changes in land development that affect mitigation priorities?
- Do the goals, objectives, and action items meet social, technical, administrative, political, legal, economic, and environmental criteria as defined in FEMA's STAPLEE analysis?
- Are the goals, objectives, and mitigation actions relevant given any changes in Traill County?
- Are the goals, objectives, and mitigation actions relevant given any changes to state or federal regulations or policy?
- Is there any new data that affects the Risk Assessment portion of the Traill County Hazard Mitigation Plan?

7.5 Update

The Traill County Emergency Manager will ensure the Hazard Mitigation Steering Committee updates the Traill County Hazard Mitigation Plan every five years to reflect the results of the annual reports and on-going evaluation. Throughout the planning cycle, the Traill County Emergency Manager will ensure that new information is compiled and incorporated into the Traill County Hazard Mitigation Plan. The Traill County Emergency Manager will also incorporate recommended comments expressed by FEMA in the initial review into the revision. At the end of the planning cycle, the Hazard Mitigation Steering Committee will submit the updated Traill County Hazard Mitigation Plan to the State Emergency Management Office and FEMA for review. After FEMA has approved the Traill County Hazard Mitigation Plan, the county will again formally adopt the Traill County Hazard Mitigation Plan. The following table is an outline of how the Traill County Hazard Mitigation Plan will be updated upon FEMA-approval:

Table 114: Traill County Hazard Mitigation Plan Update Schedule

Traill County Hazard Mitigation Plan Update Schedule		
Timeframe	Participant	Outcome
First Quarter 2017	Hazard Mitigation Steering Committee Participating Jurisdictions	Reconvene Planning Committee to discuss mitigation action progress and possible plan improvements.
First Quarter 2018	Hazard Mitigation Steering Committee Participating Jurisdictions	Reconvene Planning Committee to discuss mitigation action progress and possible plan improvements.
First Quarter 2019	Hazard Mitigation Steering Committee Participating Jurisdictions	Reconvene Planning Committee to discuss mitigation action progress and possible plan improvements.
Fourth Quarter 2019	Hazard Mitigation Steering Committee Participating Jurisdictions County Commissioners	Apply for plan update grant funding
First Quarter 2020	Hazard Mitigation Steering Committee	Reconvene Planning Committee to discuss mitigation action progress and

Traill County Hazard Mitigation Plan Update Schedule		
Timeframe	Participant	Outcome
	Participating Jurisdictions	possible plan improvements.
Fourth Quarter 2020	Hazard Mitigation Steering Committee Participating Jurisdictions ND DES	Reconvene Hazard Mitigation Planning Team and begin plan update. Coordinate monthly meetings with Hazard Mitigation Steering Committee.
First Quarter 2021	Hazard Mitigation Steering Committee Participating Jurisdictions ND DES	Continue plan update.
Fourth Quarter 2021	Hazard Mitigation Steering Committee Participating Jurisdictions ND DES	Submit plan to FEMA for final approval

7.6 Incorporation into Existing Planning Mechanisms

As part of the local capability assessment conducted during the planning process, the Hazard Mitigation Steering Committee identified current plans, programs, policies/ordinances, and studies/reports that will augment or help support mitigation-planning efforts. The Hazard Mitigation Steering Committee will meet on an annual basis, and will be the mechanism for ensuring the county integrates hazard mitigation into its future planning activities. Following approval and adoption, the Hazard Mitigation Steering Committee and participating jurisdictions will work to incorporate, where applicable, the Traill County Hazard Mitigation Plan into the planning mechanisms identified in the mitigation action section.

Throughout the maintenance cycle, the Traill County Emergency Manager will work with the county and participating jurisdictions to integrate hazard mitigation goals and actions into the general operations of Traill County agencies. The Traill County Emergency Manager will work with agencies to identify opportunities as outlined below:

- Update work plans, policies, or procedures to include hazard mitigation concepts
- Identify potential mitigation funding within capital and operational budgets
- Issue plans, policies, executive orders, regulations, or other directives to carry out mitigation actions
- Add hazard mitigation elements to redevelopment plans

7.7 Continued Public Involvement

Traill County is dedicated to continued public involvement in the hazard mitigation planning and review process. During all phases of maintenance, the public will have the opportunity to provide feedback. The Traill County Hazard Mitigation Plan will be maintained and available for review on the county website. Individuals will have an opportunity to submit comments for the Traill County Hazard Mitigation Plan update at any time. The Traill County Emergency Manager will compile all comments and present them at the annual Hazard Mitigation Steering Committee meetings, where members will consider them for

incorporation into the revision. To help publicize the revised Traill County Hazard Mitigation Plan six months prior to the submission of the 2021 update, Traill County will post a notice on its website requesting feedback on an updated draft. The Hazard Mitigation Planning Team will hold community involvement meetings with representatives from academic institutions, the private sector, community groups, and neighboring jurisdictions. This will provide the public an opportunity to express their concerns, opinions, or ideas about any updates/changes that are proposed to the Traill County Hazard Mitigation Plan.

7.8 The Hazard Mitigation Steering Committee

The Hazard Mitigation Steering Committee oversees changes and modifications to the Traill County Hazard Mitigation Plan, and will regularly review each goal and objective to determine its relevance to the changing situation of the county. The Hazard Mitigation Steering Committee will also monitor and evaluate the mitigation strategies in the Traill County Hazard Mitigation Plan to ensure that the document reflects current hazard/risk analysis, development trends, code changes, and risk perceptions.

The Hazard Mitigation Steering Committee and the participating jurisdictions agree that outreach and input will be solicited throughout the Traill County Hazard Mitigation Plan's lifecycle through workshops, presentations, meetings, internet, and other public information and education campaigns.

To ensure the Traill County Hazard Mitigation Plan is up to date and relevant the Hazard Mitigation Steering Committee meets annually, within a timely manner after any actual or exercised disaster, and/or at the direction of the Traill County Emergency Manager.

7.9 Participating Jurisdictions

Participating jurisdictions are key stakeholders within the Traill County Mitigation Plan, and as such, have agreed to be active participants in the mitigation process. Participating jurisdictions may be active Hazard Mitigation Steering Committee members, but they are not required to be members. Participating jurisdictions are welcome to attend mitigation-planning meetings and or review the minutes of said meetings.

The participating jurisdictions have agreed to ensure the Traill County Hazard Mitigation Plan is current and relevant. Participating jurisdictions agree to provide updates of appropriate activities occurring within their jurisdictions on a regular basis, and/or at the direction of the Traill County Emergency Manager.

Participating jurisdictions have agreed to ensure that within their own jurisdictions, the Traill County Hazard Mitigation Plan is integrated into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate. Jurisdictions also agree to work with the Traill County Emergency Manager to identify areas of integration, as well as provide annual progress reports of the integration of the mitigation plan into existing and or new plans. Conversely, the Traill County Emergency Manager agrees to ensure participating jurisdictions are included in the planning process, particularly when updates will affect the participating jurisdictions, and when or if changes are made to the Traill County Hazard Mitigation Plan. Furthermore, the participating jurisdictions agree to work with the Traill County Emergency Manager and Hazard Mitigation Steering Committee when requested.

Appendix A: Inventory of Hazard Mitigation Programs, Policies, and Funding

Federal Agencies and Programs

U.S. Department of Homeland Security

Federal Emergency Management Agency (FEMA)

General information on mitigation planning, hazards, disaster assistance programs, current disasters, etc.

Hazard Mitigation Grant Program (HMGP)

HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with state, tribal, and local priorities.

Pre-Disaster Mitigation (PDM)

PDM provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while at the same time, also reducing reliance on Federal funding from actual disaster declarations.

Flood Mitigation Assistance (FMA)

FMA provides funds on an annual basis so that measures can be taken to reduce or eliminate the risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP).

National Flood Insurance Plan

Detailed information on the National Flood Insurance Program and other mitigation activities is provided here.

Hazard Mitigation Funding Under Section 406 (Public Assistance)

Section 406 provides discretionary authority to fund mitigation measures in conjunction with the repair of the disaster-damaged facilities.

Natural Resources Conservation Service (NRCS)

To provide leadership in a partnership effort to help conserve, improve, and sustain our natural resources and environment.

Community Facility Grants

Assistance for the development of essential community facilities. Grant funds can be used to construct, enlarge, or improve community facilities for health care, public safety, and community and public services.

Emergency Watershed Protection (EWP)

The program is for emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.

Environmental Quality Incentives Program (EQIP)

Provides technical assistance, cost-share payments, and incentive payments to assist crop, livestock, and

other agricultural producers with environmental and conservation improvements to their operations.

Wetlands Reserve Program

A voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Provides technical and financial support to help landowners.

Farm Service Agency (FSA)

- Disaster Assistance Programs available, includes:
- Conservation Loans
- Conservation Reserve Program
- Emergency Conservation Program
- Non-Insured Crop Disaster Assistance Program
- Emergency Farm Loans

U.S. Department of Commerce (DOC)

Economic Development Administration (EDA)

To generate jobs, help retain existing jobs, and stimulate industrial and commercial growth in economically distressed areas of the U.S.

U.S. Census Bureau

Profile of North Dakota and each North Dakota County.

National Oceanic and Atmospheric Administration (NOAA)

NOAA, Coasts

Provides detailed information on coastal water issues, including the Great Lakes.

NOAA, National Climatic Data Center

Current and historical archive of climatic data and information.

NOAA, Drought Information Center

Updated drought conditions including monitors and outlooks

NOAA, National Severe Storms Laboratory

Comprehensive information on severe weather research.

NOAA, National Weather Service (NWS)

Provides all available weather information including warning updates.

Advanced Hydrologic Prediction Service (AHPS)

A program designed to provide improved river and flood forecasting and water information. AHPS provides a suite of graphical and numeric products over the Internet to assist community leaders and emergency managers in making better life- and cost-saving decisions about evacuations and movement of the property before flooding occurs.

Flood Inundation Mapping

This interactive web page shows the spatial extent of possible or expected flooding in a given area. It can be used to show if roadways and structures will be impacted by floodwaters. At the limited number of forecast locations where inundation maps are currently available, this web page is accessed by clicking on the inundation mapping tab on the hydrograph webpage. In collaboration with partners, this product will be expanded to new locations.

Flash Flood Guidance

The North Central River Forecast Centers issues Flash Flood Guidance throughout the day for every county in their area. The river forecast centers determine 1- 3- and 6-hour flash flood guidance values for all counties, and 12- and 24-hour values for parts of the eastern United States. Flash Flood Guidance estimates the average number of inches of rainfall for given durations required to produce flash flooding in the indicated county.

North Central River Forecast Center

Contains a variety of seasonal products including the Spring Hydrologic Outlook

U.S. Army Corps of Engineers (USACE)

Planning programs include Flood Risk Management, Planning Assistance to States, Flood Plain Management Services, and Silver Jackets.

Planning Assistance to States (PAS)

Funded annually by Congress. Federal allotments for each State or Tribe from the nation-wide appropriation are limited to \$2,000,000 annually, but typically are much less. Individual studies, of which there may be more than one per State or Tribe per year, generally cost \$25,000 to \$75,000. The studies may be phased over several years and cover a wide range of water resource planning activities. PAS studies are cost shared on a 50 percent Federal-50 percent non-Federal basis. The entire local sponsor contribution may be work in kind, and WRDA 2007, Section 2013 provided authority for 100 percent Federal funded PAS studies for hydrologic, economic, and environmental data and analyses.

Floodplain Management Services

A full range of technical services and planning guidance on flood and floodplain issues is provided upon request. These services are generally made available to other federal, state, and local agencies, but some may also be used by nongovernmental organizations and individuals and are 100 percent federally funded.

Regional Flood Risk Management Team

This Regional Flood Risk Management Team (RFRMT) will integrate pre-flood mitigation with a long-term strategy to plan and implement pre- and post-flood emergency actions, while developing promising nonstructural alternatives and other flood risk mitigation actions recognized to reduce future flood risk within the region.

Cold Regions Research and Engineering Laboratory (CRREL)

Engineering and technology for use in cold regions.

Flood Damage Reduction Studies & Projects

Flood damage reduction is one of the primary missions of the U.S. Army Corps of Engineers. As such, the Corps of Engineers may undertake studies and build projects to reduce and/or minimize flood damages.

The Corps of Engineers may investigate flooding problems and opportunities in response to directives, called authorizations, from the Congress. Congressional authorizations are contained in public laws and in resolutions of either the House Public Works and Transportation Committee or the Senate Environment and Public Works Committee.

Continuing Authorities Program

Under the Continuing Authorities Program (CAP) legislation authorizes the Corps of Engineers to plan, design, and construct certain types of water resource and ecosystem restoration projects without additional and specific congressional authorization. The purpose is to implement projects of limited scope and complexity. Each authority has specific implementation guidelines, total program, and per-project funding limits.

Funding: Studies are cost shared 50/50 during feasibility. Most projects are cost shared 65 percent Federal and 35 percent local during implementation unless otherwise noted.

- Small Flood Control Projects authorized by Section 205 of the 1948 Flood Control Act. Per-project: Federal funding limit of \$7 million. Designed to implement projects that reduce overland flood damages. Projects must be engineering sound, economically justified, and environmentally acceptable.
- Emergency Streambank Protection Projects authorized by Section 14 of the 1946 Flood Control Act. Per-project Federal funding limit of \$1.5 million. Designed to protect essential public facilities threatened by flood-induced erosion.
- Aquatic Ecosystem Restoration authorized by Section 206 of the 1996 Water Resources Development Act. Per-project Federal funding limit of \$5 million. Designed to develop aquatic ecosystem restoration and protection projects that improve the quality of the environment, are in the public interest, and are cost effective.
- Project Modifications for the Improvement of the Environment authorized by Section 1135 of the 1986 Water Resources Development Act. Federal funding limit of \$5 million. Designed to modify existing Corps projects for the purpose of improving environmental quality.

Federal Energy Regulatory Commission (FERC)

Regulates dams that generate electric hydropower.

U.S. Geologic Survey (USGS)

Excellent source of natural disaster information (earthquakes, drought, floods, etc.).

Real-Time Data for North Dakota Streamflow

Users can select data from multiple sites using a broad set of filters, such as by State, county, watershed and a latitude/longitude box. This new web service can benefit users with programs that download tab-delimited real-time data from 138 gauges.

These data are also available in coordination with NWS-AHPS and the Corps of Engineers websites, although USGS quality assures and maintains the data.

WaterWatch

The site displays maps, graphs, and tables describing real-time, recent, and past streamflow conditions for the United States. The real-time information generally is updated on an hourly basis. The stream gage-

based maps show conditions for real-time, average daily, and 7-day average stream flow. The real-time streamflow maps highlight flood and high flow conditions. WaterWatch also includes tables of current streamflow information and locations of flooding.

Flood Watch

In coordination with USGS's WaterWatch Web site, the state map shows the location of stream gages where the water level is above flood or at high flow. High flow conditions are expressed as percentiles that compare the current (i.e., within the past several hours) instantaneous flow value to historical daily mean flow values for all days of the year.

Water Alert

The U.S. Geological Survey WaterAlert service sends e-mail or text messages when certain parameters measured by a USGS data-collection station exceed user-definable thresholds.

StreamStats

A Web-based Geographic Information System (GIS) that provides users with access to an assortment of analytical tools that are useful for water-resources planning and management, and for engineering design applications.

USGS Programs in North Dakota

Details USGS activities in North Dakota.

Earthquake Hazards Program

Up- to-date information on world seismicity.

U.S. Department of Housing and Urban Development (HUD)

Community Development Block Grants

Disaster grants are used to rebuild resilient communities after a disaster.

Disaster Recovery Assistance

Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes.

Neighborhood Stabilization Program

Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis.

U.S. Department of Transportation (DOT)

Federal Highway Administration (FHWA)

Provides funding for mitigation activities such as snow fences and living snow fences as part of construction funding

U.S. Small Business Administration (SBA)

Provides training and advocacy for small firms.

Catalog of Federal Domestic Assistance (CFDA)

It provides a full listing of all Federal programs available to State and local governments; federally recognized Indian tribal governments; domestic public, quasi- public, and private profit and nonprofit organizations and institutions; specialized groups; and individuals.

State Agencies and Programs

This section is an inventory of State programs that are important to mitigation efforts statewide. Additional information for agencies with programs that may assist in mitigation efforts is listed. A brief description of each program follows, as does funding information.

North Dakota Department of Agriculture (NDDA)

Responsible for the regulation of pesticides, fertilizers, food safety and feed including emergency response, state Superfund authority and financial assistance for agricultural entities.

North Dakota Department of Economic Development

To advance the economic vitality of North Dakota through trade and economic development, including the provision of employer and labor market information.

North Dakota Management & Budget (MMB)

Expedite fiscal management during a state disaster. Assist with funding issues when federal assistance is not provided.

North Dakota Department of Health (NDDH)

Detailed information on services and current events affecting the citizens of North Dakota.

North Dakota's State Historic Preservation Office (SHPO)

Review and Compliance: The SHPO consults with federal and state government agencies to identify historic properties in government project areas and advise on ways to avoid or reduce adverse effects on those properties.

North Dakota Housing Finance Agency (NDHFA)

Provides low- and moderate-income housing and resources.

North Dakota Department of Human Services (DHS)

Provides health care, economic assistance, and other services for those in need.

FireWise in North Dakota

The North Dakota FireWise Project is working with local communities by passing federal Fire Plan funds through to local communities as grants for various "on-the-ground" activities including homeowner, mitigation education, home site assessment, access improvement, and dry hydrants. It involves community groups including fire and emergency services, local schools, city staff (i.e. foresters, planners), and local interest groups.

North Dakota State Climatology Office

The State Climatology Office workgroups exist to study and describe the climate of North Dakota. Each of its members concentrates its efforts on specific topical areas in which climate plays a significant role.

North Dakota Office of the State Archaeologist

Conduct research into the prehistoric and historic archaeology of North Dakota.

North Dakota Department of Transportation (NDOT)

Comprehensive transportation issues in North Dakota.

North Dakota State University (NDSU)

North Dakota State University's mission of education, research, and public engagement

Other Organizations

The following is a list of associations and organizations that may fund, educate or in some way assist mitigation in the state. The list is a resource for local mitigation planners and has been utilized by the state in the update of this Plan.

American Red Cross

Provide relief to victims of disasters and help people prevent, prepare for, and respond to emergencies.

American Water Works Association

Information on safe water resources.

League of North Dakota Cities

A membership organization dedicated to promoting excellence in local government. The League serves its more than 800 member cities through advocacy, education and training, policy development, risk management, and other services.

Association of North Dakota Counties

A broad range of services to its members, including education, communications, and intergovernmental relations. AMC works closely with the legislative and administrative branches of government in seeing that legislation and policies favorable to counties are enacted.

Association of State Dam Safety Officials

General Information about dams and dam safety in the US.

Mid-America Earthquake Center (MAE)

One of three national earthquake engineering research centers established by the National Science Foundation.

North Dakota Geological Survey (NDGS)

The University outreach center for the science and technology of earth resources in North Dakota.

North Dakota Association of Watershed Districts (MAWD)

Provides educational opportunities, information and training for watershed district managers and staff through yearly tours, meetings and quarterly newsletters.

North Dakota Association of Soil and Water Conservation Districts (MASWCD)

Provide voluntary, incentive-driven approaches to landowners for better soil and cleaner water. Provide private landowners with technical assistance to implement a wide variety of conservation practices.

North Dakota Independent Insurance Agents

See calendar for NFIP training.

National Association of Counties (NACO)

NACO is the only nation-wide organization representing county governments.

North Dakota Natural Resource Conservation Service

Locally based NRCS staff work directly with farmers, ranchers, and others, to provide technical and financial conservation assistance.

National Drought Mitigation Center

Information on drought preparation and risk management.

National Emergency Management Association (NEMA)

NEMA is the professional association of state, pacific, and Caribbean insular state emergency management directors.

Natural Hazard Mitigation Association

NHMA is an association for those in the hazard mitigation profession by offering a workshop and bringing expertise and experience to organizations, communities or regions with mitigation planning, training, outreach and implementation.

Appendix B: Historical Storm Event Data

This data was obtained from the NOAA National Centers for Environmental Information Storm Events Database from January 1, 1964 to December 31, 2015 for Traill County.

Table B.1 Historical Flood Events for Traill County

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	11.203M	1.050M
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/10/1996	13:00	CST	Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/10/1996	13:00	CST	Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/10/1996	13:00	CST	Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/03/1997	00:00	CST	Flood		0	0	500.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/17/1997	00:00	CST	Flood		0	0	10.000M	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	06/12/2000	23:30	CST	Flood		0	0	0.00K	1.000M
MAYVILLE	TRAILL CO.	ND	06/19/2000	19:00	CST	Flash Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/07/2001	00:00	CST	Flood		0	0	500.00K	0.00K
HILLSBORO	TRAILL CO.	ND	05/06/2001	16:30	CST	Flash Flood		0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/19/2001	00:00	CST	Flash Flood		0	0	0.50K	0.00K
MAYVILLE	TRAILL CO.	ND	07/09/2002	23:07	CST	Flash Flood		0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/09/2002	23:07	CST	Flash Flood		0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/09/2002	23:07	CST	Flash Flood		0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/09/2002	23:30	CST	Flash Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	07/10/2002	01:08	CST	Flood		0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	08/08/2002	19:45	CST	Flash Flood		0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	08/31/2002	02:00	CST	Flash Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/28/2004	15:50	CST	Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/01/2004	00:00	CST	Flood		0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/11/2005	19:30	CST	Flash Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	06/12/2005	04:48	CST	Flood		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	06/13/2005	20:50	CST	Flood		0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	09/09/2005	10:05	CST	Flash Flood		0	0	0.00K	0.00K
COUNTYWIDE	TRAILL CO.	ND	03/30/2006	00:00	CST	Flood		0	0	0.00K	0.00K
COUNTYWIDE	TRAILL CO.	ND	04/01/2006	00:00	CST	Flood		0	0	177.00K	0.00K
HATTON	TRAILL CO.	ND	03/22/2009	11:15	CST-6	Flood		0	0	5.00K	0.00K
HATTON	TRAILL CO.	ND	04/01/2009	00:00	CST-6	Flood		0	0	5.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/27/2009	00:00	CST-6	Flash Flood		0	0	10.00K	50.00K
HATTON	TRAILL CO.	ND	03/18/2010	10:48	CST-6	Flood		0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	04/08/2011	09:51	CST-6	Flood		0	0	0.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
BUXTON	TRAILL CO.	ND	04/28/2013	18:24	CST-6	Flood		0	0	5.00K	0.00K
Totals:								0	0	11.203M	1.050M

Table B.2 Historical Severe Summer Weather for Traill County (Hail, Thunderstorm Wind, Lightning, Extreme Heat, Tornado)

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	1	3.236M	32.710M
TRAILL CO.	TRAILL CO.	ND	06/26/1965	12:20	CST	Tornado	F2	0	0	250.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/05/1966	18:31	CST	Tornado		0	0	25.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/06/1969	09:45	CST	Hail	1.00 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/16/1973	18:15	CST	Tornado	F3	0	0	250.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/16/1973	18:15	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/03/1974	19:25	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/20/1974	05:50	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/20/1974	20:35	CST	Tornado	F2	0	0	250.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/27/1977	18:15	CST	Hail	1.50 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/27/1977	18:15	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/10/1978	18:20	CST	Hail	1.00 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	05/26/1980	19:50	CST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	05/26/1980	19:50	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	05/28/1980	20:10	CST	Tornado	F1	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/29/1980	05:30	CST	Hail	2.50 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/30/1981	21:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/04/1982	19:40	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/04/1982	19:40	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/22/1983	01:26	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/22/1983	01:40	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/22/1983	01:55	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K

TRAILL CO.	TRAILL CO.	ND	08/18/1983	21:20	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/24/1983	20:25	CST	Thunderstorm Wind	64 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/24/1983	20:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	09/02/1983	18:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/07/1984	10:15	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/16/1985	20:30	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/16/1985	20:36	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	05/11/1986	22:31	CST	Tornado	F1	0	0	25.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/26/1986	20:45	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/21/1987	16:30	CST	Hail	2.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/21/1987	16:45	CST	Tornado	F0	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/21/1987	18:30	CST	Hail	2.50 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/21/1987	19:15	CST	Thunderstorm Wind	57 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/21/1987	21:30	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/21/1987	22:20	CST	Thunderstorm Wind	61 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/22/1987	00:00	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/18/1988	18:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/18/1988	18:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/10/1988	22:02	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/10/1988	23:10	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	06/11/1990	19:50	CST	Hail	0.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/25/1990	16:20	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	05/14/1991	22:50	CST	Hail	0.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/09/1992	15:30	CST	Hail	1.00 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/09/1992	16:00	CST	Hail	1.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	07/14/1992	20:55	CST	Hail	0.75 in.	0	0	0.00K	0.00K
TRAILL CO.	TRAILL CO.	ND	08/22/1992	20:55	PST	Thunderstorm Wind	58 kts.	0	0	0.00K	0.00K

Clifford	TRAILL CO.	ND	07/04/1994	06:44	CST	Thunderstorm Wind	52 kts.	0	0	5.00K	0.00K
Portland	TRAILL CO.	ND	08/06/1994	22:35	CST	Thunderstorm Wind	65 kts.	0	0	0.00K	0.00K
Mayville	TRAILL CO.	ND	08/06/1994	23:10	CST	Thunderstorm Wind	70 kts.	0	0	20.00K	0.00K
PORTLAND	TRAILL CO.	ND	06/27/1997	22:30	CST	Hail	1.00 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/27/1997	23:20	CST	Hail	0.75 in.	0	0	0.00K	0.00K
PORTLAND	TRAILL CO.	ND	08/02/1997	21:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	10/08/1997	14:50	CST	Thunderstorm Wind		0	0	1.00K	0.00K
GALESBURG	TRAILL CO.	ND	06/10/1998	19:35	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	06/18/1998	18:08	CST	Tornado	F0	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/04/1999	00:20	CST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/09/1999	04:00	CST	Thunderstorm Wind		0	0	0.50K	0.00K
HILLSBORO	TRAILL CO.	ND	06/25/1999	23:30	CST	Thunderstorm Wind		0	0	10.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/08/1999	08:15	CST	Thunderstorm Wind	87 kts.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/08/1999	08:15	CST	Thunderstorm Wind		0	0	5.00K	0.00K
BUXTON	TRAILL CO.	ND	07/12/1999	20:08	CST	Hail	1.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/12/1999	20:18	CST	Hail	0.88 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/07/2000	11:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/14/2000	07:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	08/14/2000	08:30	CST	Hail	0.88 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	08/30/2000	21:30	CST	Lightning		0	0	10.00K	0.00K
TAFT	TRAILL CO.	ND	06/11/2001	11:15	CST	Thunderstorm Wind		0	0	15.00K	0.00K
HATTON	TRAILL CO.	ND	06/20/2001	13:45	CST	Hail	1.00 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/20/2001	14:20	CST	Tornado	F0	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/20/2001	14:35	CST	Tornado	F0	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/20/2001	14:41	CST	Tornado	F0	0	0	0.00K	0.00K
CUMMINGS	TRAILL CO.	ND	06/20/2001	14:43	CST	Hail	1.00 in.	0	0	0.00K	30.000M
CLIFFORD	TRAILL CO.	ND	07/17/2001	16:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	07/17/2001	16:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/17/2001	17:06	CST	Hail	0.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/18/2001	23:30	CST	Thunderstorm		0	0	2.00K	0.00K

						Wind					
BUXTON	TRAILL CO.	ND	07/18/2001	23:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	07/21/2001	03:00	CST	Thunderstorm Wind		0	0	1.00K	0.00K
BUXTON	TRAILL CO.	ND	07/31/2001	02:55	CST	Thunderstorm Wind		0	0	0.50K	0.00K
HATTON	TRAILL CO.	ND	07/31/2001	10:08	CST	Thunderstorm Wind		0	0	0.50K	0.00K
CLIFFORD	TRAILL CO.	ND	08/08/2001	00:15	CST	Thunderstorm Wind		0	0	100.00K	0.00K
MAYVILLE	TRAILL CO.	ND	08/08/2001	00:15	CST	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	08/08/2001	00:15	CST	Thunderstorm Wind		0	0	20.00K	0.00K
CLIFFORD	TRAILL CO.	ND	08/08/2001	00:15	CST	Thunderstorm Wind		0	0	15.00K	0.00K
MAYVILLE	TRAILL CO.	ND	08/08/2001	00:15	CST	Thunderstorm Wind		0	0	10.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/08/2001	00:18	CST	Thunderstorm Wind		0	0	15.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/08/2001	00:20	CST	Thunderstorm Wind		0	0	20.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/08/2001	00:20	CST	Thunderstorm Wind	96 kts. M	0	0	1.000M	0.00K
HILLSBORO	TRAILL CO.	ND	08/08/2001	00:20	CST	Thunderstorm Wind		0	0	20.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/08/2001	00:20	CST	Thunderstorm Wind		0	0	150.00K	0.00K
CUMMINGS	TRAILL CO.	ND	08/08/2001	00:20	CST	Thunderstorm Wind		0	0	20.00K	0.00K
CALEDONIA	TRAILL CO.	ND	08/08/2001	00:22	CST	Thunderstorm Wind		0	0	15.00K	0.00K
CUMMINGS	TRAILL CO.	ND	08/08/2001	20:05	CST	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/17/2001	15:20	CST	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/17/2001	15:40	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	09/06/2001	15:40	CST	Hail	0.88 in.	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	09/06/2001	17:00	CST	Hail	0.75 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/08/2002	23:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/25/2002	14:18	CST	Hail	1.00 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/25/2002	14:22	CST	Hail	0.75 in.	0	0	0.00K	0.00K

REYNOLDS	TRAILL CO.	ND	06/25/2002	14:45	CST	Hail	1.50 in.	0	0	0.00K	0.00K
PORTLAND	TRAILL CO.	ND	08/08/2002	16:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	08/08/2002	17:15	CST	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
PORTLAND	TRAILL CO.	ND	08/08/2002	18:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
CUMMINGS	TRAILL CO.	ND	08/08/2002	18:55	CST	Tornado	F1	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	08/08/2002	19:15	CST	Thunderstorm Wind		0	0	5.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/11/2002	18:14	CST	Thunderstorm Wind	58 kts. E	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	08/30/2002	23:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/31/2002	01:15	CST	Hail	1.00 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	08/31/2002	22:40	CST	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	06/06/2003	12:15	CST	Hail	0.75 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/17/2003	13:32	CST	Hail	1.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/24/2003	22:32	CST	Thunderstorm Wind	80 kts. EG	0	0	100.00K	0.00K
MAYVILLE	TRAILL CO.	ND	07/13/2003	21:03	CST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	07/13/2003	21:05	CST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/14/2003	21:10	CST	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	07/19/2003	20:30	CST	Hail	1.50 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	07/19/2003	20:45	CST	Hail	0.88 in.	0	0	0.00K	0.00K
BLANCHARD	TRAILL CO.	ND	05/11/2004	16:30	CST	Hail	1.00 in.	0	0	0.00K	0.00K
BLANCHARD	TRAILL CO.	ND	05/11/2004	20:10	CST	Hail	1.00 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	05/11/2004	20:25	CST	Hail	1.75 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	05/11/2004	21:26	CST	Hail	1.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	05/11/2004	21:43	CST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BLANCHARD	TRAILL CO.	ND	05/11/2004	22:25	CST	Hail	1.00 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/23/2004	10:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/23/2004	10:55	CST	Hail	0.75 in.	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	07/12/2004	03:40	CST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/18/2004	18:48	CST	Tornado	F0	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	08/24/2004	00:40	CST	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K

REYNOLDS	TRAILL CO.	ND	08/25/2004	22:25	CST	Hail	0.75 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	08/29/2004	16:20	CST	Hail	1.00 in.	0	0	0.00K	0.00K
CUMMINGS	TRAILL CO.	ND	08/29/2004	16:25	CST	Hail	2.00 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	05/20/2005	15:33	CST	Tornado	F0	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	05/20/2005	15:45	CST	Hail	1.00 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/02/2005	06:15	CST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/11/2005	17:48	CST	Tornado	F0	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/11/2005	17:52	CST	Tornado	F0	0	0	0.00K	0.00K
ROSEVILLE	TRAILL CO.	ND	06/23/2005	16:21	CST	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/23/2005	17:00	CST	Hail	1.00 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	06/27/2005	00:00	CST	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/27/2005	00:12	CST	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/27/2005	00:20	CST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	07/03/2005	01:30	CST	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/03/2005	01:55	CST	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	07/14/2005	21:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/14/2005	22:00	CST	Lightning		0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/25/2005	11:58	CST	Hail	0.75 in.	0	0	0.00K	0.00K
ROSEVILLE	TRAILL CO.	ND	09/05/2005	15:15	CST	Hail	0.88 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	09/05/2005	17:26	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	09/09/2005	09:10	CST	Hail	0.88 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	09/09/2005	09:50	CST	Hail	0.75 in.	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/05/2006	18:30	CST	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/26/2006	12:21	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/26/2006	12:45	CST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	08/10/2006	14:00	CST	Hail	0.75 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	08/10/2006	14:00	CST	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	08/22/2006	21:58	CST	Hail	1.25 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	08/22/2006	22:35	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	05/18/2007	22:22	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K

KELSO	TRAILL CO.	ND	06/17/2007	22:47	CST-6	Thunderstorm Wind	75 kts. EG	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	07/15/2007	17:50	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	07/15/2007	19:25	CST-6	Thunderstorm Wind	70 kts. EG	0	0	100.00K	0.00K
BLANCHARD	TRAILL CO.	ND	07/15/2007	19:30	CST-6	Thunderstorm Wind	70 kts. EG	0	0	100.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/15/2007	19:30	CST-6	Hail	2.00 in.	0	0	200.00K	2.000M
BLANCHARD	TRAILL CO.	ND	07/15/2007	19:45	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	07/22/2007	09:50	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	08/13/2007	15:25	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	08/13/2007	15:36	CST-6	Hail	1.50 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	08/13/2007	15:44	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	08/26/2007	21:45	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	08/26/2007	22:07	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	10/07/2007	00:05	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	06/14/2008	15:45	CST-6	Thunderstorm Wind	55 kts. EG	0	0	20.00K	0.00K
HATTON	TRAILL CO.	ND	06/14/2008	18:50	CST-6	Thunderstorm Wind	50 kts. EG	0	0	30.00K	200.00K
MAYVILLE ARPT	TRAILL CO.	ND	06/14/2008	18:55	CST-6	Thunderstorm Wind	90 kts. MG	0	0	200.00K	500.00K
MAYVILLE	TRAILL CO.	ND	06/14/2008	19:00	CST-6	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	06/14/2008	19:09	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MAYVILLE ARPT	TRAILL CO.	ND	07/07/2008	17:10	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
MAYVILLE ARPT	TRAILL CO.	ND	07/28/2008	23:26	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/28/2008	23:40	CST-6	Thunderstorm Wind	55 kts. EG	0	0	50.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/28/2008	23:45	CST-6	Thunderstorm	56 kts.	0	0	0.00K	10.00K

					6	Wind	EG				
BUXTON	TRAILL CO.	ND	06/26/2009	19:35	CST-6	Tornado	EF1	0	0	150.00K	0.00K
BUXTON	TRAILL CO.	ND	06/26/2009	20:12	CST-6	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	06/26/2009	20:12	CST-6	Tornado	EF0	0	0	5.00K	0.00K
BUXTON	TRAILL CO.	ND	06/26/2009	20:14	CST-6	Thunderstorm Wind	59 kts. MG	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/26/2009	20:50	CST-6	Tornado	EF0	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/20/2009	05:15	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/23/2009	20:40	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
PORTLAND	TRAILL CO.	ND	05/24/2010	17:00	CST-6	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
CUMMINGS	TRAILL CO.	ND	05/24/2010	17:45	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	06/08/2010	16:05	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/08/2010	16:35	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	06/08/2010	16:45	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	06/17/2010	14:49	CST-6	Tornado	EF4	0	1	0.00K	0.00K
KELSO	TRAILL CO.	ND	05/30/2011	20:29	CST-6	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	05/30/2011	21:02	CST-6	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/04/2011	19:32	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/04/2011	20:15	CST-6	Tornado	EF1	0	0	20.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	07/16/2011	12:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/23/2011	02:20	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/23/2011	02:29	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	08/01/2011	02:05	CST-6	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K

CLIFFORD	TRAILL CO.	ND	08/04/2011	18:20	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	08/11/2011	14:08	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/07/2012	17:29	CST-6	Hail	1.25 in.	0	0	0.00K	0.00K
MAYVILLE	TRAILL CO.	ND	06/07/2012	17:50	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/19/2012	17:30	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/19/2012	17:35	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/19/2012	17:50	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/20/2013	16:45	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/20/2013	16:50	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BLANCHARD	TRAILL CO.	ND	06/20/2013	17:05	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	06/20/2013	17:40	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/26/2013	00:00	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/21/2013	22:37	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	07/21/2013	22:40	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	07/21/2013	22:40	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	07/21/2013	23:00	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	06/21/2014	15:00	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
GALESBURG	TRAILL CO.	ND	06/21/2014	15:00	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
ALTON	TRAILL CO.	ND	06/21/2014	15:10	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	06/21/2014	15:30	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	06/21/2014	15:30	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/21/2014	15:44	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K

					6						
HILLSBORO	TRAILL CO.	ND	06/21/2014	18:44	CST-6	Hail	1.75 in.	0	0	0.00K	0.00K
HILLSBORO ARPT	TRAILL CO.	ND	06/21/2014	18:55	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
CALEDONIA	TRAILL CO.	ND	06/21/2014	19:00	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BUXTON	TRAILL CO.	ND	06/28/2014	12:32	CST-6	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
VOLGA	TRAILL CO.	ND	07/05/2014	22:25	CST-6	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/05/2014	22:35	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HATTON	TRAILL CO.	ND	07/21/2014	19:25	CST-6	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
HILLSBORO	TRAILL CO.	ND	07/21/2014	19:40	CST-6	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
KELSO	TRAILL CO.	ND	07/21/2014	19:49	CST-6	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
REYNOLDS	TRAILL CO.	ND	09/20/2014	11:50	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MURRAY	TRAILL CO.	ND	06/24/2015	15:50	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	06/24/2015	16:03	CST-6	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
CLIFFORD	TRAILL CO.	ND	06/27/2015	17:00	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	07/12/2015	15:07	CST-6	Tornado	EF0	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	07/23/2015	22:50	CST-6	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K
PORTLAND JCT	TRAILL CO.	ND	07/23/2015	22:51	CST-6	Tornado	EF1	0	0	0.00K	0.00K
TAFT	TRAILL CO.	ND	07/23/2015	23:00	CST-6	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
Totals:								0	1	3.236M	32.710M

B.3 Historical Severe Winter Weather for Traill County (Blizzards, Heavy Snow, Ice Storms, Extreme Cold)

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	12.003M	0.00K
TRAILL	TRAILL	ND	01/17/1996	04:30	CST	Blizzard		0	0	0.00K	0.00K

(ZONE)	(ZONE)										
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/17/1996	14:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/10/1996	02:30	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/10/1996	10:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/22/1996	12:30	CST	Ice Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/22/1996	12:30	CST	Ice Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/26/1996	21:30	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/27/1996	10:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/23/1996	19:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/23/1996	19:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/16/1996	16:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/20/1996	06:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/17/1996	01:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/31/1996	12:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/04/1997	18:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/09/1997	14:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/15/1997	09:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/21/1997	22:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/30/1997	19:00	CST	Ice Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/03/1997	02:00	CST	Heavy Snow		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/04/1997	02:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/04/1997	10:00	CST	Ice Storm		0	0	6.000M	0.00K

TRAILL (ZONE)	TRAILL (ZONE)	ND	04/05/1997	14:30	CST	Blizzard		0	0	6.000M	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/27/1998	15:30	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/13/1998	09:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/10/1998	05:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/18/1998	06:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/18/1998	12:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/13/1999	09:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/01/1999	09:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/03/1999	13:00	CST	Ice Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/08/2000	11:00	CST	Ice Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/13/2000	23:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/06/2000	16:00	CST	Winter Storm		0	0	2.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/19/2000	09:03	CST	Blizzard		0	0	1.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/16/2000	09:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/20/2000	11:47	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/27/2000	22:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/23/2001	18:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/24/2001	23:08	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	10/24/2001	09:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/05/2001	07:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/22/2001	12:29	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/07/2002	13:17	CST	Heavy Snow		0	0	0.00K	0.00K

(ZONE)	(ZONE)										
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/08/2002	15:35	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/11/2003	09:55	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/15/2003	11:05	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/24/2004	15:25	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/01/2004	10:04	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/11/2004	21:20	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/29/2004	15:30	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/31/2004	15:35	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/01/2005	00:00	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/21/2005	04:20	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	11/27/2005	12:29	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/24/2006	09:00	CST	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/24/2006	07:58	CST	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/30/2006	04:46	CST-6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/12/2007	03:09	CST-6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/03/2007	04:47	CST-6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/24/2007	09:30	CST-6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/28/2007	04:00	CST-6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/01/2007	00:00	CST-6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/04/2007	07:38	CST-6	Heavy Snow		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/17/2008	21:00	CST-6	Extreme Cold/wind Chill		0	0	0.00K	0.00K

TRAILL (ZONE)	TRAILL (ZONE)	ND	01/29/2008	06:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/09/2008	08:27	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/09/2008	18:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/19/2008	10:13	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/13/2008	04:03	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/15/2008	04:01	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/19/2008	14:20	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/20/2008	15:18	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/04/2009	04:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/08/2009	15:44	CST- 6	Ice Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/09/2009	14:56	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/24/2009	18:16	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/31/2009	03:11	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/23/2009	04:10	CST- 6	Heavy Snow		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/24/2009	10:51	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/07/2010	15:11	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/22/2010	04:43	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/25/2010	04:19	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/06/2010	15:52	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/19/2010	14:46	CST- 6	Heavy Snow		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/30/2010	12:16	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/31/2010	04:20	CST- 6	Blizzard		0	0	0.00K	0.00K

(ZONE)	(ZONE)				6						
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/01/2011	00:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/01/2011	21:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/08/2011	03:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/11/2011	20:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/22/2011	12:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/15/2011	09:29	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/18/2012	18:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/10/2012	02:45	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/25/2012	21:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	10/04/2012	00:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/11/2013	18:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/19/2013	12:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/20/2013	18:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/10/2013	06:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/18/2013	00:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/04/2013	01:00	CST- 6	Heavy Snow		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/17/2013	16:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/17/2013	21:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/14/2013	10:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/03/2013	04:54	CST- 6	Winter Storm		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/06/2013	15:29	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K

TRAILL (ZONE)	TRAILL (ZONE)	ND	12/28/2013	13:57	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/28/2013	21:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/03/2014	19:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/04/2014	18:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/16/2014	00:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/22/2014	06:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/22/2014	15:38	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/26/2014	06:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/26/2014	22:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/13/2014	08:41	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/26/2014	16:32	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/28/2014	18:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/01/2014	00:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	03/31/2014	00:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	04/01/2014	00:00	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/03/2015	09:35	CST- 6	Blizzard		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/03/2015	14:49	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	01/06/2015	18:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	02/21/2015	21:00	CST- 6	Extreme Cold/wind Chill		0	0	0.00K	0.00K
TRAILL (ZONE)	TRAILL (ZONE)	ND	12/15/2015	18:00	CST- 6	Winter Storm		0	0	0.00K	0.00K
Totals:								0	0	12.003M	0.00K

B.4 Historical Wild Land Fire for Traill County

No events were reported between 01/01/1964 and 12/31/2015 (18,993 days).