## 2022 Northern Cheyenne Tribe

# Hazard Mitigation Plan

**APPROVED**
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Prepared by:

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# CHAPTER 1: INTRODUCTION

## Introduction

Hazard mitigation planning is a process in which hazards are identified and profiled; people and facilities at-risk are identified and assessed for threats and potential vulnerabilities; and strategies and mitigation measures are identified. Hazard mitigation planning increases the ability of communities to effectively function in the face of natural and human-caused disasters. The goal of the process is to reduce risk and vulnerability, in order to lessen impacts to life, the economy, and infrastructure.

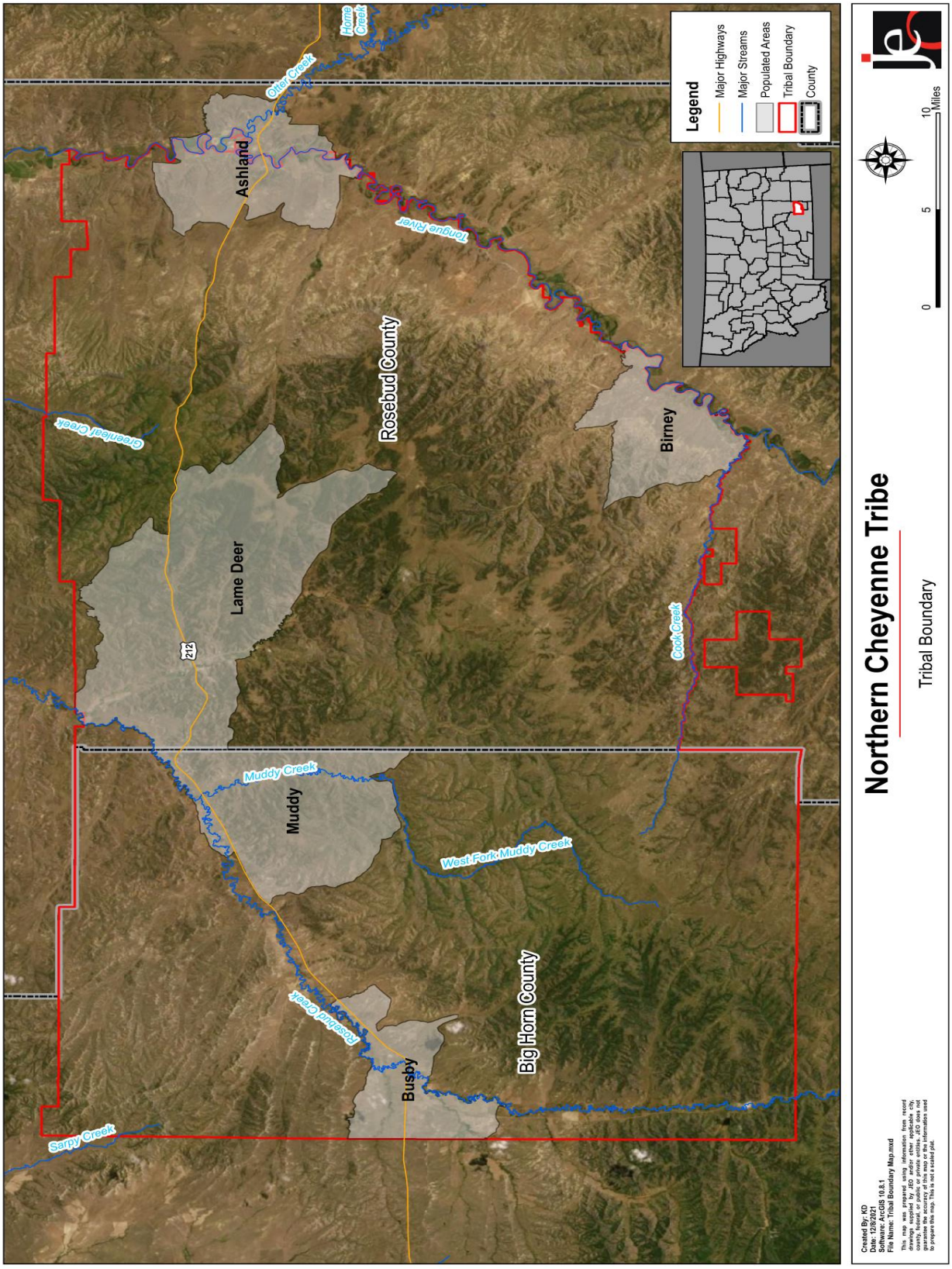
FEMA definition of Hazard Mitigation

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from [natural] hazards."

This plan serves all of the Northern Cheyenne Indian Reservation. For the purpose of this plan, hazard events and regional data is included for Big Horn and Rosebud Counties in southeastern Montana. The Northern Cheyenne Tribe Reservation includes portions of eastern Big Horn County and southwestern Rosebud County. There are no incorporated municipalities on the Reservation. While the Emergency Managers for Big Horn and Rosebud Counties attended meetings and provided local feedback, neither county acted as active participants in this plan update and each maintain their own mitigation plans.

This Northern Cheyenne Tribe Hazard Mitigation Plan was developed in compliance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). For the purpose of this plan, a tribal government is identified according to the 44 Code of Federal Regulations (CFR) 201.2-7. Indian Tribal government means any federally recognized governing body of an Indian or Alaska Native Tribe, band, nation, pueblo, village or community that the Secretary of Interior acknowledges to exist as an Indian Tribe under the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a.

***Figure 1: Tribal Boundary***



## Hazard Mitigation Planning

Hazard events are inevitable; it is just a matter of when they occur and what steps jurisdictions have taken to mitigate the potential impacts. Mitigation reduces risk and is a socially and economically responsible action to prevent long term risks from natural and human-caused hazard events.

> **Mitigation** is the cornerstone of emergency management. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation lessens the impact disasters have on people's lives and property through damage prevention, appropriate development standards, and affordable flood insurance. Through measures such as avoiding building in damage-prone areas, stringent building codes, and floodplain management regulations, the impact on lives and communities is lessened.
>
> - FEMA Mitigation Directorate

Natural hazards as evaluated in this plan, such as drought and extreme heat, earthquakes, flooding, landslides, thunderstorms, tornadoes and high winds, volcanic eruptions, wildfire, and winter storms are part of the world around us. Their occurrence is natural and inevitable, and there is little that can be done to control their force and intensity. Human-caused hazards are a product of human intent, error, or failed human-built systems and can cause significant impacts to the community. Human-caused hazards in this plan include hazardous material spills, public health concerns, terrorism, and dam failure. These hazard events can occur as a part of normal operation or as a result of human error. All communities in the planning area are vulnerable to a wide range of natural and human-caused hazards that threaten the safety of residents and have the potential to damage or destroy both tribal and private property, cause environmental degradation, and disrupt the local economy and overall quality of life.

Northern Cheyenne Tribe (NCT) prepared this tribal hazard mitigation plan in an effort to reduce impacts from natural and human-caused hazards and to better protect the people and property of the region from the effects of hazards. This plan demonstrates the Tribe's commitment to reducing risks from hazards and serves as a tool to help decision makers establish mitigation activities and resources. Furthermore, this plan was developed to make NCT eligible for various federal mitigation funding programs that address natural hazard events and to accomplish the following objectives:

- Minimize the disruption to tribal residents and departments following a disaster.
- Establish actions to reduce or eliminate future damages in order to efficiently recover from disasters.
- Investigate, review, and implement activities or actions to ensure disaster related hazards are addressed by the most efficient and appropriate solution.
- Educate residents about potential hazards.
- Facilitate development and implementation of hazard mitigation management activities to ensure a sustainable tribal reservation.

## Authority

The Northern Cheyenne Tribe operates under a constitution consistent with the Indian Reorganization Act. The Northern Cheyenne Indian Reservation boundaries were established by Executive Order on November 26, 1884 and then extended on March 19, 1990.

Tribal government consists of a Tribal Council (with representation based on population in the various districts), headed by a President, elected at large for a four-year term. The Northern Cheyenne have

elected to submit this plan through the State of Montana's Disaster and Emergency Services Division. Funding for the development of the plan came from the Federal Emergency Management Agency through a Pre-Disaster Mitigation grant. The Northern Cheyenne provided in-kind services to provide the matching contribution for the local share funding.

## Tribal Assurance

The NCT will comply with all applicable Federal statutes and regulations in effect for those periods when the Tribe receives federal grant funding through the Hazard Mitigation Assistance programs as administered by FEMA. The tribal council provides assurance that amendments will be made to the Tribe's currently adopted Hazard Mitigation Plan whenever necessary to reflect changes in local, state, tribal, or federal policies and/or identified updates after a disaster event occurs.

**E1 Element and Requirements §201.7(c)(6):** Does the plan include assurances that the tribal government will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002, and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes?

a. The plan shall include assurances which state that the tribal government will comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding including 2 CFR Parts 200 and 3002. The tribal government will amend its mitigation plan whenever necessary to reflect changes in tribal or federal laws and statutes.

## Disaster Mitigation Act of 2000

The U.S. Congress passed the Disaster Mitigation Act of 2000 to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act[1]. Section 322 of the DMA 2000 requires that state, tribal, and local governments develop, adopt, and routinely update a hazard mitigation plan to remain eligible for pre- and post-disaster mitigation funding.[2] These funds include the Hazard Mitigation Grant Program (HMGP)[3], Building Resilient Infrastructure and Communities (BRIC)[4], and the Flood Mitigation Assistance Program (FMA)[5]. The Federal Emergency Management Agency (FEMA) administers these programs under the Department of Homeland Security (DHS).[6]

This plan was developed in accordance with current state and federal rules and regulations governing tribal hazard mitigation plans. The plan shall be monitored and updated on a routine basis to maintain compliance with the legislation – Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the DMA 2000 (P.L. 106-390)[7] and by FEMA's Final Rule (FR)[8] published in the Federal Register on November 30, 2007, at 44 Code of Federal Regulations

[1] Federal Emergency Management Agency, Public Law 106-390. 2000. "Disaster Mitigation Act of 2000." Last modified September 26, 2013. https://www.fema.gov/media-library/assets/documents/4596.

[2] Federal Emergency Management Agency. June 2007. "Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and Related Authorities." Federal Emergency Management Agency 592: 22. Sec. 322. Mitigation Planning (42 U.S.C. 5165). https://www.fema.gov/pdf/about/stafford_act.pdf.

[3] Federal Emergency Management Agency. "Hazard Mitigation Grant Program." Last modified July 8, 2017. https://www.fema.gov/hazard-mitigation-grant-program.

[4] Federal Emergency Management Agency. "Pre-Disaster Mitigation Grant Program." Last modified July 11, 2017. https://www.fema.gov/pre-disaster-mitigation-grant-program.

[5] Federal Emergency Management Agency. "Flood Mitigation Assistance Grant Program." Last modified July 11, 2017. https://www.fema.gov/flood-mitigation-assistance-grant-program.

[6] Federal Emergency Management Agency. "Hazard Mitigation Assistance." Last modified March 29, 2017. https://www.fema.gov/hazard-mitigation-assistance.

[7] Federal Emergency Management Agency: Federal Register. 2002. "Section 104 of Disaster Mitigation Act 2000: 44 CFR Parts 201 and 206: Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule." https://www.fema.gov/pdf/help/fr02-4321.pdf.

[8] Federal Emergency Management Agency: Federal Register. 2002 "44 CFR Parts 201 and 206: Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule." https://www.fema.gov/pdf/help/fr02-4321.pdf.

(CFR) Part 201.

## Hazard Mitigation Assistance

On June 1, 2009, FEMA initiated the Hazard Mitigation Assistance (HMA) program integration, which aligned certain policies and timelines of the various mitigation programs. These HMA programs present a critical opportunity to minimize the risk to individuals and property from hazards while simultaneously reducing the reliance on federal disaster funds.[i]

Each HMA program was authorized by separate legislative actions, and as such, each program differs slightly in scope and intent. To qualify for post-disaster mitigation funds, tribal jurisdictions must have adopted a mitigation plan that is approved by FEMA.

- **HMGP**: HMGP provides funds to states, territories, Indian tribal governments, local governments, and eligible private non-profits following a presidential disaster declaration. The DMA 2000 authorizes up to seven percent of HMGP funds available to a state after a disaster to be used for the development of state, tribal, and local mitigation plans. HMGP funds are available to any jurisdiction until disaster funds are exhausted.
- **FMA**: This annual grant funds are designated for the reduction of flood risk by implementing projects such as acquisition or elevation of flood-prone homes, or other flood hazard specific mitigation activities. Furthermore, local jurisdictions must be participating entities in the National Flood Insurance Program (NFIP). The goal of FMA is to reduce or eliminate claims under the NFIP.
- **BRIC:** This program replaces the Pre-Disaster Mitigation Program and provides funds on an annual allocation to tribal and state jurisdictions for implementing programs and projects to improve resiliency and local capacity before disaster events. BRIC funds are available to apply for from October through January annually and includes a tribal and state set-aside amount, as well as a nationally competitive program. A specific amount of funding is set aside for each tribe.

## Plan Financing and Preparation

Regarding plan financing and preparation, the Northern Cheyenne Tribe, as a federally recognized Tribe, is an eligible entity which may submit an application for FEMA assistance as either a “sub-applicant” or as an “applicant”. If NCT applies directly to FEMA for funding, they will be classified as an applicant for HMA funding, but if they go through the State of Montana as a pass-through agent, the Tribe will be a sub-applicant. If HMA funding is awarded, the Applicant becomes the “Grantee” and is responsible for managing the grant and complying with program requirements and other applicable federal, state, territorial, tribal, and local laws and regulations.

FEMA typically awards funds to states or tribal applicants, who in-turn provide subawards to local government sub-applicants. If HMA funding is awarded to the Tribe, the sub-applicant becomes the sub-grantee and is responsible for managing the sub-grant and complying with program requirements and other applicable federal, state, territorial, tribal, and local laws and regulation.

The Northern Cheyenne Tribe received a Pre-Disaster Mitigation Grant in 2019 to fund the update of their previously expired Hazard Mitigation Plan. This grant provides up to 75% cost share from FEMA while NCT is responsible for 25% of project cost which was provided through in-kind labor.

## Goals

The planning team identified goals at the Kick-off meeting to help guide and facilitate the update of this Hazard Mitigation Plan. These goals were developed to correspond with the local priorities of the Tribe.

Goal 1: Protect Residents from Hazard Events
Goal 2: Protect Critical Infrastructure and Development in Hazard Areas
Goal 3: Protect and Preserve the Natural Environment and Cultural Resources
Goal 4: Increase Public Awareness and Education about Hazard Events
Goal 5: Support and Improve Tribal Mitigation Capabilities and Relationships
Goal 6: Build Upon and Increase Local Capacity to Respond to Hazard Events
Goal 7: Review, update, and integrate Hazard Mitigation principals into other planning mechanisms, as applicable, to streamline future planning efforts

## Hazard Profiles

The hazard mitigation plan includes a description of the hazards considered, including a risk and vulnerability assessment. Data considered during the risk assessment process includes historic occurrences and recurrence intervals; historic losses (physical and monetary); impacts to the built environment (including privately-owned structures as well as critical facilities); and the local risk assessment. The following tables provide an overview of the risk assessment for each hazard and the losses associated with each hazard for the entire planning area.

***Table 1: Hazard Risk Occurrence for NCT***

| HAZARD | | PREVIOUS OCCURRENCE EVENTS | APPROXIMATE ANNUAL PROBABILITY | LIKELY EXTENT |
|---|---|---|---|---|
| **DROUGHT & EXTREME HEAT** | Drought | 527/1,523 months | 33% | Mild Drought (D1) |
| | Extreme Heat | Avg. 3 days per year >90°F | 69/94 = 73% | Temps in excess of 90°F annually |
| **EARTHQUAKES** | | 3 | 3/32 = 9% | ~2.0-3.0 magnitude |
| **FLOODING** | Flood | 24 | 14/26 = 54% | Inundation of structures and roads near streams likely. Some evacuations of people may be necessary. Moderate flooding extent anticipated. |
| | Flash Flood | 28 | | |
| **HAZARDOUS MATERIALS** | Fixed Site | 1 | 1/32 = 3% | Localize to the facilities and adjacent surroundings |
| | Transportation | 1 | 1/51 = 2% | Limited (<0.5 mile) from release site, anticipated highway closures |
| **LANDSLIDES** | | 0 | Unknown | Risk to rural homes, transportation corridors, and businesses near slopes |
| **PUBLIC HEALTH CONCERNS** | Agricultural Disease | 35 Plant Disease; 8 Animal Disease | 15/22 = 68% 13/13 = 100% | Unknown for plant disease. Avg. 7 animals per outbreak. |

| HAZARD | | PREVIOUS OCCURRENCE EVENTS | APPROXIMATE ANNUAL PROBABILITY | LIKELY EXTENT |
|---|---|---|---|---|
| | Water Quality | Unavailable | Unavailable | May range from single wells to whole drainage basin |
| | Public Health | >1 | Unknown | Varies by event; >1 injury of fatality |
| THUNDER-STORMS | Hail | 488 | 26/26 = 100% | Range 0.75”-4.0”<br>Avg. 1.14” |
| | Heavy Rain | 8 | 3/26 = 12% | Inundation of some structures, overwhelmed stormwater system |
| | Lightning | 3 | 3/26 = 12% | Damaged property, trees; Wildfire ignitions |
| | Thunderstorm Wind | 279 | 24/26 = 92% | Range 50-100mph<br>Avg. 59 mph |
| TERRORISM | | 0 | <1% | Varies by event. |
| TORNADOES & HIGH WINDS | High Winds | 124 | 22/26 = 84% | Level 9 BWR () |
| | Tornadoes | 7 | 4/26 = 15% | EF0 |
| VOLCANIC ERUPTIONS | | 0 | Unknown | Moderate to Significant ashfall (300-1,000mm) |
| WILDFIRE | | 34 | 4/14 = 29% Likely | Avg. fire >12,000 acres; Moderate risk to homes and structures threatened or at risk |
| WINTER STORMS | Blizzards | 32 | 6/26 = 23% | .5 - 1.5” ice<br>20-40°below zero (wind chills)<br>6-10” snow<br>25-40 mph winds |
| | Extreme Cold | 4 | 1/26 = | |
| | Heavy Snow | 80 | 16/26 = 62% | |
| | Ice Storm | 4 | 3/26 = 12% | |
| | Winter Storms | 131 | 15/26 = 58% | |
| | Winter Weather | 5 | 4/26 = 15% | |

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# CHAPTER 2: PLANNING PROCESS

## Introduction

The process utilized to develop a hazard mitigation plan is as important as the final planning document. For this planning process, NCT adapted the four-step hazard mitigation planning process outlined by FEMA to fit the needs of the participating jurisdictions. The following pages will outline how the planning process was established; who was involved; critical project meetings and community representatives; outreach efforts to the general public; key stakeholders and neighboring jurisdictions; general information relative to the risk assessment process; general information relative to local/regional capabilities; plan review and adoption; and ongoing plan maintenance.

**A1 Element and Requirements §201.7(c)(1):** Does the plan document the planning process, including how it was prepared and who was involved in the process?

a. The plan shall document how the plan was prepared, including the schedule or timeframe and the activities that made up the plan's development.
b. The plan shall document who was involved on the planning team, including each person's position or title and department/agency.

## Single-Jurisdictional Approach

In many cases, a multi-jurisdictional approach through the cooperation of counties, communities, and regional emergency management can be used to develop and produce a Hazard Mitigation Plan. However, the Northern Cheyenne Tribe maintains its own individual and autonomous Hazard Mitigation Plan. By acting as the sole participant in their plan, the Tribe has provided an opportunity for a more in-depth review of tribal specific hazards of concern and current capabilities. Furthermore, a single jurisdictional plan allows for sole discretion and autonomy in how the tribal nation will conduct its planning process.

Single jurisdictional plans must still meet the requirements of Title 44 Part 201, Mitigation Planning in the CFR. The term "jurisdiction" means local government and the CFR defines a 'local government' as "any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; **any Indian tribe or authorized tribal organization**, any rural community, unincorporated town or village, or other public entity."

This planning process was guided by multiple resources available including, but not limited to, the Local Mitigation Plan Review Guide[9], Local Mitigation Planning Handbook[10], Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards[11], Tribal Mitigation Planning Handbook[12], and the Mitigation Action Plan Portfolio[13] to develop this plan.

9 Federal Emergency Management Agency. 2011. "Local Mitigation Plan Review Guide." https://www.fema.gov/media-library-data/20130726-1809-25045-7498/plan_review_guide_final_9_30_11.pdf.
10 Federal Emergency Management Agency. 2013. "Local Mitigation Planning Handbook." https://www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf.
11 Federal Emergency Management Agency. 2013. "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards." https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema_mitigation_ideas_final508.pdf.
12 Federal Emergency Management Agency. 2019. "Tribal Mitigation Planning Handbook." https://www.fema.gov/sites/default/files/2020-06/fema-tribal-planning-handbook_05-2019.pdf.
13 Federal Emergency Management Agency. 2020. "Hazard Mitigation Assistance Mitigation Action Portfolio." https://www.fema.gov/sites/default/files/documents/feam_fy21-bric-mitigation-action-portfolio.pdf.

As a Tribal entity, this plan was developed to meet the requirements of Title 44 CFR 201.7, Tribal Mitigation Planning for a Standard Tribal Mitigation Plan. Throughout the development of this plan, the Tribal Mitigation Plan Review Guide[14,15] was reviewed to ensure consistency with FEMA requirements. These tribal planning requirements included, but are not limited to:

- Planning Process
    - An inclusive planning process which brings together tribal leaders, tribal elders, and other partners including the public to discuss and share knowledge and their perception of risk.
    - A discussion of how existing data resources (plans, studies, reports, data, etc.) and other ongoing tribal and federal planning efforts are integrated into the HMP.
- Hazard Identification and Risk Assessment
    - A discussion of natural hazards which impact the planning area and their subsequent effects on the region, which includes previous occurrences and probability for future events.
- Mitigation Strategies
    - A discussion of the tribal government's pre- and post-disaster hazard mitigation policies as well as tribal funding sources for mitigation actions identified in the HMP.
    - Clearly identified goals and an action plan to implement and administer actions identified to reduce long-term vulnerabilities.
- Plan Updates
    - As an update to a previous HMP, revisions must be made to reflect changes in development, progress on mitigation actions, and any changes to priorities for the planning area.
- Assurances and Adoption
    - The tribal government must include assurances to comply with all applicable federal statutes and regulations and provide documentation that the HMP has been adopted by the tribal governing body.

## Hazard Mitigation Planning Process

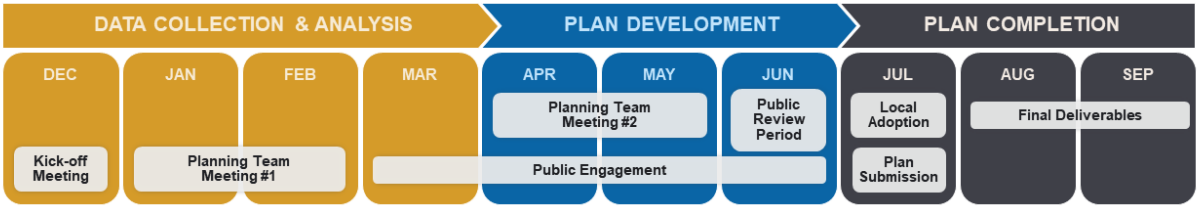
The hazard mitigation planning process as outlined by FEMA has four general steps, which include: organization of resources; assessment of risks; development of mitigation strategies; and implementation and annual monitoring of the plan's progress. The mitigation planning process is rarely a linear process. It is characteristic of the process that ideas developed during the initial assessment of risks may need revision later in the process, or that additional information may be identified while developing the mitigation plan or during the implementation of the plan that results in new goals or additional risk assessments.

The first activity in the development process for the NCT HMP update was coordination of efforts with local, state, and federal agencies and organizations. The NCT Department of Emergency Services served as the primary contact department throughout this planning process. NCT and JEO worked together to identify key tribal officials, departments, and stakeholders to be involved throughout the planning effort. A clear timeline of this plan update process is provided in **Error! Reference source not found.**.

[14] Federal Emergency Management Agency. December 2017. "FEMA Policy: Tribal Mitigation Plan Review Guide." https://www.fema.gov/media-library-data/1513200002073-dfe90940b732a02dafc8fd798aeccf46/Tribal_Mitigation_Plan_Review_Guide_Policy_2017.pdf.

[15] Federal Emergency Management Agency. December 2017. "Tribal Mitigation Plan Review Guide." https://www.fema.gov/media-library-data/1512757722502-00b8f917b23ece763161c14b04d7eae8/Tribal_Mitigation_Plan_Review_Guide_Dec5_2017_508.pdf.

***Figure 2: Project Schedule***




## Planning Team and Involvement

The local Planning Team was comprised of tribal members from a broad range of departments and organizations. Planning Team members were invited to and attended various Planning Team Meetings and contributed to the development of the plan by: developing goals and objectives; identifying key contacts to include in the planning process; identifying and discussing hazards of top concern, including past events and their impacts to the reservation; identifying and prioritizing mitigation actions or projects; providing new data; and by serving as a liaison for the plan to other residents. Members of the Planning Team also served as technical resources for their applicable tribal department and reviewed sections of the draft document for accuracy and completeness. Additional technical support was provided to the Planning Team by staff from FEMA.

In order to be a member of a Planning Team, individuals had to attend at least one meeting with JEO planners. A list of Planning Team members can be found in the table below.

***Table 2: NCT HMP Planning Team Members***

| NAME | TITLE / DEPARTMENT |
|---|---|
| Angel Becker | Disaster and Emergency Services Coordinator |
| Brian Mischel | Big Horn County Emergency Manager |
| Colette Urfer | Northern Cheyenne Tribal Council |
| Debra Charette | Northern Cheyenne Tribal Council |
| Diana Spotted Elk | Northern Cheyenne Tribal Council |
| Dr. David Riley | Director, Strategic Development |
| Emily Alvarez | FEMA - Hazard Mitigation Planning Specialist |
| Henry Speelman | Northern Cheyenne Tribal Council |
| Jennifer Magpie | Indian Health Services |
| Joan Huston | FEMA - Hazard Mitigation Planning Specialist |
| John Grinsell | Criminal Investigator |
| Kirby Small | Criminal Investigator |
| Kyle Alderman | Renewable Energy Manager |
| Lane Spotted Elk | Northern Cheyenne Tribal Council |
| Nathan Moyer | Indian Health Services Safety Officer |
| Nicole Edwards | FEMA - Hazard Mitigation Planning Specialist |
| Nizhoni Friesz | Northern Cheyenne Tribal Council |
| Otto Braided Hail | Northern Cheyenne Tribal Council |
| Randy Elliot | Northern Cheyenne Fire Department |
| Reginald Killsnight | Department of Transportation |
| Rod Trahan | Executive Director Housing Authority |
| Silver Little Eagle | Northern Cheyenne Tribal Council |

| NAME | TITLE / DEPARTMENT |
|---|---|
| Steve Bachini | Indian Health Services Administrator |
| Thedis Crowe | Bureau of Indian Affairs |

Northern Cheyenne Tribe points of contact, FEMA representatives, and JEO staff held several pre-kick off meeting conference calls which were used to discuss key strategies and information to include at the kick-off and Planning Team meetings. Discussion items included identifying stakeholders, departments, and specific staff members to engage in the plan update or invite to meetings; identify dates for the kick-off meeting; and outline engagement strategies.

## *Kick-Off Meeting*

The Tribal HMP Kick-off Meeting was held on December 16, 2021, in Lame Deer. This meeting provided Planning Team members an overview of the planning process and HMP components; open discussion to establish plan goals; define the term "the public" for the purpose of this plan update; identification of hazards to profile; and discussion of roles and responsibilities for planning team members. Departments invited to the kick-off meeting and kick-off meeting attendees are listed in the tables below. Sign-in sheets and other materials can be found in *Appendix A*.

***Table 3: Kick-off Meeting – Invited and Attendees***

| Name or Department Invited | Attended? | Name or Department Invited | Attended? |
|---|---|---|---|
| Angel Becker (DES) | Yes | Kyle Alderman (Renewable Energy Manager) | Yes |
| Benji Headswift (District Representative) | | Lane Spotted Elk (Council) | Yes |
| Brian Mischel (Big Horn County Emergency Management) | Yes | Lisa Shulock (Covenant Solar) | |
| Charlene Alden (Environmental Protection) | | Marcy Cobell (Lame Deer Schools Superintendent) | |
| Colette Urfer (Council) | Yes | Matthew Anderson (Tribal Forestry) | |
| Dana Eaglefeathers (District Representative) | | Melissa Fisher (Council) | |
| David Riley (Covenant Solar) | | Merlin Sioux (District Representative) | |
| Debra Charette (Council) | Yes | Nicole Edwards (FEMA) | Yes |
| Diana Spotted Elk (Council) | Yes | Norma Gourneau (Council) | |
| Donna Fisher (Tribal President) | | Otto Braided Hair (Council) | |
| Donovan Wind (Chief of Police) | | Phillip Beckman (Council) | |
| Edith Cainl (District Representative) | | Randy Elliot (Fire Dept) | Yes |
| Emily Alvarez (FEMA) | Yes | Ron Burns (NCLA) | |
| Ernest Little Mouth (District Representative) | | Ryhal Rowland (District Representative) | |
| Ernestine Spang (Director of Emergency Services) | | Serena Wetherelt (Administration) | |
| Eva Foote (Council) | | Sheldon King (District Representative) | |
| Gwen Talawyma (Council) | | Silver Little Eagle (Council) | Yes |

| Name or Department Invited | Attended? | Name or Department Invited | Attended? |
|---|---|---|---|
| Henry Speelman (Council) | Yes | Teresa McMakin (Northern Cheyenne Schools Superintendent) | |
| Iola Woodenthigh (Federal programs Information Manager) | | Thedis Crowe (BIA) | Yes |
| Joan Huston (FEMA) | Yes | Vernon Small (District Representative) | |
| Keith Raymond (Rosebud County Emergency Management) | | Waylon Rogers (District Representative) | |
| Brooke Seachord (JEO Consulting) | Yes | Kayla Vondracek (JEO Consulting) | Yes |

## *Round 1 Meetings: Hazard Identification*

The primary function of the first round of meetings was to identify and discuss the top concerns of the jurisdiction. Hazards to be evaluated in this Hazard Mitigation Plan were identified at the Kick-off meeting by planning team members. This was an opportunity to gather input from the list of identified hazards on records of historical occurrences, significant impacts, and their effects on residents and the planning area. For the hazards identified by planning team members at the Kick-off meeting, past events were described in detail including: location of damages; specific damages to property, trees, or infrastructure; descriptions of blocked transportation routes; loss of power; and improvements or projects implemented post event. (For a complete list of hazards and discussion of risk and vulnerabilities, see *Section Four: Risk Assessment*.) This meeting also provided representatives with an update on the status of the plan, for those representatives who attended the Kick-off meeting, or provide a brief overview of the HMP and planning process to any new jurisdictional representatives.

***Table 4: Planning Team Meeting #1 Date, Agenda, and Attendees***

| MEETING DATE AND TIME | AGENDA ITEMS |
|---|---|
| **PUBLIC MEETING**<br>**THURSDAY, JANUARY 27TH, 2022**<br>**2:00PM MT**<br>**ZOOM MEETING** | HMP Overview and Components<br>Planning Process Status Update<br>Discussion of Hazard Types and Past Impacts<br>Stakeholder and Public Involvement |

| NAME | Title | Jurisdiction |
|---|---|---|
| **ANGEL BECKER** | Disaster and Emergency Services Coordinator | NCT |
| **KYLE ALDERMAN** | Renewable Energy Manager | NCT |
| **BRIAN MISCHEL** | Emergency Management, DES Coordinator | Big Horn County |
| **DR. DAVID RILEY** | Director, Strategic Development | Covenant Solar |
| **NICOLE EDWARDS** | Tribal HMA Specialist | FEMA |
| **KAYLA VONDRACEK** | Planner | JEO |
| **BROOKE SEACHORD** | Project Manager | JEO |

## *Round 2 Meeting: Mitigation Strategies*

The key objective at the Round 2 meeting was the identification and prioritization of mitigation measures. These actions are an essential component in developing effective hazard mitigation plans. At the Round 2 meeting, attendees discussed the status of mitigation actions identified in the previously FEMA-approved HMP from 2006, as well as identified new mitigation actions to address current concerns and priorities.

There was also a brief discussion about the planning process, when the plan would be available for public review and comment, and additional opportunities to share the public involvement survey with residents. Table 5 shows the date and location of meetings held for the Mitigation Strategies phase of this project.

***Table 5: Planning Team Meeting #2 Date, Agenda, and Attendees***

| DATE NAD TTIME | AGENDA ITEMS |
|---|---|
| **PUBLIC MEETING**<br>**THURSDAY, APRIL 21ST, 2022**<br>**2:00PM MT**<br>**IN PERSON – COUNCIL CHAMBERS**<br>**ONLINE - ZOOM MEETING** | Update mitigation actions, identify new mitigation actions, identify critical facilities, review local data, share public engagement survey, and discuss plan review process. |

| NAME | Title | Jurisdiction |
|---|---|---|
| **ANGEL BECKER** | Disaster and Emergency Services Coordinator | NCT |
| **KYLE ALDERMAN** | Renewable Energy Manager | NCT |
| **DEBRA CHARETTE** | Northern Cheyenne Tribal Council | NCT |
| **DIANA SPOTTED ELK** | Northern Cheyenne Tribal Council | NCT |
| **EMILY ALVAREZ** | Hazard Mitigation Planning Specialist | FEMA |
| **JENNIFER MAGPIE** | Indian Health Services | NCT |
| **JOHN GRINSELL** | Criminal Investigator | NCT |
| **KIRBY SMALL** | Criminal Investigator | NCT |
| **LANE SPOTTED ELK** | Northern Cheyenne Tribal Council | NCT |
| **NATHAN MOYER** | Safety Officer | NCT |
| **NICOLE EDWARDS** | Hazard Mitigation Planning Specialist | FEMA |
| **NIZHONI FRIESZ** | Northern Cheyenne Tribal Council | NCT |
| **OTTO BRAIDED HAIL** | Northern Cheyenne Tribal Council | NCT |
| **REGINALD KILLSNIGHT** | Department of Transportation | NCT |
| **ROD TRAHAN** | Housing Authority | NCT |
| **STEVE BACHINI** | Administrator | Indian Health Services |
| **BRIAN MISCHEL** | Emergency Manager | Big Horn County |
| **KAYLA VONDRACEK** | Planner | JEO |
| **BROOKE SEACHORD** | Project Manager | JEO |

## Public Involvement and Outreach

**A3 Element and Requirements §201.7(c)(1)(ii):** Does the plan document, as appropriate, an opportunity for neighboring communities, tribal and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as other interests to be involved in the planning process?

a. The plan shall identify all tribal members/citizens, and partners who were given an opportunity to be involved in the planning process. During plan review, it is important for the reviewer to consider that variations in tribal capability and/or cultural practice may influence participation.
b. The plan shall identify how tribal members/citizens and partners were invited to participate in the process.

The Planning Team emphasized the importance of involving tribal members, tribal departments, and the public in the planning process. For the purposes of this plan the planning team defined the "public" as: *all residents of the reservation, tribal and non-tribal members, who do not hold a tribal government position, as well as all Northern Cheyenne Tribe members who reside off reservation.*

Outreach to eligible jurisdictions and the public included letter and email notification prior to all public meetings, phone calls and email reminders of upcoming meetings, and invitations to complete surveys and worksheets required for the planning process. Table 6 provides a summary of outreach activities utilized in this process. Copies of letters, press releases, project flyer, and survey can be found in *Appendix A*.

***Table 6: Outreach Activity Summary***

| ACTION | INTENT |
|---|---|
| **PROJECT WEBSITE** | Informed the public and local/planning team members of past, current, and future activities (https://jeo.com/nct-hmp). Links to join virtual meetings, recordings of meetings, agenda, or other meeting materials posted online.<br>Project website also included a comment form box for the public to submit comments/questions. |
| **PLANNING TEAM MEETING LETTERS, PHONE CALLS AND EMAILS** | Sent to planning team members, stakeholders, and partner agencies for reminders of upcoming meeting dates/times, agenda items, and follow up questions |
| **FOLLOW-UP EMAILS AND PHONE CALLS** | Correspondence was provided to remind and assist planning team members and stakeholders with the collection and submission of required local data |
| **PROJECT FLYER** | Flyers were posted about the HMP and how to get involved. Flyers were posted at multiple locations throughout the counties and reservation including the local restaurant, gas station, grocery store, Post Office, Tribal Council Offices, and tribal college. |
| **WORD-OF-MOUTH** | Tribal members discussed the plan with representatives and residents throughout the planning process |
| **PUBLIC ENGAGEMENT SURVEY** | Surveys were shared with tribal members and stakeholders to provide input throughout the planning process. Letters, emails, a postcard and social media posts were made to distribute survey link. |

| ACTION | INTENT |
|---|---|
| **PRESS RELEASE** | Sent to local newspapers (Lakota Country Times and Native Sun) and radio station (KILI) to announce the plan and describe the purpose of the plan. Additional press releases were sent to local newspapers to notify residents of public review period. |

The public involvement strategy developed by the Planning Team and used throughout the plan update aimed to maximize Tribal capabilities. Planning team members and stakeholders provided information necessary for inclusion within the document. One of the first steps taken was the development of a contact list which included individuals whose input was needed to complete this plan to its fullest capacity. The Planning Team identified stakeholders that were encouraged to attend and participate in the planning process. The following table identifies stakeholder groups who were invited to attend HMP meetings or provide local feedback via the Hazard Mitigation Plan public survey. Invitations to participate in the plan included phone calls, email blasts to departments, social media posts, project website updates, local news media, and flyers posted at key tribal locations.

***Table 7: Notified Stakeholder Groups***

| Stakeholder Name/Agency | | | |
|---|---|---|---|
| American Red Cross | Confederated Salish and Kootenai Tribes | Governor's Office of Indian Affairs | The Depot |
| Big Horn County | County Commissioners | Healthcare Facilities | Transportation Department |
| Blackfeet Nation | Crow Tribal Council | Housing Authority | Tribal Council |
| Board of Health | Cultural Commission | Land Authority | Tribal Education Department |
| Boys and Girls Club | Department of Natural Resources | Law Enforcement | Tribal Forestry |
| Bureau of Indian Affairs | Economic Development | Little Shell Tribe of Chippewa Indians of Montana | U.S. Forest Service |
| Bureau of Land Management | Family Services | Montana Department of Natural Resources | Utilities Commission |
| Charging Horse Casino | Fire Districts/Departments | Northern Cheyenne Development District | Yellow Bird |
| Chief Dull Knife College | Fort Belknap Indian Community Council (Gros Ventre & Assiniboine Tribes) | Northern Cheyenne Tribal School | |
| Chippewa Cree Tribe | Fort Peck Tribal Council | Rosebud County | |

Indian Health Services, Bureau of Indian Affairs, Rosebud County, and Board of Health attended HMP meetings and provided localized information which has been integrated into their applicable risk assessment profile.

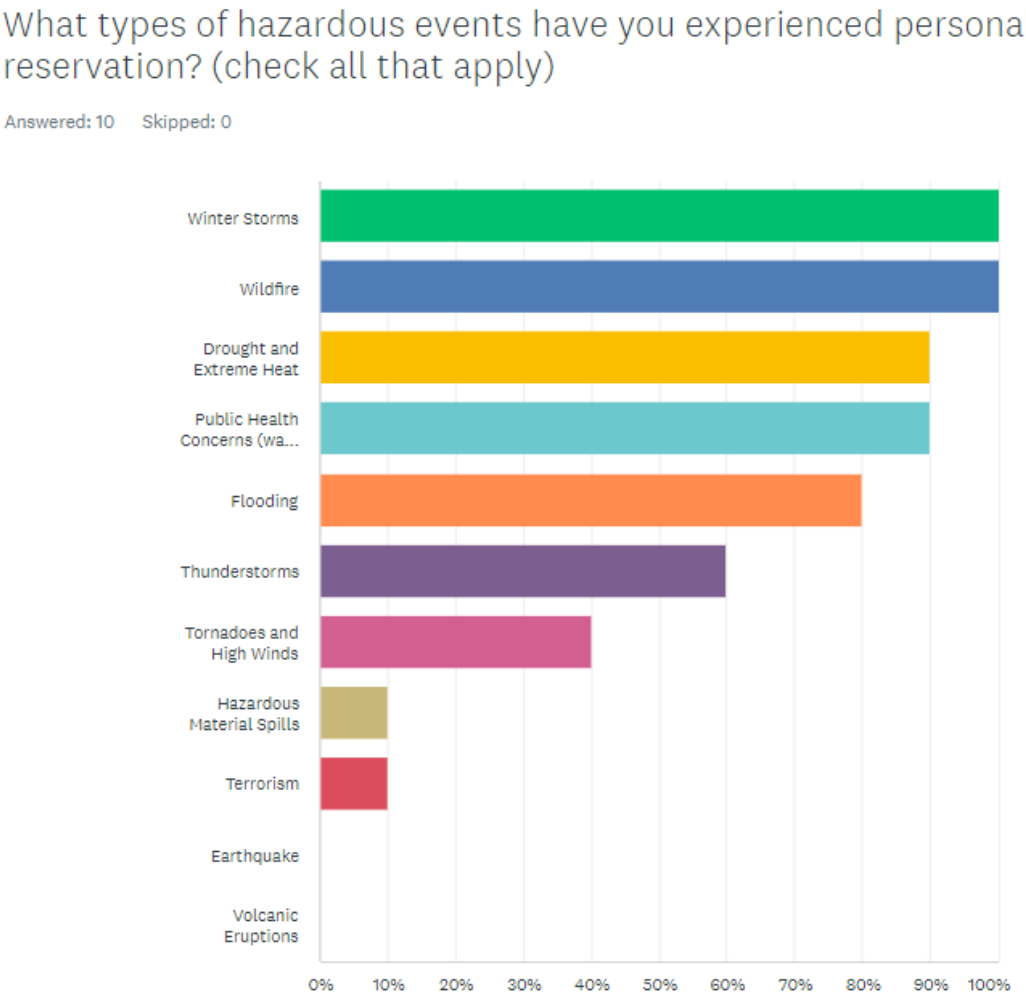
The outreach strategy also included: Tribal Council Government updates; public meetings to provide local input and review the draft plan; distribution of the draft plan to Planning Team members; utilization of a hazard mitigation survey; development of a project website dedicated to the plan, and media releases

during various stages in the process. Throughout the course of this project, numerous meetings were held, in addition to briefings provided to various stakeholders involved in this planning effort.

To collect a local perspective on the HMP and identify priorities of concern from tribal members, a public engagement survey was developed and shared at various meeting functions by the Planning Team and provided online at the project website. In total, ten surveys were collected. This information was used by the planning team and consultant to assist in the identification of hazards of highest risk to the jurisdictions and prioritization of appropriate mitigation actions. A copy of the survey can be found in *Appendix B* and results are summarized below.

Respondents to the public survey encompassed numerous departments across tribal governments. The ten responses to the survey included representatives from the following departments: Tribal Council, Housing Authority, Indian Health Services, Department of Emergency Services, police, Department of Transportation, and Big Horn County.

The first question asked respondents which types of hazardous events they have personally experienced. The most commonly experienced hazard events for residents include Winter Storms, Wildfire, Drought and Extreme Heat, Public Health Concerns, and Flooding, Thunderstorms, Tornadoes and High Winds, Hazardous Material Spills, and Terrorism. No Earthquake or Volcanic Eruptions were experienced.



This also aligned with the top ranked hazards of concern (from most concerning to least concerning) by ranked choice voting.

1. Wildfire
2. Drought and Extreme Heat
3. Public Health Concerns
4. Winter Storms
5. Flooding
6. High Winds and Tornadoes
7. Thunderstorms
8. Hazardous Material Spills
9. Tornadoes and High Winds
10. Terrorism
11. Earthquakes
12. Volcanic Eruptions

Respondents were asked to describe how each of the identified hazards have impacted them personally, their homes, their neighborhood, or their work. Responses are outlined below by hazard type.

**Drought and Extreme Heat**

- Lack of water for crops
- Increased wildfire risk
- Interruption of utility service
- High prices of animal feed, low water supplies

**Flooding**

- Help neighbors evacuate
- Homes damaged by flooding
- Blocked transportation routes
- Interruption of utility service

**Severe Thunderstorms**

- Power outages
- Lightning starts wildfires
- Interruption of utility services
- Property damages
-

**Public Health Concerns**

- Overwhelmed/interrupted services
- Disease outbreaks – COVID-19 caused deaths across reservation
- Lack of available service due to no potable water

**Hazardous Material Spills**

- Evacuation of homes close to spills
- Transportation accidents on the highway

**Tornadoes and High Winds**

- Interruption of utility service
- Property damage
- Power outages

**Winter Storms**

- Hazardous road conditions/blocked transportation routes
- Pipes freezing/bursting
- Power outages

**Wildfire**

- Evacuation of residents and livestock
- Power outages
- Blocked transportation routes
- Poor air quality – health impacts

Respondents were also asked for household mitigation actions which had been done or not. The most commonly done actions included attending safety related training or identifying the safest place in the home/workplace during a tornado.

***Table 8: Household Mitigation Responses***

| HAVE YOU OR A MEMBER OF YOUR HOUSEHOLD TAKEN ANY OF THE FOLLOWING ACTIONS TO PROTECT YOUR HOME? | | | | |
|---|---|---|---|---|
| | Elevated your home for flood protection | Moved out of hazardous areas (floodplain or near major highways) | Braced or reinforced walls, foundations, chimneys, or utilities | Anchored your home/trailers/ tanks to foundation |
| HAVE DONE | 2 | 0 | 2 | 2 |
| PLAN TO DO | 1 | 0 | 0 | 0 |
| NOT DONE | 3 | 3 | 4 | 4 |
| UNABLE TO DO | 1 | 3 | 1 | 0 |
| NOT APPLICABLE | 3 | 4 | 3 | 4 |
| **HAVE YOU OR A MEMBER OF YOUR HOUSEHOLD TAKEN ANY OF THE FOLLOWING ACTIONS TO PROTECT YOUR HOME?** | | | | |
| | Used fire-resistant building or roof materials | Maintain 30' of bare space around homes or buildings | Signed up for emergency alerts | Attended safety related training and certifications |
| HAVE DONE | 4 | 5 | 5 | 6 |
| PLAN TO DO | 2 | 2 | 3 | 1 |
| NOT DONE | 2 | 1 | 1 | 2 |
| UNABLE TO DO | 0 | 0 | 0 | 0 |
| NOT APPLICABLE | 2 | 2 | 1 | 1 |
| **HAVE YOU OR A MEMBER OF YOUR HOUSEHOLD TAKEN ANY OF THE FOLLOWING ACTIONS TO PROTECT YOUR HOME?** | | | | |
| | Developed a Home Emergency Plan that describes what you will do during a natural disaster | Identified the safest place to be in your home/work during a tornado | Identified the safest place to be in your home/work during an earthquake | Upgraded home energy utilities for increased efficiency |
| HAVE DONE | 3 | 6 | 4 | 3 |
| PLAN TO DO | 1 | 0 | 0 | 2 |
| NOT DONE | 5 | 2 | 3 | 4 |
| UNABLE TO DO | 0 | 0 | 0 | 1 |
| NOT APPLICABLE | 1 | 2 | 3 | 0 |

Oftentimes implemented mitigation actions are prioritized based upon need to mitigate risk, cost effectiveness, feasibility, and public support. To help identify overall local support for types of mitigation projects, respondents were asked to rank from very important to not important mitigation action end goals.

***Table 9: Priorities for Mitigation Question and Answers***

| PREPARING FOR A DISASTER CAN TAKE MANY FORMS. HOW IMPORTANT IS IT TO MITIGATE POTENTIAL HAZARD RISK TO THE FOLLOWING? | | | | |
|---|---|---|---|---|
| | Protecting people | Protecting private property | Protecting community assets (parks, community buildings) | Protecting critical facilities (hospitals, fire/police stations, utilities) |
| VERY IMPORTANT | 100% | 50% | 60% | 100% |
| SOMEWHAT IMPORTANT | 0% | 50% | 40% | 0% |
| NEUTRAL | 0% | 0% | 0% | 0% |
| SOMEWHAT NOT IMPORTANT | 0% | 0% | 0% | 0% |
| NOT IMPORTANT | 0% | 0% | 0% | 0% |
| **HAVE YOU OR A MEMBER OF YOUR HOUSEHOLD TAKEN ANY OF THE FOLLOWING ACTIONS TO PROTECT YOUR HOME?** | | | | |
| | Preventing development in hazardous areas (example - flood prone areas) | Protecting natural environments | Protecting historical/cultural landmarks | Increasing cooperation between emergency response agencies and the public |
| VERY IMPORTANT | 60% | 40% | 60% | 100% |
| SOMEWHAT IMPORTANT | 40% | 50% | 30% | 0% |
| NEUTRAL | 0% | 10% | 10% | 0% |
| SOMEWHAT NOT IMPORTANT | 0% | 0% | 0% | 0% |
| NOT IMPORTANT | 0% | 0% | 0% | 0% |
| **HAVE YOU OR A MEMBER OF YOUR HOUSEHOLD TAKEN ANY OF THE FOLLOWING ACTIONS TO PROTECT YOUR HOME?** | | | | |
| | Improving notification and weather alert communication systems | Improving emergency response capabilities (fire/police/emergency management equipment and training) | Increase or improve education for disaster preparedness (evacuation, weather safety, etc.) | Protecting energy resources and utilities |
| VERY IMPORTANT | 100% | 100% | 90% | 90% |
| SOMEWHAT IMPORTANT | 0% | 0% | 10% | 0% |
| NEUTRAL | 0% | 0% | 0% | 10% |
| SOMEWHAT NOT IMPORTANT | 0% | 0% | 0% | 0% |
| NOT IMPORTANT | 0% | 0% | 0% | 0% |

The majority of respondents indicated the best way to share information about preparing for a disaster is through social media (10 votes), emergency text alerts (8 votes), tribal website updates (5 votes) and radio

alerts (5 votes).

Respondents were asked to identify the most valuable buildings when there is an emergency or power outage. These facilities are of greatest importance and should be emphasized for hardening or mitigating purposes. The top buildings identified included: tribal headquarters, housing maintenance facilities, hospitals, gas stations, grocery stores, and utility buildings.

Lastly, respondents were asked what they would like to see the Northern Cheyenne Tribe to do to help reduce risk to natural disasters or severe weather events in the future. Common themes and responses are listed below.

- Education on all forms of disasters including unnatural
- Define a plan about delineating responsible entities – comprehensive contact list
- Improve coordination between emergency responders
- Mitigate secondary disasters from wild land fires and winter weather events
- Improve or make a more resilient water system
- Implement the IPAWS system

## *Neighboring Jurisdictions*

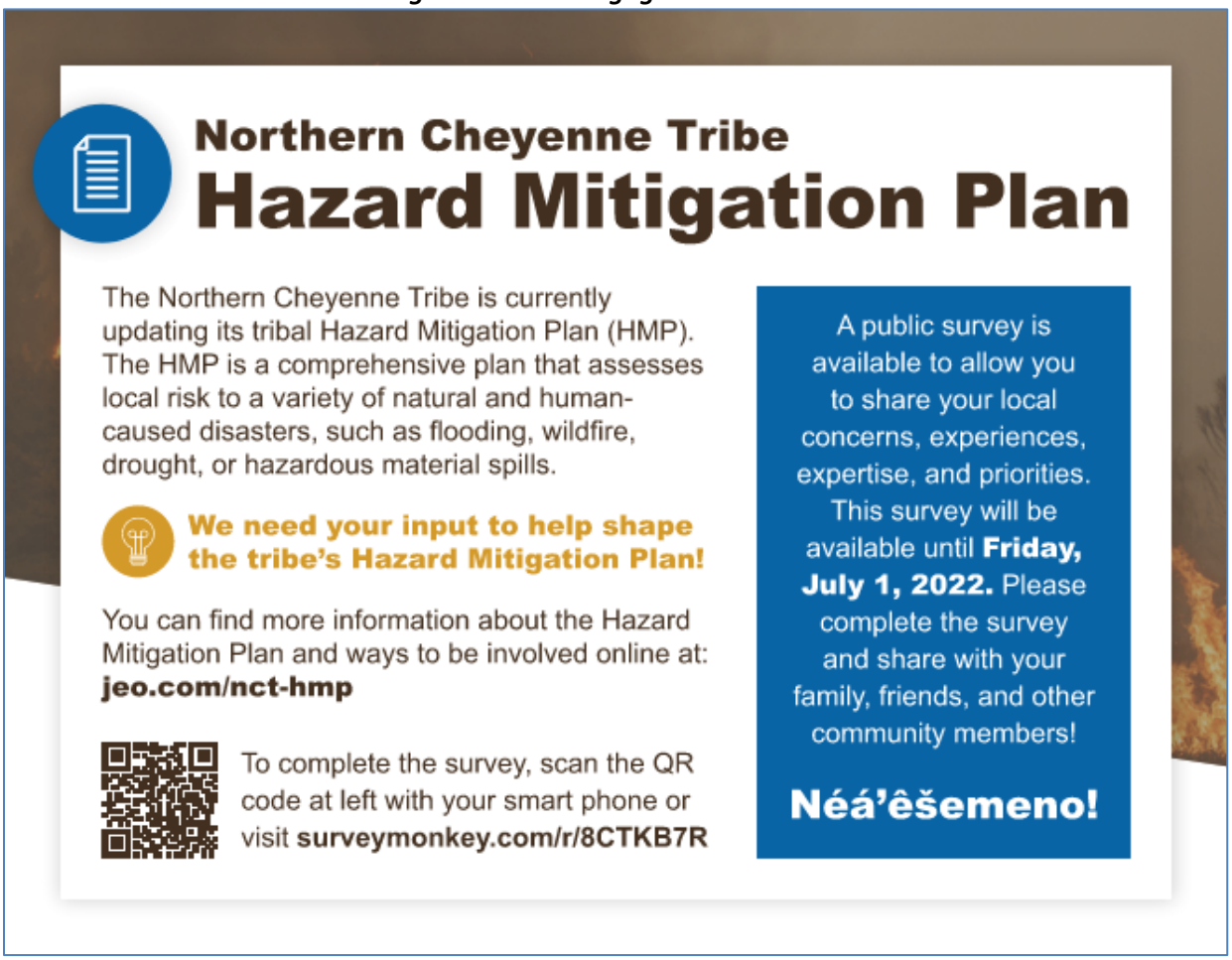
Neighboring jurisdictions were notified and invited to participate in the planning process. Specifically, each neighboring jurisdiction and applicable stakeholders in the planning area were sent a letter notifying them of the project kick-off and a postcard with a link to the public engagement survey to garner additional local input. The following table lists individuals, departments, and/or agencies notified while the figure below shows an example of the postcard sent to each jurisdiction.

***Table 10: Notified Neighboring Jurisdictions***

| NEIGHBORING JURISDICTIONS | | | |
|---|---|---|---|
| American Red Cross, Bozeman | Chippewa Cree Tribe | Indigenized Energy Initiative | Northern Cheyenne Tribal School |
| Big Horn County | Christ the King Catholic Church | Lame Deer Trading Post | Office of Public Assistance |
| Blackfeet Nation | Circle of Life Lutheran Church | Little Big Horn College | People's Partners for Community Development |
| Blessed Sacrament Catholic Church | Confederated Salish and Kootenai Tribes | Little Shell Tribe of Chippewa Indians of Montana | Rosebud County |
| Boys and Girls Club | Crow Tribe | Montana Department of Natural Resources - Billings Field Office | St. Labre Church |
| Bureau of Indian Affairs | Family Services | Montana DNRC - Headquarters | The Depot |
| Bureau of Land Management | Fort Belknap Indian Community Council (Gros Ventre & Assiniboine Tribes) | Morning Star Baptist Church | The Spoon and Fork |
| Busby Assembly of God | Fort Peck Tribe | Northern Cheyenne Childcare | Tribal Forestry |

| NEIGHBORING JURISDICTIONS | | | |
|---|---|---|---|
| Charging Horse Casino | Governor's Office of Indian Affairs | Northern Cheyenne Commodity Program | U.S. Forest Service; Billings Interagency Dispatch Center |
| Chief Dull Knife College | Healthy Montana Kids | Northern Cheyenne Tribal Rights Employment Office (TERO) | Yellow Bird Life Ways Center |

***Figure 3: Public Engagement Postcard***




## Document Development, Data Resources, and Review

Effective hazard mitigation planning requires the review and inclusion of a wide range of data, documents, plans, and studies. The following table is a non-exhaustive list of identified sources utilized during this planning process to form risk hazard profiles, help define vulnerability, and shape appropriate mitigation actions for both the Tribe and county. Additional resources, plans, or data used to develop this plan and hazard profiles are cited within the appropriate profile.

***Table 11: Document and Technical Resources***

| Documents, Plans, & Studies | |
|---|---|
| Disaster Mitigation Act of 2000 DMA https://www.fema.gov/media-library/assets/documents/4596?id=1935 | National Response Framework (2016) https://www.fema.gov/media-library/assets/documents/117791 |
| Final Rule (2007) https://www.fema.gov/media-library/assets/documents/23672 | Northern Cheyenne Drought Resiliency Plan Update (2022) *Provided to consultant by tribe* |
| Hazard Mitigation Assistance Unified Guidance (2013) https://www.fema.gov/media-library/assets/documents/103279 | Robert T. Stafford Disaster Relief and Emergency Assistance Act (2016) https://www.fema.gov/media-library/assets/documents/15271 |
| Hazard Mitigation Assistance Guidance and Addendum (2015) https://www.fema.gov/media-library/assets/documents/103279 | The Census of Agriculture (2017) https://www.nass.usda.gov/Publications/AgCensus/2017/index.php |
| Local Mitigation Plan Review Guide (2011) https://www.fema.gov/media-library/assets/documents/23194 | Tribal Mitigation Plan Review Guide (2017) https://www.fema.gov/media-library/assets/documents/18355 |
| Local Mitigation Planning Handbook (2013) https://www.fema.gov/media-library/assets/documents/31598 | Tribal Mitigation Plan Review Guide Policy (2017) https://www.fema.gov/media-library/assets/documents/18355 |
| Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013) https://www.fema.gov/media-library/assets/documents/30627 | What is a Benefit: Guidance on Benefit-Cost Analysis on Hazard Mitigation Projects http://www.fema.gov/benefit-cost-analysis |
| National Flood Insurance Program Community Status Book (2018) https://www.fema.gov/national-flood-insurance-program-community-status-book | 2017 Montana Climate Assessment https://montanaclimate.org/ |
| Flood Insurance Studies (where applicable) http://www.fema.gov/floodplain-management/flood-insurance-study | State of Montana Hazard Mitigation Plan (2018) https://des.mt.gov/Mitigation/Mitigation-Documents/2018_State-of-Montana-MHMP.pdf |
| Fourth National Climate Assessment (2018) https://nca2018.globalchange.gov/ | Montana Climate Solutions Plan (2020) https://deq.mt.gov/files/DEQAdmin/Climate/2020-09-09_MontanaClimateSolutions_Final.pdf |
| National Climate Assessment (2014) https://nca2014.globalchange.gov/ | Rosebud County Hazard Mitigation Plan (2021) *Not available online.* |
| Big Horn County Hazard Mitigation Plan (2021) *Not available online.* | Rosebud County Community Wildfire Protection Plan (2007) http://dnrc.mt.gov/divisions/forestry/docs/fire-and-aviation/wui/rosebud_cwpp.pdf |
| Big Horn County Community Wildfire Protection Plan (2006) | Tongue River Dam Emergency Action Plan (2018) Not available online. |

| | |
|---|---|
| http://dnrc.mt.gov/divisions/forestry/docs/fire-and-aviation/wui/bighorn_cwpp.pdf | |
| **Data Sources/Technical Resources** | |
| Arbor Day Foundation – Tree City Designation https://www.arborday.org/ | Montana Department of Health and Human Services https://dphhs.mt.gov/ |
| Bureau of Indian Affairs https://www.bia.gov/ | Montana Office of Public Instruction https://opi.mt.gov/ |
| Bureau of Indian Affairs, Northern Cheyenne Agency https://www.bia.gov/bia-agency/northern-cheyenne-agency | Montana Department of Natural Resources and Conservation http://dnrc.mt.gov/ |
| Centers for Disease Control and Prevention http://www.cdc.gov | Montana Department of Transportation https://www.mdt.mt.gov/ |
| Federal Emergency Management Agency http://www.fema.gov | Montana Disaster and Emergency Services https://des.mt.gov/ |
| FEMA Flood Map Service Center https://msc.fema.gov/portal/advanceSearch | Storm Prediction Center Statistics http://www.spc.noaa.gov |
| High Plains Regional Climate Center http://climod.unl.edu/ | United States Army Corps of Engineers – National Levee Database http://nld.usace.army.mil/egis/f?p=471:1:0::NO |
| National Agricultural Statistics Service http://www.nass.usda.gov/ | United States Census Bureau https://data.census.gov/cedsci/ |
| National Centers for Environmental Information https://www.ncei.noaa.gov/ | United States Department of Agriculture http://www.usda.gov |
| National Consortium for the Study of Terrorism and Responses to Terrorism (START) http://www.start.umd.edu/gtd/ | United States Department of Agriculture – Risk Assessment Agency http://www.rma.usda.gov |
| National Drought Mitigation Center – Drought Impact Reporter http://droughtreporter.unl.edu/map/ | United States Department of Commerce http://www.commerce.gov/ |
| National Drought Mitigation Center – Drought Monitor http://drought.unl.edu/dm/monitor.html | United States Department of Transportation – Pipeline and Hazardous Materials Safety Administration https://www.phmsa.dot.gov/ |
| National Flood Insurance Program https://www.fema.gov/national-flood-insurance-program | United States Forest Service https://www.fs.fed.us/ |
| National Historic Registry http://www.nps.gov/nr | United States Geological Survey http://www.usgs.gov/ |
| National Oceanic Atmospheric Administration http://www.noaa.gov/ | United States National Response Center http://www.nrc.uscg.mil/ |
| National Weather Service http://www.weather.gov/ | United States Small Business Administration http://www.sba.gov |
| Northern Cheyenne Tribe Website https://www.cheyennenation.com/ | University of Nebraska-Lincoln – National Drought Mitigation Center http://drought.unl.edu/Planning/DroughtPlans/StatePlanning.aspx?st=sd |

| | |
|---|---|
| Montana Department of Natural Resources & Conservation – Wildland Fire Information https://www.mtfireinfo.org/ | |

## Public Review

Once the draft of the HMP was completed, a public review period was opened to allow for tribal members and members of the public to review the plan and provide comments and changes. For the purposes of this plan the planning team defined the "public" as: *all residents of the reservation, tribal and non-tribal members, who do not hold a tribal government position, as well as all Northern Cheyenne Tribe members who reside off reservation.* The public review period was open from Wednesday, May 11,2022 through Friday, July 1, 2022. Participants were emailed and mailed a letter notifying them of this public review period. The HMP was also made available on the project website (https://jeo.com/nct-hmp) to download and edit the document, and notifications were sent to local newspapers and to the NCT website. Received comments and suggested changes were incorporated into the plan, including:

- Additional clarification of Tribal and FEMA agreements in place,
- Additional risk discussion on water quality concerns, and,
- Inclusion of agricultural diseases present in the reservation.

**A2 Element and Requirements §201.7(c)(1)(i):** Does the plan document an opportunity for public comment during the drafting stage and prior to plan approval, including a description of how the tribal government defined "public"?

a. The plan shall describe how the tribal government defined "public."
b. The plan shall describe how the public was given the opportunity to be involved in the planning process and how their feedback was incorporated into the plan. Examples of public involvement include, but are not limited to, interactive websites with drafts for public review and comment, questionnaires or surveys, or booths at community events.
c. The opportunity for participation shall occur during plan development, which is prior to the comment period on the final plan and prior to plan adoption/approval.

## Plan Adoption

**E2 Element and Requirements §201.7(c)(5):** Does the plan include documentation that it has been formally adopted by the governing body of the tribal government requesting approval?

a. The tribal government's governing body shall submit documentation that the plan was adopted.

Based on FEMA requirements, this hazard mitigation plan must be formally adopted by the Tribal Council through approval of a resolution. This approval will create 'individual ownership' of the plan by each participant. Formal adoption provides evidence of a participant's full commitment to implement the plan's goals, objectives, and action items. A copy of the resolution draft submitted to participating jurisdictions is located in *Appendix A*. Copies of adoption resolutions may be requested from the State Hazard Mitigation Officer or from the Northern Cheyenne Tribe directly.

Once adopted, NCT is responsible for implementing and updating the plan every five years. Those who participated directly in the planning process would be logical champions for updating the plan. In addition, the plan will need to be reviewed and updated annually or when a hazard event occurs that significantly affects the tribal area or tribal members.

## Plan Implementation and Progress Monitoring

Hazard mitigation plans need to be living documents. To ensure this, the plan must be monitored, evaluated, and updated on a five-year or preferably each year. This also includes incorporating the mitigation plan into tribal planning mechanisms as they stand or are developed. Chapters 6 and 7 describe existing plans; outlines a system the Tribe may use to monitor the plan; provides a description of how, when, and by whom the HMP process and mitigation actions will be evaluated; presents the criteria used to evaluate the plan; and explains how the plan will be maintained and updated.

# CHAPTER 3: PLANNING AREA PROFILE

To identify local and specific vulnerabilities, it is vitally important to understand the people and built environment of the planning area. The following section is meant to provide an overall description of the characteristics of the reservation.

## Project Area Geographic Summary

The Northern Cheyenne Reservation is located in southeastern Montana and encompasses 442,193 acres in Big Horn and Rosebud Counties. The Crow Indian Reservation borders the Northern Cheyenne Reservation to the west. There are no incorporated communities within the reservation; however Lame Deer is home to the tribal council government. Other populated areas in the reservation include Busby, Big Muddy, and Birney. The nearest town with additional emergency services beyond reservation boundaries is Hardin, approximately 55 miles west of Lame Deer (on Interstate 90 to the west, north of Crow Agency). The next closest resource center is Billings, the largest city in Montana (2019 estimated population of 109,595).

The Northern Cheyenne Reservation is largely comprised of one topographic region, the Northern Rolling Plains[16], in the open rolling country of southeastern Montana. Much of the landscape is dry open rangeland, with smaller areas of irrigated farmland along river bottoms, and some forestland, primarily in the hills. Elevations range from approximately 3,000 to 5,000 feet above sea level.

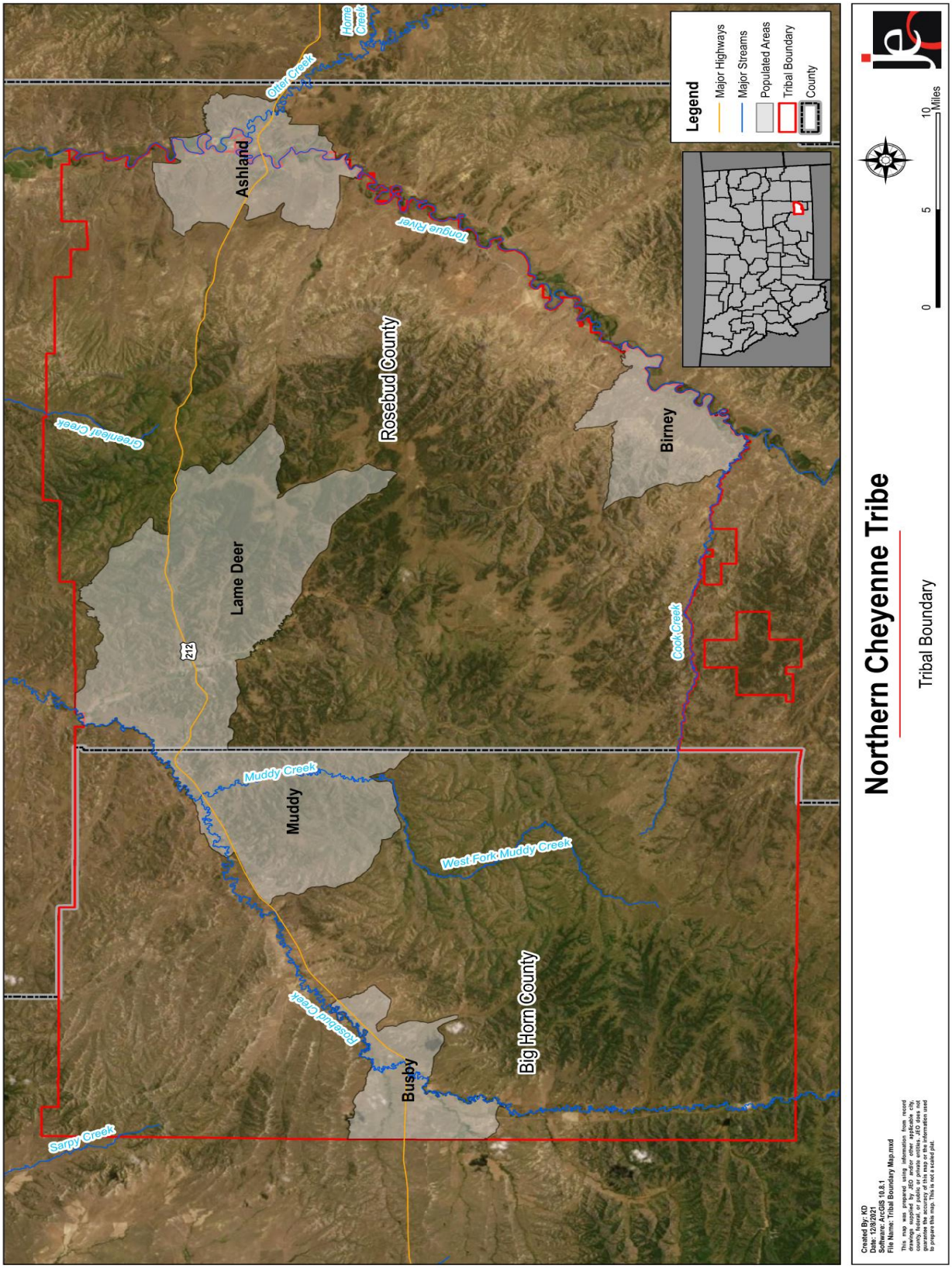
Major waterways in the reservation include the Tongue River, Rosebud Creek, Muddy Creek, Lame Deer Creek, and Cook Creek. The Tongue River forms the eastern boundary of the Reservation. Rosebud Creek flows along the western border of the Reservation and then crosses the northwest portion of the reservation. Both the Tongue River and Rosebud Creek flow northeastward in broad, alluvial valleys.

Mineral resources on the Reservation consist primarily of coal, with about 5 percent at depths shallow enough for stripping and the rest at too great a depth for surface mining. In 1975, an estimated 5-6 billion tons of low-sulfur coal could be extracted with surface mining (US Geological Survey and U.S. Bureau of Mines[17]). However, these coal reserves remain mostly undeveloped on the Reservation. (Northern Cheyenne Emergency Operations Plan). There are no known occurrences of metallic minerals, and usage of the available nonmetallic minerals such as building stone, sand and gravel, bentonite, claystone, and clinkers, appears to be limited. (US Geological Survey and U.S. Bureau of Mines).

[16] NRCS State Office. August 2006. "Major Land Resource Areas". https://efotg.sc.egov.usda.gov/references/public/MT/mlra.pdf

[17] U.S. Geological Survey and U.S. Bureau of Mines. Status of Mineral Resource Information for the Northern Cheyenne Indian Reservation, Montana. 1975. https://www1.eere.energy.gov/tribalenergy/guide/pdfs/northern_cheyenne_3.pdf

***Figure 4: Northern Cheyenne Tribal Boundary***



## Climate

Long-term climate trends have shifted throughout the 21st century and have created significant changes in precipitation and temperature which have altered the severity and subsequent impacts from severe weather events. The Northern Cheyenne Tribe identified changes in the regional climate as a top concern impacting residents and tribal members, local economies, and infrastructure throughout the reservation. Discussions on temperature, precipitation, and climate impacts are included below.

***Figure 5: Northern Great Plains Region***

The planning area is located in the Northern Great Plains region of the United States, which stretches from Montana and North Dakota southward to South Dakota, Wyoming and Nebraska (Figure 4). A large elevation change across the State of Montana contributes to high geographical, ecological, and climatological variability, including a strong gradient of decreasing precipitation moving from east to west across the region. Significant weather extremes impact the reservation, including winter storms, extreme heat and cold, severe thunderstorms, drought, and flood producing rainfall. The Northern Cheyenne Indian Reservation is located east of the Continental Divide and subject to continental weather patterns.

The Fourth National Climate Assessment has provided an overview of potential impacts within the planning area.

- **Water**: Water is the lifeblood of the Northern Great Plains, and effective water management is critical to the region's people, crops and livestock, ecosystems, and energy industry. Even small changes in annual precipitation can have large effects downstream; when coupled with the variability from extreme events, these changes make managing these resources a challenge. Future changes in precipitation patterns, warmer temperatures, and the potential for more extreme rainfall events are very likely to exacerbate these challenges.
- **Agriculture:** Agriculture is an integral component of the economy, the history, and the culture of the Northern Great Plains. Recently, agriculture has benefited from longer growing seasons and other recent climatic changes. Some additional production and conservation benefits are expected in the next two to three decades as land managers employ innovative adaptation strategies, but rising temperatures and changes in extreme weather events are very likely to have negative impacts on parts of the region. Adaptation to extremes and to longer-term, persistent climate changes will likely require transformative changes in agricultural management, including regional shifts of agricultural practices and enterprises.
- **Ecosystems and Ecosystem Services:** The integrity of forests and other ecosystems and their ability to provide natural habitat, clean water, and economic livelihoods have declined as a result of recent droughts and wildfire due in part to human-caused climate change. Greenhouse gas emissions reductions, fire management, and other actions can help reduce future vulnerabilities of ecosystems and human well-being.
- **Recreation and Tourism:** Ecosystems across the Northern Great Plains provide recreational opportunities and other valuable goods and services that are at risk in a changing climate. Rising temperatures have already resulted in shorter snow seasons, lower summer streamflow's and higher stream temperatures. These changes have important consequences for local economies that depend on winter or river-based recreational activities. Climate-induced land-use changes in agriculture can have cascading effects on closely entwined natural ecosystems, such as wetlands, and the diverse species and recreational amenities they support.

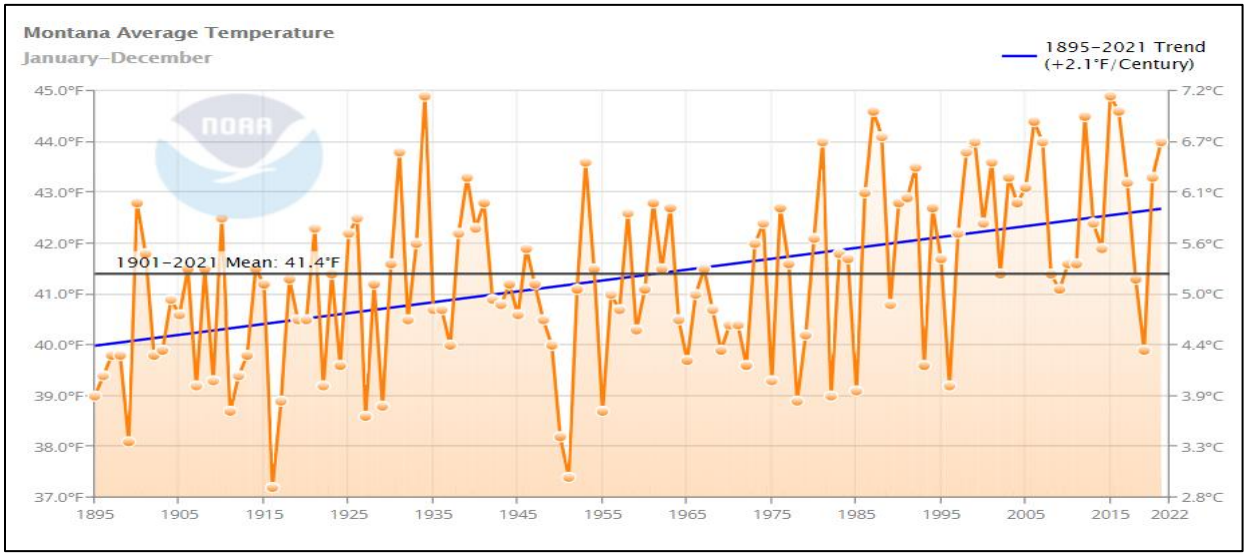
- **Energy:** Fossil fuel and renewable energy production and distribution infrastructure is expanding within the Northern Great Plains. Climate change and extreme weather events put this infrastructure at risk, as well as the supply of energy it contributes to support individuals, communities, and the U.S. economy as a whole. The energy sector is also a significant source of greenhouse gases and volatile organic compounds that contribute to climate change and ground-level ozone pollution.
- **Indigenous Peoples:** Traditional foods, natural resource-based livelihoods, cultural resources, and spiritual well-being of Indigenous peoples are increasingly affected by drought, wildfire, and changing conditions. Because future changes would further disrupt the ecosystems on which Indigenous peoples depend, tribes are implementing adaptation measures and emissions reduction actions.

## *Temperature*

According to the NOAA U.S. Climate Normals for the Northern Cheyenne Reservation (Busby station), show the normal high temperature for the month of July is 70.6°F. The normal low temperature for the month of January is 8.5°F. Average maximum and minimum temperatures recorded at Busby and Lame Deer indicate that average monthly minimum temperatures can range from as low as 4 degrees (January) to average maximum temperatures of 90 degrees (July and August).

Since 1895 Montana's overall average temperature has increased by almost 2.1°F (Figure 6). The Northern Great Plains region has also seen the greatest increase in overall temperature in the past two decades. While overall temperature shifts have not been consistent, the trend for increasing temperatures is apparent. Climate modeling suggests warmer temperature conditions will continue in the coming decades and rise steadily into mid-century. This trend will likely contribute to an increase in the frequency and intensity of hazardous events, which will cause significant economic, social, and environmental impacts on tribal members.

***Figure 6: Montana Average Temperature (1895-2020)***

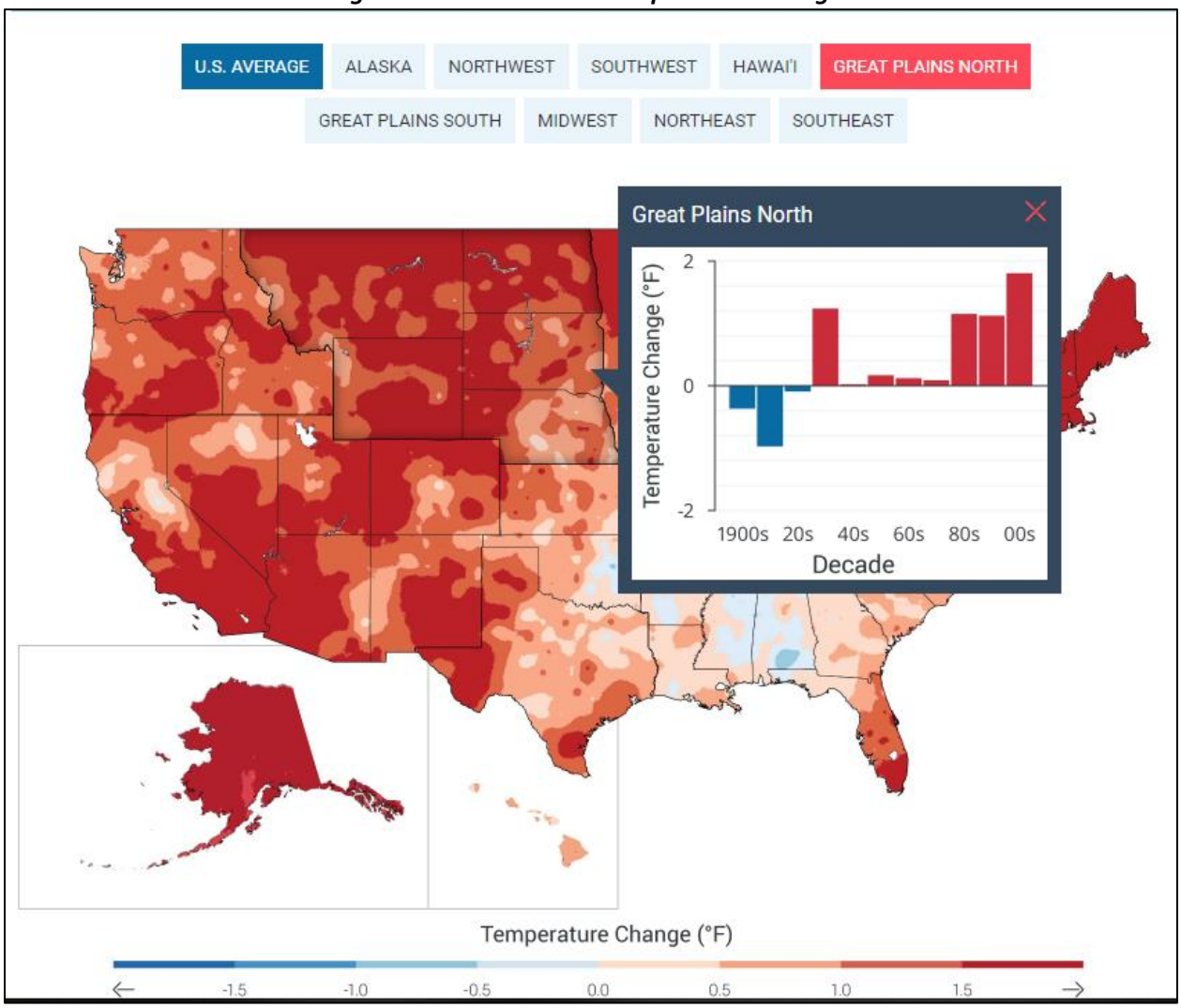



*Source: NOAA, 2020*[18]

[18] NOAA. 2020. "Climate at a Glance: Statewide Time Series.". Accessed September 2020. https://www.ncdc.noaa.gov/cag/statewide/time-series/24/tavg/12/12/1895-2022?base_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend_base=100&begtrendyear=1895&endtrendyear=2020

The length of the frost-free season (i.e. growing season) has also been increasing nationally since the 1980s. While a longer growing season may provide some benefit for heavily agricultural areas, concurrent changes in temperature, water availability, and pest pressures may cause additional adverse impacts. For instance, longer growing seasons coinciding with periods of drought and extreme heat can indicate lower production from increased plant mortality and increased risk to wildfire ignition probability and fuel load potentials. On average, the Northern Great Plains has seen an increase of one to two weeks to the annual growing season.[19]

***Figure 7: Observed U.S. Temperature Change***




*Source: National Climate Assessment, 2014*[20]

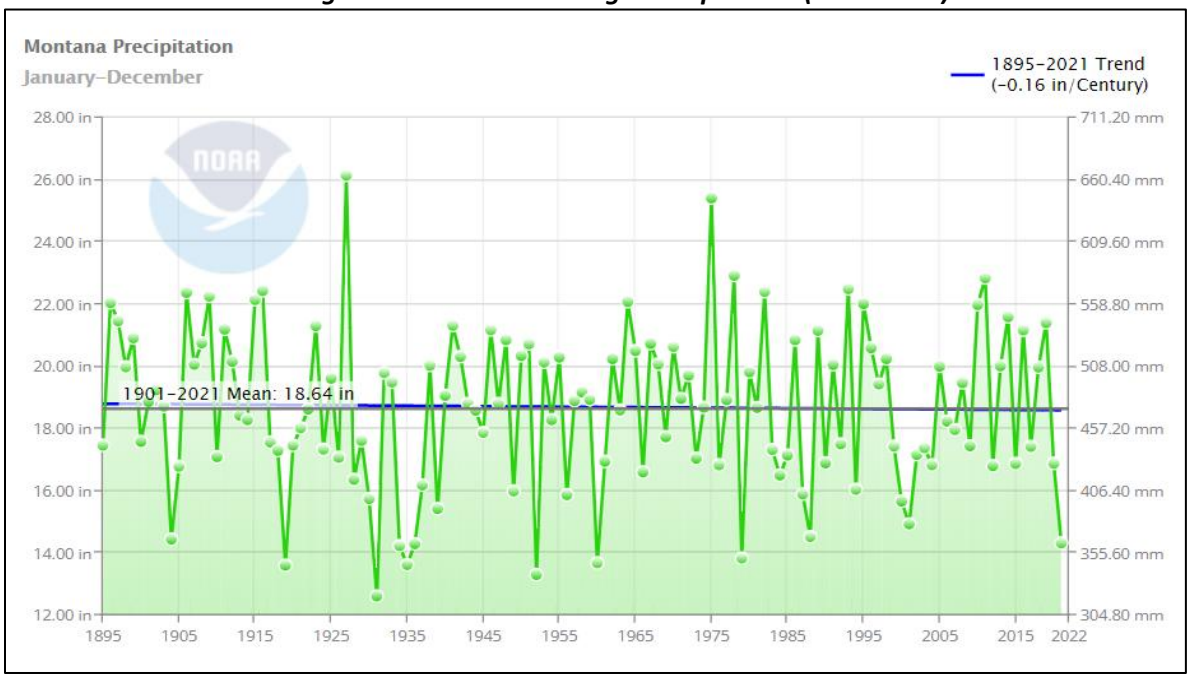
## *Precipitation*

[19] U.S. Global Change Research Program. "2014 National Climate Assessment: Frost-free Season". Accessed 2022. https://nca2014.globalchange.gov/report/our-changing-climate/frost-free-season#tab2-images

[20] U.S. Global Change Research Program. "2014 National Climate Assessment." Accessed 2022. https://nca2014.globalchange.gov/report/our-changing-climate/recent-us-temperature-trends

On average, the reservation receives 15.7 inches of rain and 52.3 inches of snowfall per year. [21] Average annual snowfall ranges from approximately 46 inches in Lame Deer, 51 inches in Busby, and 30 inches in Birney.[22] Changing extremes in precipitation are anticipated in the coming decades, with more significant rain and snowfall events and more intense drought periods. Seasonal variations will be heightened, with more frequent and more significant rainfall expected in the spring and winter with hotter, drier periods in the summer. Statewide, since 1895 there has been no significant changes in annual precipitation (Figure 8). Climate modeling may show only moderate precipitation and streamflow changes; however, most of the Northern Great Plains region is already at risk to large annual and seasonable variability as seen by extreme flooding and drought events occurring in concurrent years. There will likely be more days with a heavy precipitation event (rainfall of greater than one inch per day) across the region and subsequent impacts to riverine flooding events or overwhelmed local stormwater management systems. Groundwater and reservoir water sources are increasingly important to communities and residents in the planning area to meet water needs during periods of shortage. The geography of Montana results in a wide variety of precipitation amounts and forms across the state (Figure 4). Western Montana is likely to receive twice as much precipitation annually than eastern Montana due to higher elevations and closer proximity to the Continental Divide. The Northern Cheyenne Reservation is located in both the South Central and the Southeastern climate divisions. Since 1950, the Southeastern climate division has experienced a slight increase of +0.35 inches per decade[23].

***Figure 8: Montana Average Precipitation (1895-2022)***




*Source: NOAA, 2020[24]*

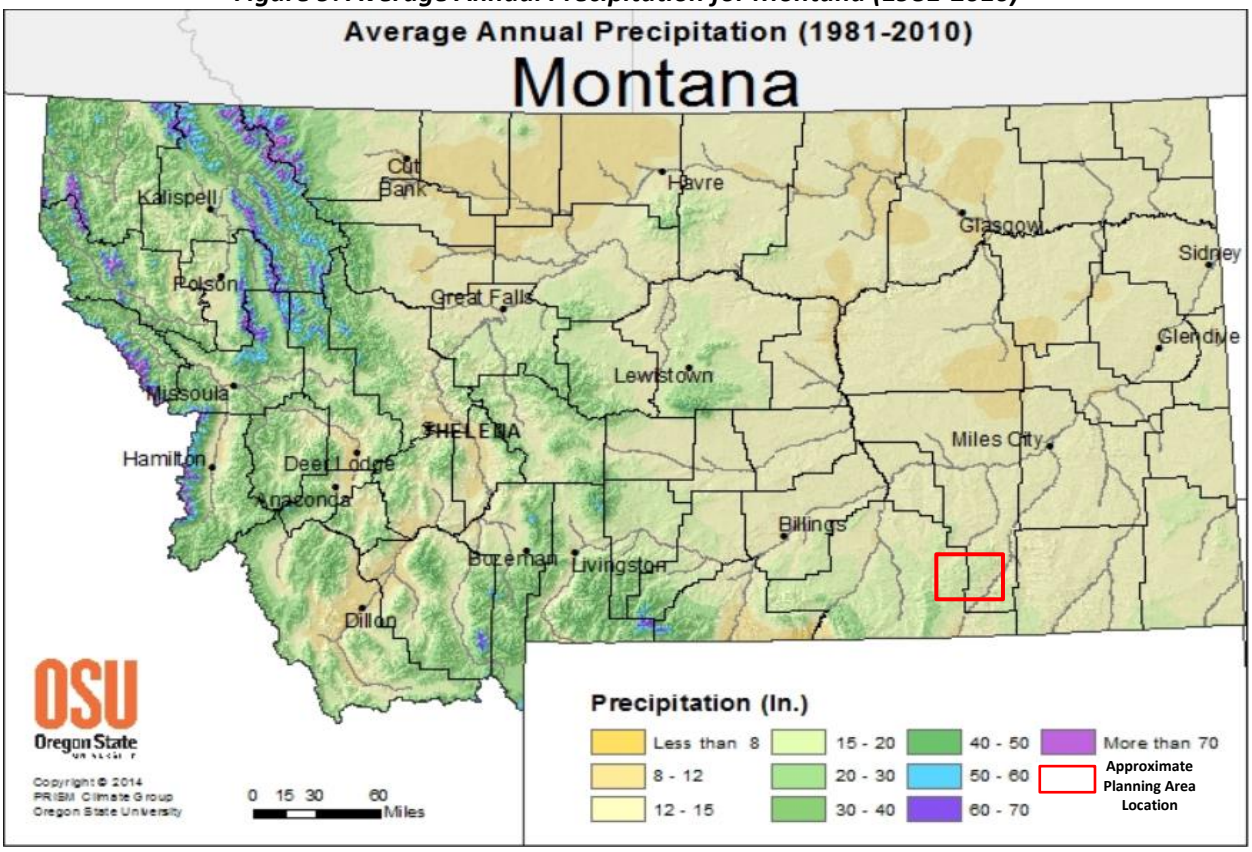
[21] State of Montana Department of Environmental Quality. "Montana Average Annual Precipitation 1981-2010." Accessed 2022. https://mslservices.mt.gov/Geographic_Information/Data/DataList/datalist_Details.aspx?did={3b8333a8-c938-4021-a5c5-acdfdd37e80c}

[22] Western Regional Climate Center. "Cooperative Climatological Data summaries". Accessed February 2022. https://wrcc.dri.edu/summary/Climsmemt.html

[23] Montana Climate Assessment. "Climate Change in Montana". Accessed February 2022. https://montanaclimate.org/chapter/climate-change

[24] NOAA. 2020. "Climate at a Glance: Statewide Time Series.". Accessed September 2020. https://www.ncdc.noaa.gov/cag/statewide/time-series/24/pcp/12/12/1895-2022?base_prd=true&begbaseyear=1901&endbaseyear=2022&trend=true&trend_base=100&begtrendyear=1895&endtrendyear=2022

***Figure 9: Average Annual Precipitation for Montana (1981-2010)***




*Source: Oregon State University PRISM Climate Group, 2014*[25]

## *Climate Change Impacts*

Observed changes in the intensity and frequency of extreme events are a significant concern now and in the future because of the social, environmental, and economic costs associated with the impacts of any given event. Challenges that are expected to affect communities, environments, and residents as a result of climate change include:

- Developing and maintaining sustainable agricultural systems
- Resolving increasing competition among land, water, and energy resources
- Conserving vibrant and diverse ecological systems
- Enhancing the resilience of the region's people to the impacts of climatic extremes

Certain groups of people may face greater difficulty when dealing with the impacts of a changing climate. Older adults and those living in poverty are particularly susceptible. Additionally, specific industries and professions tied to weather and climate, like outdoor tourism, commerce, and agriculture, are especially vulnerable.[26] Tribal communities are disproportionately impacted by extreme weather events exacerbated by climate change due to its remote geographic location, high poverty levels, high unemployment rates, and a lack of adequate local resources or support programs in place.

[25] Oregon State University PRISM Climate Group. "Average Annual Precipitation for Montana". Accessed February 2022. https://prism.oregonstate.edu/projects/gallery_view.php?state=MT

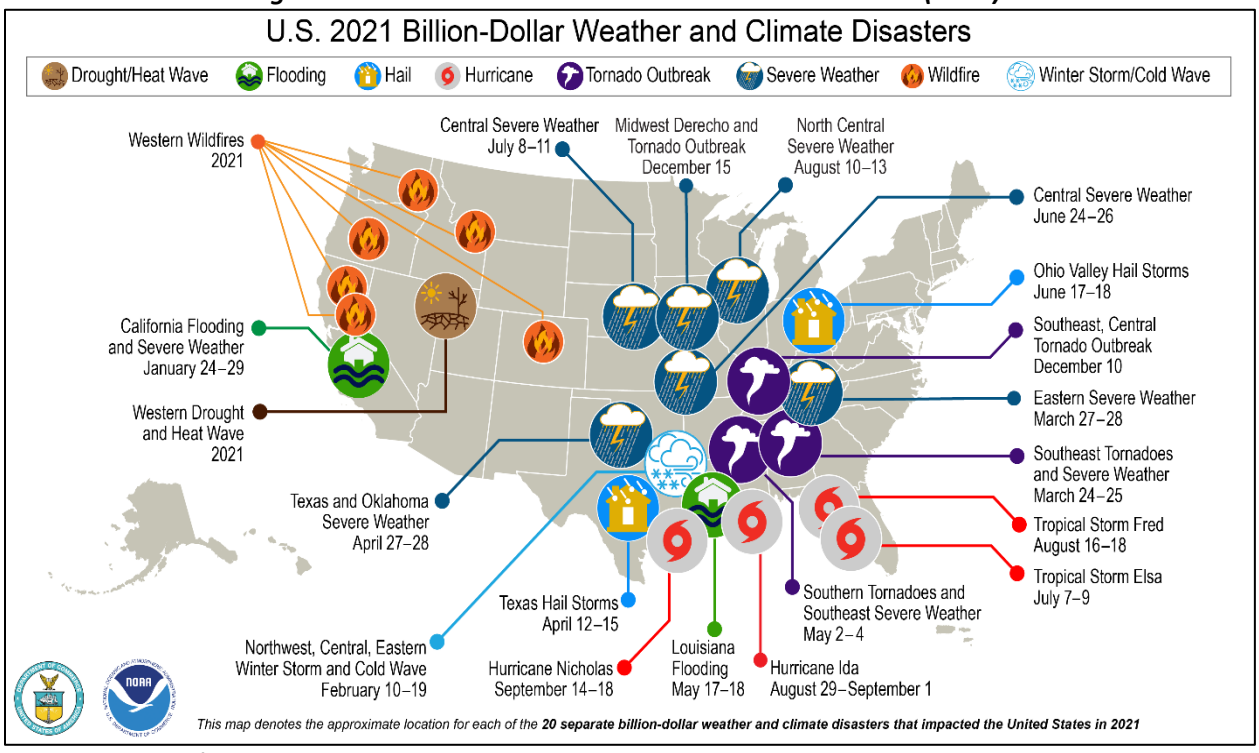
[26] U.S. Environmental Protection Agency. "Climate Impacts on Society." Accessed April 2021. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-society_.html

Climate change can reduce the availability of wild game, fish, and many ceremonial, medicinal, and subsidence plants which threatens community health for native communities by reducing food security and cultural well-being. A Northern Cheyenne Tribal Ordinance regulates recreation activities and sets hunting and fishing seasons, bag limits, and hunting and fishing locations. Fishing and hunting are only open to Northern Cheyenne tribal members and all tribal lands are open for hunting. Popular fishing locations include stocked ponds, along Rosebud Creek, and the Tongue River. Big game species, upland game birds, wild turkeys, migratory birds, and waterfowl are present and hunted on the Reservation. To date, some hunting seasons have been closed due to low species population numbers. If persistent climate impacts such as drought, flood, or fire impacts forage availability or water availability for wildlife species, then additional hunting seasons may be closed, or some species may no longer be hunted.

Cultural and spiritual reliance on local ecosystems which provide water sources and subsidence food leads to increased vulnerability during extreme climate events. Some tribes in Montana, such as the Crow Tribe, are already observing impacts on traditional food and water sources due to climate change. They noted that warming streams are impacting the health and distribution of fish species and microbial contamination of rivers has led to a loss of trusted water sources for ceremonial purposes.

As seen in the figure below, the United States is experiencing an increase in the number of billion-dollar natural disasters. Figure 11 shows a rise in the overall average of billion-dollar events in the state of Montana.

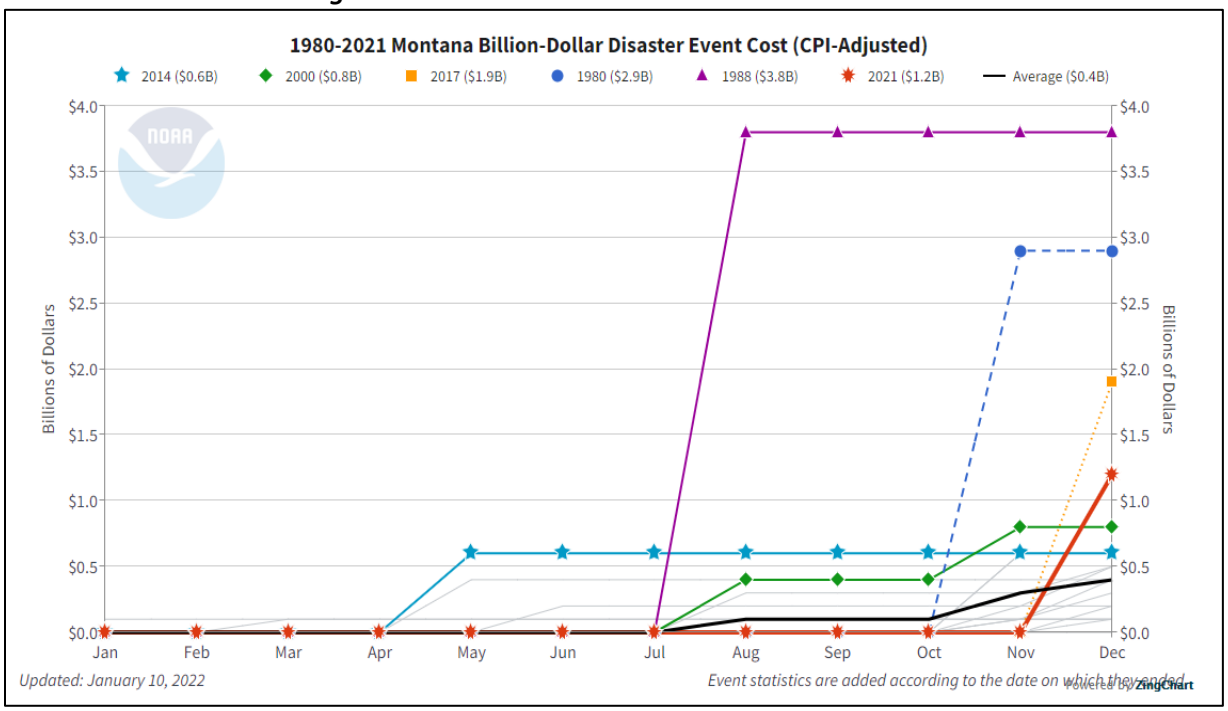
***Figure 10: Billion Dollar Weather and Climate Disasters (2021)***




*Source: NOAA, 2022*[27]

[27] NOAA. 2021. "Billion-Dollar Weather and Climate Disasters: Overview. Accessed February 2022. https://www.ncdc.noaa.gov/billions/

***Figure 11: Billion Dollar Disaster Costs in Montana***



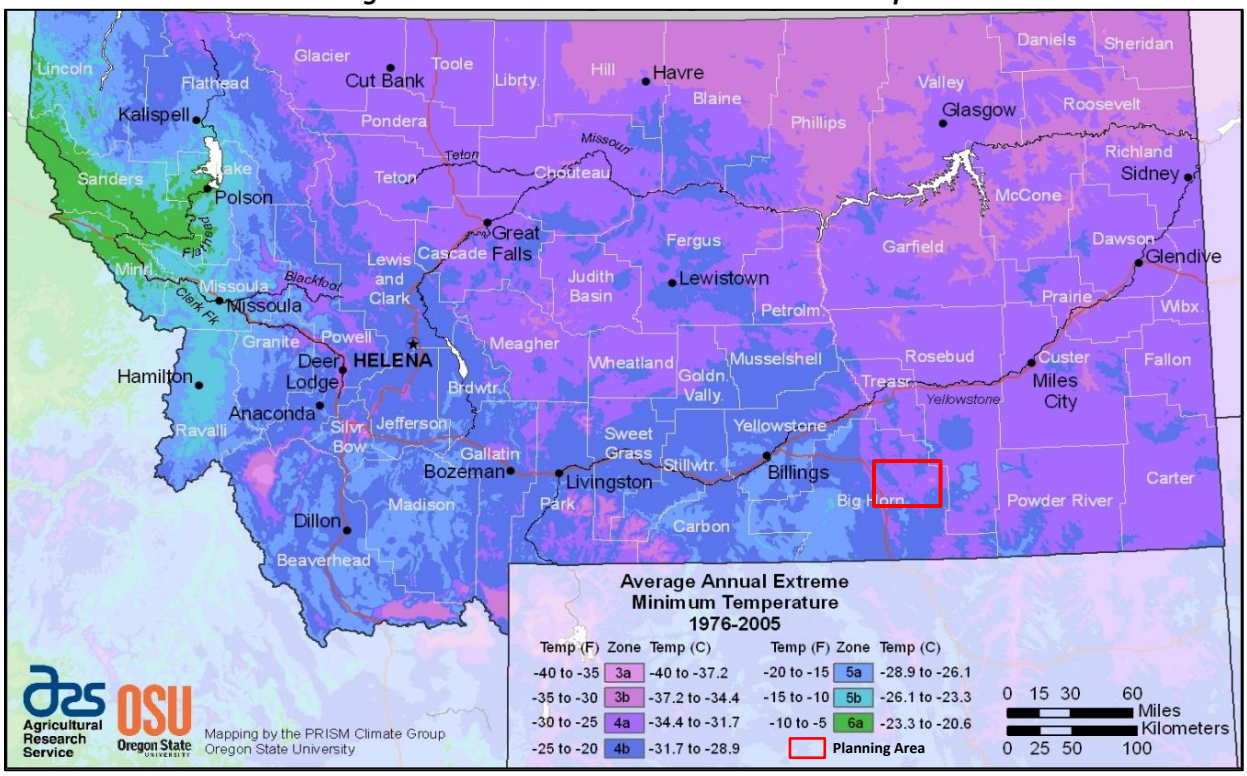

*Source: NOAA, 2021*

## *Agriculture*

The agricultural sector will experience an increase in droughts, an increase in grass and wildfire events, changes in the growth cycle as winters warm, an influx of new and damaging agricultural diseases or pests, and changes in the timing and magnitude of rainfall. Sensitivity to drought, flood, and fire events from climate change will increase the importance of agriculture and timber across the reservation as they are major economic drivers. These changes have shifted the annual growing season and expected agricultural production conditions and the added stressors on agriculture could have devastating economic effects if innovative agricultural and livestock management practices are not adopted. The below figure (Figure 12) shows the current Plant Hardiness Zones of Montana. The terrain of the Northern Cheyenne Tribal Reservation is primarily suited for livestock grazing and has approximately 13,971 acres of cropland.[28]

[28] USDA "U.S. American Indian Agriculture at a Glance." September 2014. https://www.nass.usda.gov/Statistics_by_State/Montana/Publications/Charts_and_Graphs/American_Indian_Profile_2012.pdf

***Figure 12: Montana Plant Hardiness Zone Map***




*Source: USDA, 2022*

### *Air Quality*

Rising temperatures will also impact air quality. Harmful air pollutants and allergens increase as temperatures increase. More extended periods of warmth or growing seasons contribute to longer pollen seasons that allow plant spores to travel farther and increase exposure to allergens. More prolonged exposure to allergens can increase the risk and severity of asthma attacks and worsen existing allergies in individuals.[29] Increased drought conditions also produce additional road sust poltuion which can impact air quality monitoring efforts. An increase in air pollutants can also occur from the growing number of grass and wildfires. The public can be exposed to harmful particulate matter from smoke and ash that can cause various health issues. Depending on the length of exposure, age, and individual susceptibility, effects from wildfire smoke can range from eye and respiratory irritation to severe disorders like bronchitis, asthma, and aggravation of pre-existing respiratory and cardiovascular diseases. [30]

### *Drought and Extreme Temperatures*

An increase in average temperatures will contribute to the rise in the frequency and intensity of hazardous events like extreme heat, extreme cold, and drought, which will cause significant economic, social, and environmental impacts on tribal members. Although drought is a natural part of the climate system, increasing temperatures will increase evaporation rates, decrease soil moisture, and lead to more intense droughts in the future, having negative impacts on dryland farming. Extreme heat and extreme cold events have adverse effects on both human and livestock health. Heatwaves may also impact plant health, with negative effects on crops during essential growth stages. Increasing temperatures and drought may

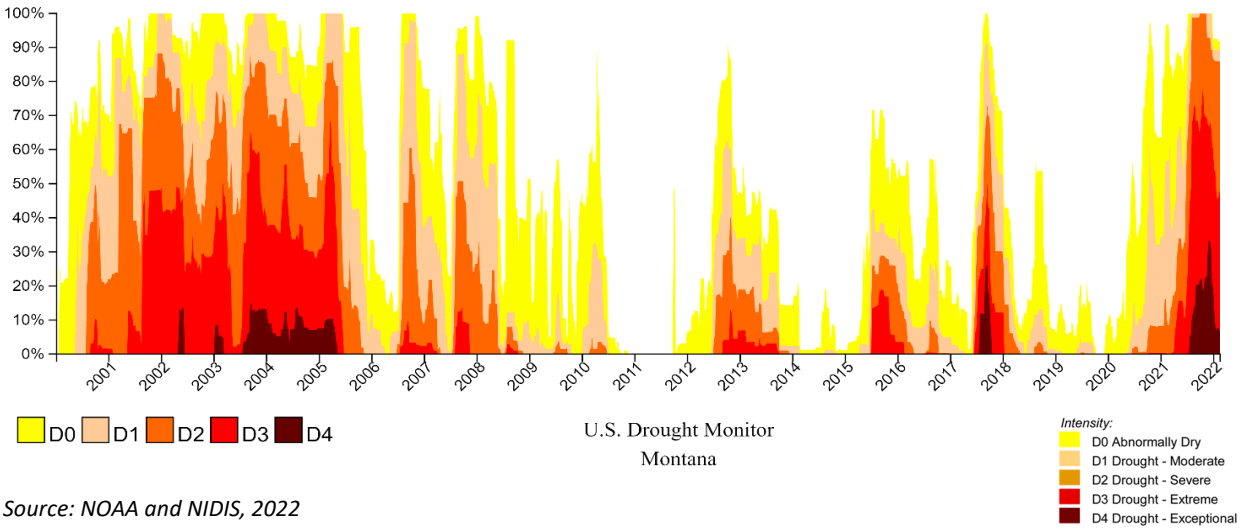
[29] Asthma and Allergy Foundation of America. 2010. "Extreme Allergies and Climate Change." Accessed 2022. https://www.aafa.org/extreme-allergies-and-climate-change/

[30] AirNow. 2019. "Wildfire Smoke: A Guide for Healthcare Professionals." Accessed 2022. https://www.airnow.gov/sites/default/files/2021-09/wildfire-smoke-guide-chapters-1-3.pdf

reduce the potential for aquifers to recharge, which has long-term implications for the viability of agriculture. Exposure to extreme cold, meaning temperatures below zero, can result in hypothermia or frostbite and lead to life-threatening situations for both humans and animals caught outside unprepared for too long. The most susceptible individuals to the adverse effects of extreme cold are infants and elderly people.

Changes in precipitation are tied to changes in drought patterns. The following figure shows the history of drought and its severity in Montana since 2000. Record dryness occurred in Montana in 2021, becoming the 4th driest year on record with 33.10% of the state in a D4 drought. The longest drought to hit the area was from May 16, 2000 to March 28, 2006.[31] The area will remain vulnerable to periodic drought as most projected increases in precipitation are anticipated to occur during the winter months, while increasing temperatures lead to increased soil drying.

***Figure 13: Drought Severity 2000-February 2022***




*Source: NOAA and NIDIS, 2022*

### *Energy*

Shifting climate trends will have a direct impact on water and energy demands. As the number of 100°F days increases, along with warming nights, the stress placed on the energy grid will likely increase and possibly lead to more power outages. Severe weather events also stress energy production, infrastructure transmission, and transportation. Roads are at risk of damages from flooding, extreme heat, erosion, or added stress from increased residential demands.[32] Critical facilities and vulnerable populations that are not prepared to handle periods of power outages, particularly during heat waves, will be at risk.

### Precipitation

With a changing climate, winter and spring precipitation is projected to increase across Montana. Average annual precipitation varies across the state, with western Montana averaging between 22 and 30 inches, and eastern Montana averaging between 12 to 14 inches. According to climate projections, winter and spring precipitation is likely to increase, many models show summer precipitation decreasing. An increase in spring precipitation can have positive impacts on Montana's agricultural economy by improving soil

[31] NOAA. "Drought in Montana from 2000-Present". Accessed 2022. https://www.drought.gov/states/montana

[32] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp.

moisture but could potentially delay planting and result in yield losses. Rising temperatures will also affect snowmelt patterns, shifting runoff and increasing the potential for flooding.[33]

### *Water Quality*

Increasing temperatures, shifting precipitation patterns, and extreme weather events impact water quality throughout the state. As average temperatures increase, water temperatures also rise and put water bodies at risk for eutrophication and excess algal growth that reduce water quality. Extreme weather events and shifting precipitation can lead to fluctuating river flows, erosion, sediment accumulation, and morphological changes to water bodies and surrounding landscapes. In agricultural landscapes, major storm events can cause sediment and nutrients such as phosphorous and nitrogen to runoff into nearby water sources. Runoff can contribute to the buildup of nutrients in the water, increasing plant and algae growth that can deplete oxygen and kill aquatic life. Nutrient enrichment can lead to toxic cyanobacterial harmful algae blooms (cyanoHABs), which can be harmful to animal and human health. CyanoHABs can cause economic damage such as decreasing property values, reducing recreational revenue, and increasing the costs for treating drinking water.[34]

With the increasing intensity and frequency of extreme precipitation events, impacts to water systems ultimately threaten human health. Events can lead to flooding and stormwater runoff that can carry pollutants across landscapes and threaten human health by contaminating water wells, groundwater, and other bodies of water. Common pollutants include pesticides, bacteria, nutrients, sediment, animal waste, oil, and hazardous waste. Flooding impacts property, infrastructure, economies, and the ecology of water bodies.

In the Northern Cheyenne Tribal Reservation, many people use private wells and/or get their drinking water from other parts of the Reservation than their place of residence. Two of the districts within the Reservation experience excessive calcium in the water and the other districts have an excess of iron. Excessive calcium can damage household appliances such as coffee makers and water heaters, leading residents of those districts to use store bought water more[35]. Any old and aging water system infrastructure of the Reservation could also be at a higher risk of infiltration, cracking, or pollution.

### *Grass/Wildfire*

Rising temperatures can increase the frequency and intensity of wildfires across the state. Warmer temperatures cause snow to melt sooner and create drier soils and forests, which act as kindling to ignite and spread fires. Additionally, warmer nighttime temperatures contribute to the continued spread of wildfires over multiple days.[36] From 2017 to 2020 (the available period of record) there were a total of 82 wildfire events within the Northern Cheyenne Reservation, with no fires being recorded in 2018. Of the 82 fires, 61 of them were recorded as having burned an acre or less, 13 of them burned less than 100 acres, and seven fires burned over 100 acres. The largest fire occurred in April 2019, burned 1,700 acres, and prompted the partial evacuation of Lame Deer.[37]

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[33] NOAA NCEI. 2022. "Montana State Climate Summary." Accessed 2022. https://statesummaries.ncics.org/chapter/mt/

[34] USGS. "Nutrients and Eutrophication". Accessed February 2022. https://www.usgs.gov/mission-areas/water-resources/science/nutrients-and-eutrophication?qt-science_center_objects=0#qt-science_center_objects

[35] Montana State University: Chris Preuninger, Florence Dunkel, Fred Blackwolf Jr., Ed Jones, Angelita Bearquiver, Waybe Roundstone, and Bob Madsen. "Perceptions of Water Quality on the Northern Cheyenne Indian Reservation". Accessed March 2022. https://www.montana.edu/mali/documents/studentsposterspdfs/PreuningerChrisWaterQualityNorthernCheyenne.pdf

[36] NASA Global Climate Change. September 2019. "Satellite Data Record Shows Climate Change's Impact on Fires." Accessed 2021. https://climate.nasa.gov/news/2912/satellite-data-record-shows-climate-changes-impact-on-fires/

[37] Montana Department of Natural Resources and Conservation. "DNRC Interactive Wildland Fire Map – NASF Fire Occurrence Data 2017-2020". Accessed January, 2022. https://gis.dnrc.mt.gov/apps/firemap/

### *Severe Storms*

Montana experiences frequent snowstorms and ice storms during winter, which can produce heavy snowfall and high wind gusts that lead to whiteout conditions. In the warmer months, severe storms are common and include flash flood-producing rainstorms and severe thunderstorms capable of producing hail and damaging winds. Since 1996 there have been three flood events in Lame Deer due to heavy rain or snow melt.[38] As temperatures continue to rise, more water vapor evaporates into the atmosphere, creating increased humidity, which can develop intense storms.

### *Future Adaptation and Mitigation*

The planning area will have to adapt to a changing climate and its impacts or experience an increase in economic losses, property damages, agricultural damages, and loss of life. Past events have typically informed mitigation plans to be more resilient to future events. This HMP includes strategies for the planning area to address these changes and increase resilience. Many mitigation actions or strategies that can be adopted today will produce long-lasting benefits to combat climate change.

Future updates of this HMP should consider including adaptation as a core strategy to be better informed by "future" projections on the frequency, intensity, and distribution of hazards. An increased emphasis on nature-based solutions and green infrastructure by the Tribe in future development should be a priority. The Tribe should also consider past and future climate changes and impacts when incorporating mitigation actions into local planning processes.

## Tribal Districts and Council

NCT's governing body consists of eleven members with one at-large seat held by the Vice President. The reservation is divided into five political districts. Each district has two elected council member representative. These districts include:

- Ashland District
- Birney District
- Busby District
- Lame Deer District
- Muddy District

The Northern Cheyenne Tribe has numerous departments which oversee various functions and contribute to the overall success of the Nation. The list below is not exhaustive but does include some departments or roles which may aid in the pursuit of hazard mitigation projects:

- Ambulance Service
- Board of Health
- Bureau of Indian Affairs
- Environmental Protection/Natural Resources
- Environmental Health
- Fire Protection
- Indian Health Services
- Housing Authority

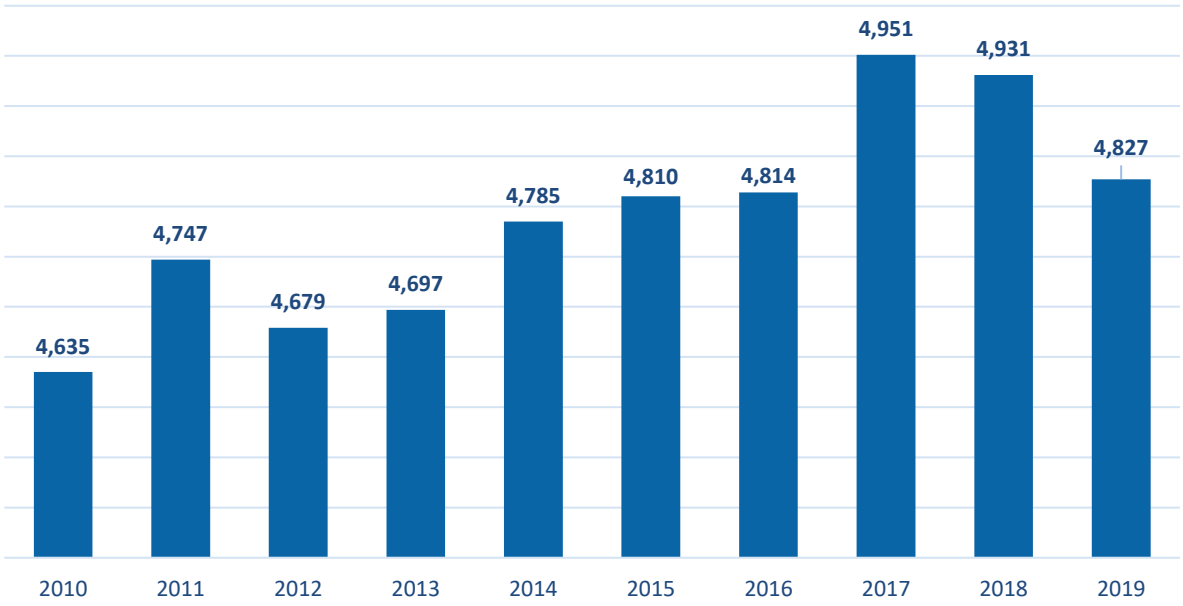
[38] NOAA National Centers for Environmental Information. "Storm Events Database: Big Horn and Rosebud Counties, Montana, 1996-2020." Accessed February 2022. https://www.ncdc.noaa.gov/stormevents/

- Land Authority
- Renewable Energy
- Transportation/Transit
- Tribal Forestry
- Utilities

## Population and Demographics

The historic population of the Northern Cheyenne Reservation increased from 2010 to 2017 and then began to decline from 2017 to 2019. The U.S. Census Bureau's American Community Survey (ACS) population estimate of the Tribe was 4,827 in 2019. However, the census bureau has not proved to be an effective means of determining tribal populations, so true tribal population counts may be higher than reported.

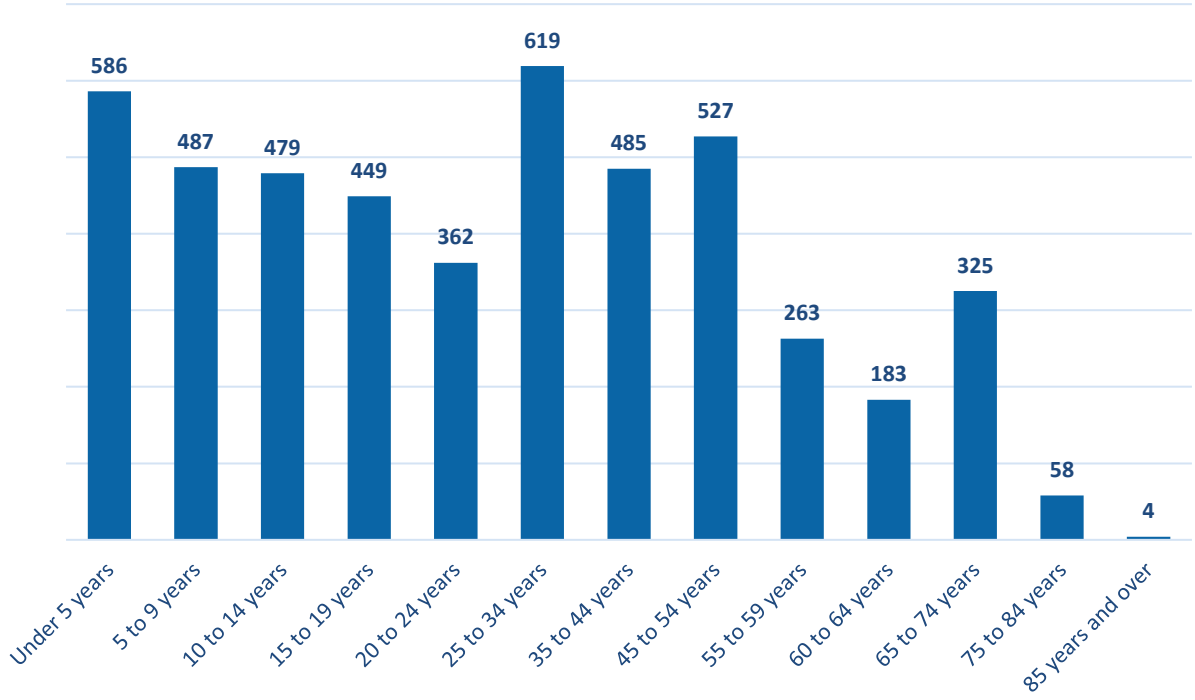
***Figure 14: Historical Population of Northern Cheyenne Tribe***




*Source: U.S. Census Bureau, 2019 ACS*[39]

[39] U.S. Census Bureau, 2019. "American Community Survey: 2019 ACS 5-Year Estimates Data Profiles." Accessed February 2022.

***Figure 15: 2019 Estimated Population by Age***




*Source: U.S. Census Bureau, 2019 ACS*

## *At-risk Populations*

In general, at-risk populations may have difficulty with medical issues, poverty, extremes in age, and communications due to language barriers. Several outliers may be considered when discussing potentially at-risk populations, including:

- Not all people who are considered "at-risk" are actually at-risk;
- Outward appearance does not necessarily mark a person as at-risk;
- A hazard event will, in many cases, impact at-risk populations in different ways.

The National Response Framework defines at-risk populations as "…populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care."[40] Tribal elders and very young populations may be more vulnerable to certain hazards than other population groups. Approximately thirty-eight percent of the Tribe's population is 18 years or younger. The median age of the Tribe is 25.8 years old. Approximately 12 percent are older than 60 years old.

There are several schools within the planning area which may house a high number of at-risk residents within the planning area during the daytime hours of weekdays, as well as during special events on evenings and weekends. The following table identifies the schools located within and near the reservation. Families and children living within the Northern Cheyenne Indian Reservation may attend surrounding school districts in Rosebud and Big Horn counties.

[40] United States Department of Homeland Security. June 2016. "National Response Framework Third Edition." https://www.fema.gov/sites/default/files/2020-04/NRF_FINALApproved_2011028.pdf

***Table 12: School Inventory***

| NUMBER | SCHOOL NAME | CITY | TYPE |
|---|---|---|---|
| **1** | Northern Cheyenne Tribal School | Busby | BIA |
| **2** | Lame Deer Elementary | Lame Deer | Public |
| **3** | Lame Deer Junior High | Lame Deer | Public |
| **4** | Lame Deer High School | Lame Deer | Public |
| **5** | Ashland Elementary | Ashland | Public |
| **6** | Ashland Junior High | Ashland | Public |
| **7** | St. Labre Indian Catholic School | Ashland | Private |
| **8** | Birney Elementary | Birney | Public |
| **9** | Spring Creek Elementary | Decker | Public |
| **10** | Pine Butte Elementary | Colstrip | Public |
| **11** | Frank Brattin Middle School | Colstrip | Public |
| **12** | Colstrip High School | Colstrip | Public |
| **13** | Big Horn Valley Christian School | Hardin | Private |
| **14** | Hardin Elementary | Hardin | Public |
| **15** | Hardin High School | Hardin | Public |
| **16** | Crow Agency School | Crow Agency | Public |
| **17** | Lodge Grass School | Lodge Grass | Public |
| **18** | Lodge Grass High School | Lodge Grass | Public |
| **19** | Pretty Eagle Catholic School | St. Xavier | Private |
| **20** | Fort Smith School | Fort Smith | Public |
| **21** | Forsyth Elementary | Forsyth | Public |
| **22** | Forsyth Junior High | Forsyth | Public |
| **23** | Forsyth High School | Forsyth | Public |
| **24** | Cottonwood School | Forsyth | Private |
| **25** | Mountain View School | Forsyth | Private |
| **26** | St. Charles Mission School | Pryor | Private |
| **27** | Rosebud Elementary | Rosebud | Private |
| **28** | Rosebud Junior High | Rosebud | Private |
| **29** | Rosebud High School | Rosebud | Private |
| **30** | Wyola Elementary | Wyola | Public |
| **31** | Wyola Junior High | Wyola | Public |

*Source: "Public School Districts in Rosebud County, Montana" and "Public School Districts in Big Horn County, Montana" https://www.schoolmap.org/State/Montana/*

There is one community college within the planning area. The Chief Dull Knife College is a public tribal land-grant community college located in Lame Deer.

Like minors, elders (age 65 and greater) are often more significantly impacted by temperature extremes. During prolonged heat or extreme cold waves, seniors may lack resources to effectively address the hazards and as a result may incur injury or potentially death. Prolonged power outages (either standalone events or as the result of other contributing factors) can have significant impacts on any citizen relying on medical devices for proper bodily functions or those that live in insufficient housing. One study conducted by the Center for Injury Research and Policy found that increases in vulnerability related to severe winter

storms (with significant snow accumulations) begin at age 55.[41] The study found that on average there are 11,500 injuries and 100 deaths annually related to snow removal. Males over the age of 55 are 4.25 times more likely to experience cardiac symptoms during snow removal.

In addition to residents being classified as at-risk by age, there are other specific groups within the planning area that experience vulnerabilities related to their ability to communicate or their economic status. Residents who speak English as a second language may struggle with a range of issues before, during, and after hazard events. General vulnerabilities revolve around what could be an inability to effectively communicate with others or an inability to comprehend materials aimed at notification and/or education. When presented with a hazardous situation it is important that all community members be able to receive, decipher, and act on relevant information. An inability to understand warnings and notifications may prevent non-English speakers from reacting in a timely manner if warnings are not provided in the native language as well.

Further, educational materials related to regional hazards are most often developed in the dominant language for the area, for the planning area that would be English. Residents who struggle with English in the written form may not have sufficient information related to local concerns to effectively mitigate potential impacts. Residents with limited English proficiency would be at an increased vulnerability to all hazards within the planning area. The traditional language of the Northern Cheyenne Tribe is Algonquian, which is engrained in the cultural integrity of the Nation. Many elders speak Algonquian with additional education programs in place to teach children and young people in the reservation.

Lastly, residents below the poverty line may lack resources to prepare for, respond to, or recover from hazard events. Residents with limited economic resources will struggle to prioritize the implementation of mitigation measures over more immediate needs. Further, residents with limited economic resources are more likely to live in older, more vulnerable structures. These structures could be mobile homes or dilapidated structures; located in flood hazard risk areas; located near known hazard sites (i.e. chemical storage areas or near coal seams); or in remote or poorly accessible areas. Big Horn County has the 6th highest poverty rate for individuals from 18 to 64 years of age in Montana with Rosebud County ranked 22nd.

## *Medical and Care Facilities*

While the previously identified populations do live throughout the planning area, there is the potential that vulnerable or at-risk populations will be located in higher concentrations at medical facilities. The local planning team identified a specific need to develop additional tribally-owned assisted living and nursing home facilities to protect local resources including tribal elders, language holders, and residents at risk. There is currently one medical facility on the Northern Cheyenne Indian Reservation—the Indian Health Service clinic in Lame Deer. Additionally, there are a number of people who have special medical needs who are not hospitalized but live in their homes on the reservation. According to the American Community Survey, 563 persons (11.8% of the total civilian noninstitutionalized population) on the reservation have some type of disability. The closest hospital is the Crow/Northern Cheyenne Hospital in Crow Agency, Montana which is roughly 45 minutes from Lame Deer. This hospital provides general medical and surgical care as well as emergency services. A second hospital in Hardin, the Big Horn Hospital, is roughly an hour from Lame Deer and has an emergency service department with ambulance services that is open 24 hours a day, seven days a week. Ambulance services in the reservation are provided by the Northern Cheyenne Ambulance Service, with a crew on call 24-hours, supported by the Quick

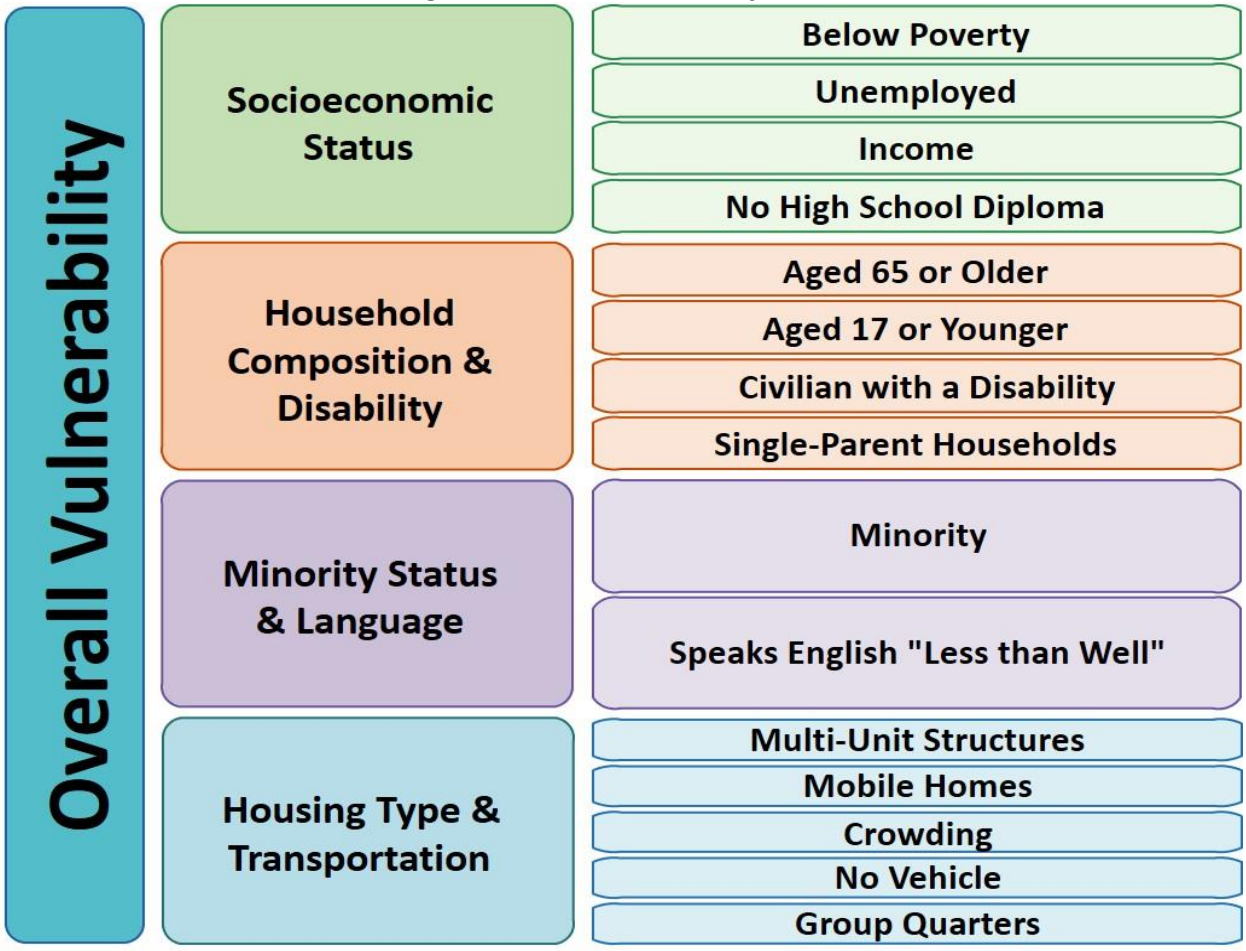
[41] Center for Injury Research and Policy. January 2011. "Snow Shoveling Safety." Accessed March 2022. http://www.nationwidechildrens.org/cirp-snow-shoveling

Response Unit in Ashland.

## Social Vulnerability Index

Various social conditions such as poverty rates, vehicle access, language, or housing stock contribute to overall social vulnerability for the planning area. The Center for Disease Control (CDC) has developed a Social Vulnerability Index to help public health officials and emergency responders identify areas at greater risk before, during, and after major hazardous events. The index evaluates 15 social factors and breaks down vulnerability into four domains: socioeconomic status; household composition and disability; minority status and language; housing and transportation. See Figure 16 for a full description of variables utilized by the CDC to determine SVI values per jurisdiction. SVI provides specific socially and spatially relevant information to help public health officials and local planners better prepare communities to respond to emergency events such as severe weather, floods, disease outbreaks, or chemical exposure.[42]

***Figure 16: Variables Utilized for SVI***




*Source: CDC, 2022*

Possible scores range from **0** (lowest vulnerability) to **1** (highest vulnerability). Specific SVI values are not available for the Northern Cheyenne Tribe; however, Big Horn County and Rosebud County have a SVI

[42] Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index 2018. Database Montana. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Accessed on April 2022.

value of 0.8274 and 0.607 respectively. A score of **0.607** indicates a **moderate to high** level of vulnerability while a score of **0.8274** indicates a **high** level of vulnerability.[43] It is reasonable to assume the Northern Cheyenne Tribe also falls within the **moderate to high** level of vulnerability. This level of vulnerability suggests a strong need for additional assistance, either technical or financial, for both the local government and residents to pursue mitigation activities. Common barriers to sustainable and impactful mitigation work are a lack of time, money, or manpower. A high score of social vulnerability indicates many residents may be struggling with basic household needs and thus pursuing mitigation activities will be a lower priority. Additionally, having a higher social vulnerability index value showcases the need for implemented mitigation actions to focus on vulnerable populations or areas of need. For the Northern Cheyenne Tribe these may include housing and health care for aging residents specifically.

## Housing

Data related to the built environment is an important component of a hazard mitigation plan. It is essential that during the planning process the Tribe display an understanding of their built environment and works to identify needs that may exist within their planning area. The US Census provides some limited information related to housing units and potential areas of vulnerability. There are approximately 1,176 total housing units in the reservation, of which approximately 54.3% are owner-occupied while approximately 45.7% are rentals. Home ownership is a key aspect to household mitigation success as often renters have less autonomy or ability to make retrofits or mitigate the property themselves.

Additional selected characteristics are examined in the table below including lacking complete plumbing facilities; lacking complete kitchen facilities; no telephone service available; housing units that are mobile homes; and housing units with no vehicles available.

***Table 13: Selected Housing Characteristics***

| | NCT Reservation | Lame Deer District | Ashland District | Birney District | Busby District | Muddy District |
|---|---|---|---|---|---|---|
| Occupied Housing Units | 1,176 (78.2%) | 553 (78.3%) | 231 (84.9%) | 39 (76.5%) | 160 (69.3%) | 193 (79.1%) |
| Lacking Complete Plumbing Facilities | 49 (4.2%) | 24 (4.3%) | 9 (3.9%) | 6 (15.4%) | 0 (0%) | 10 (5.2%) |
| Lacking Complete Kitchen Facilities | 49 (4.2%) | 24 (4.3%) | 9 (3.9%) | 6 (15.4%) | 0 (0%) | 10 (5.2%) |
| No Telephone Service Available | 153 (13%) | 32 (17.9%) | 32 (13.9%) | 0 (0%) | 17 (10.6%) | 5 (2.6%) |
| Housing Units with No Vehicles Available | 90 (7.7%) | 52 (9.4%) | 21 (9.1%) | 0 (0%) | 9 (5.6%) | 8 (4.1%) |
| Mobile Homes | 228 (15.2%) | 117 (16.6%) | 42 (15.4%) | 6 (11.8%) | 12 (5.2%) | 51 (20.9%) |

*Indicated percentages are determined based on total occupied housing units within each district.*
*Source: U.S. Census Bureau, 2019 ACS*

Approximately thirteen percent of housing units within the reservation lack access to landline telephone service. This does not necessarily indicate that there is not a phone in the housing unit, as cellular

[43] Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index 2018. SVI Interactive Map. https://svi.cdc.gov/map.html.

telephones are increasingly a primary form of telephone service. However, this lack of access to landline telephone service with reverse 911 call trees does represent a population at increased risk during emergency response procedures. Nearly fifteen percent of all occupied housing units in the planning area are mobile homes, which have a higher risk of sustaining damages during high wind events, tornadoes, severe thunderstorms, and severe winter storms. Thunderstorms are classified as severe when wind speeds exceed 58 mph, just under the 60 mph winds that can overturn mobile homes that are not anchored or are anchored incorrectly. Updating and adopting stricter local building costs is a cost-effective way for the Tribe to continue to improve housing stock durability. Lastly, just under eight percent of all occupied housing units do not have a vehicle available. Households without vehicles may have difficulty evacuating during a hazardous event and a reduced ability to access resources in times of need.

There are platted townsites with lots and streets in Busby and in Lame Deer, but there are no zoning regulations or subdivision regulations on the Northern Cheyenne Reservation. The Land Committee, consisting of Tribal Council members, guides land use and development on tribal lands. The Northern Cheyenne Tribe has adopted a policy to retain and acquire as much of the Reservation in tribal ownership as possible. When privately owned lands on the reservation are available for sale, the tribal policy is to match the highest bid to acquire the land. The Land Committee also reviews requests from tribal members to lease land for residences and identifies tribal lands for subdivisions.

Most subdivisions are managed by the Northern Cheyenne Housing Authority. Several of the subdivisions are known locally by other names. The Tribe has changed some of the official names to be more reflective of the Northern Cheyenne culture. A list of subdivisions across the reservation are included in the table below.

***Table 14: Northern Cheyenne Subdivisions***

| NAME | LOCATION | LOCALLY KNOWN AS: |
|---|---|---|
| BUSBY SUBDIVISION | Busby, near Post Office | |
| MAGIC CITY | Busby—west end | |
| EAGLE FEATHERS | Near intersection of Highways 212 and 314 | |
| MUDDY CREEK | East of Busby, just west of Big Horn County-Rosebud County line | Muddy Cluster |
| BIG BACK SUBDIVISION | | Rosebud Subdivision |
| ASHLAND WALKING HORSE | West of Ashland | Happy Flats |
| ASHLAND MEADOW ACRES | West of Ashland | Rabbit Town |
| ALLEN ROWLAND SUBDIVISION | | |
| BIRNEY SUBDIVISION | Birney | |
| TWO MOONS | Lame Deer | |
| CRAZYHEAD HEIGHTS | Lame Deer | |
| SWEET MEDICINE | Lame Deer | |
| SPOTTED ELK | Lame Deer | |
| SHOULDERBLADE HEIGHTS | Lame Deer | |
| RIDGE WALKER HEIGHTS | Lame Deer | |
| MEDICINE ELK | Lame Deer | |
| WESTSIDE HOUSING | Lame Deer | |

Source: Tribal Housing Authority, 2006 HMP

The Land Use Committee approves location of tribal housing developments, and the Northern Cheyenne Housing Authority then takes on responsibility for site design, typically by contracting for such services. The Northern Cheyenne Tribe reviews for environmental factors, such as floodplains, for the housing developments. An environmental review may also be conducted by the BIA or IHS depending on the type of development and if a federal funding source is being utilized. Developments on tribal lands would be reviewed by the Tribal Council and Housing Authority or other applicable agencies. Developments on privately owned lands, not requiring any federal or tribal financial assistance may not require any kind of review.

A significant factor for identifying new development locations is the proximity to existing infrastructure. The majority of all new residential development on the reservation has been developed within approximately 1/8 mile of existing utilities (telephone, water, and power). This is true for both individual residences constructed on individually owned land and housing developments on tribal land.

## Economy

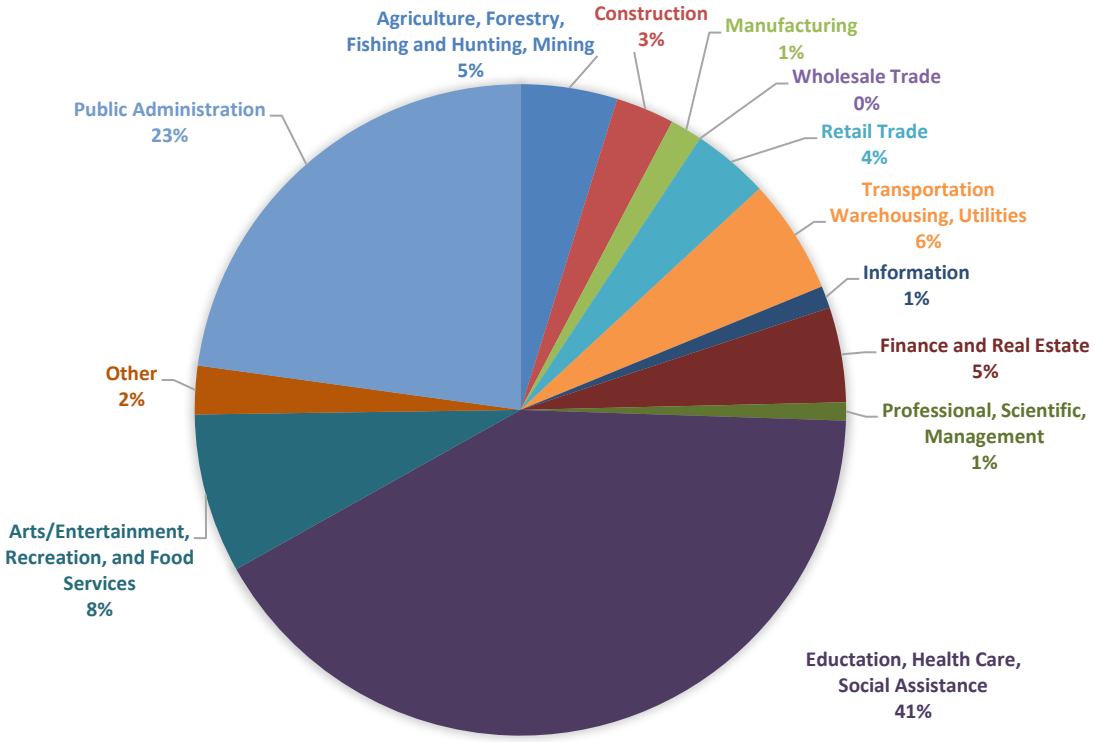
The reservation's economic base is a mixture of education and arts and entertainment uses. Employment statistics for the Pine Ridge Reservation, counties, state, and participating community are found below. The U.S. Census Bureau defines "not in the labor force" as individuals without a current job and who are not looking for one. These may include students, stay-at-home parents, and retirees. Individuals within the "Population 16 and Over in Labor Force" without a current job but are currently looking for work are included in the unemployment rate.

***Table 15: Employment Statistics***

| | NCT Reservation | Lame Deer District | Ashland District | Birney District | Busby District | Muddy District |
|---|---|---|---|---|---|---|
| **Population 16 and over in labor force** | 1,856 (58.9%) | 834 (56.7%) | 391 (69.1%) | 62 (65.3%) | 279 (52.6%) | 290 (59.2%) |
| **Employed** | 1590 (50.4%) | 721 (49%) | 326 (57.6%) | 46 (48.4%) | 216 (40.8%) | 281 (57.3%) |
| **Unemployed** | 252 (8%) | 105 (7.1%) | 65 (11.5%) | 16 (16.8%) | 57 (10.8%) | 200 (1.8%) |
| **Unemployment Rate** | 13.7% | 12.7% | 16.6% | 25.8% | 20.9 | 3.1% |
| **Population 16 and Over Not in Labor Force** | 1296 (41.1%) | 637 (43.3%) | 175 (30.9%) | 33 (34.7%) | 251 (47.4%) | 200 (40.8%) |

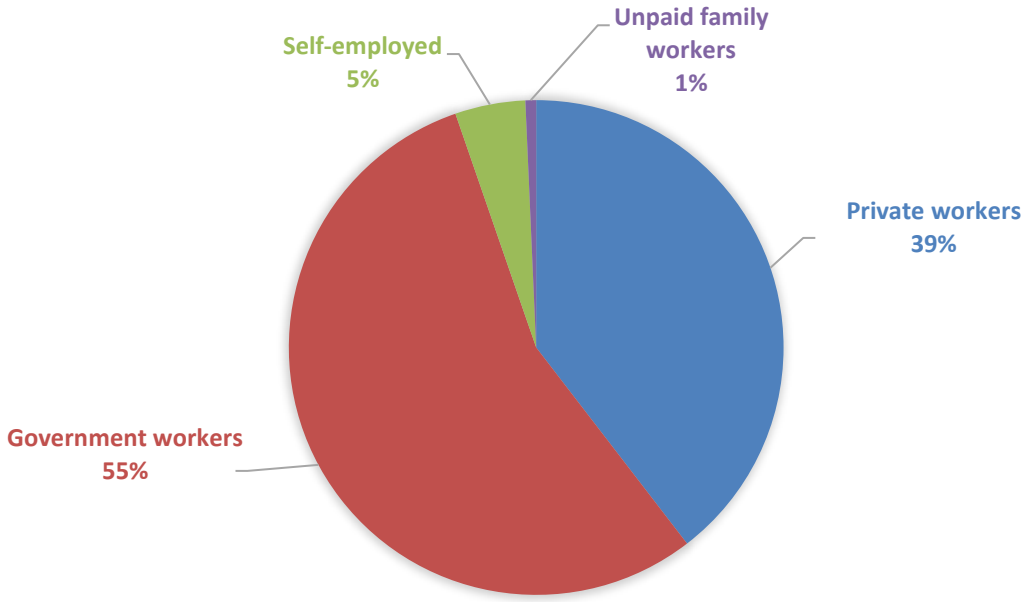
*Source: U.S. Census Bureau, 2019 ACS*

***Figure 17: Occupational Sector for Northern Cheyenne Reservation***




*Source: U.S. Census Bureau, 2019 ACS*

***Figure 18: Worker Classes***




*Source: U.S. Census Bureau, 2019 ACS*

***Table 16: Housing and Income***

| | NORTHERN CHEYENNE INDIAN RESERVATION | LAME DEER DISTRICT | ASHLAND DISTRICT | BIRNEY DISTRICT | BUSBY DISTRICT | MUDDY DISTRICT |
|---|---|---|---|---|---|---|
| MEDIAN HOUSEHOLD INCOME | $49,756 | $49,940 | $47,917 | $54,250 | $62,143 | $45,515 |
| PER CAPITA INCOME | $15,495 | $15,265 | $15,935 | $19,572 | $15,735 | $14,801 |
| MEDIAN HOME VALUE | $68,300 | $64,200 | N/A | N/A | $103,900 | $93,800 |
| MEDIAN RENT | $580 | $628 | $572 | N/A | $564 | $545 |
| % OF ALL PERSONS WITH INCOME BELOW POVERTY RATE | 25.4% | 29.5% | 26.3% | 0% | 10.7% | 31.2% |

*Source: U.S. Census Bureau, 2019 ACS*

Per capita income on the Northern Cheyenne Reservation in 2019 was $15,495, compared to the national per capita income of $34,103[44]. In 2019, 25.4% of all persons on the Reservation were at or below poverty level, compared to a national poverty rate of 10.5%. (U.S. Bureau of the Census)

### *Downtown Lame Deer*

The Northern Cheyenne Reservation private sector economy is based primarily on livestock. Businesses within the boundaries of the Reservation include a laundromat, hardware store, restaurants, bank, gas station, and a grocery store. With a few exceptions, all private commercial businesses are located in Lame Deer. Unemployment is a major issue which the local planning team noted is likely understated by census data, which in 2019 indicated that approximately 49% of all adults over the age of 16 were either unemployed or not considered as part of the "labor force."

Government employment accounted for over half of all workers on the Northern Cheyenne Reservation according to the 2019 census. Major government employers on the Reservation include the Northern Cheyenne Tribe, Bureau of Indian Affairs (BIA), Indian Health Service, and educational institutions.

## Land Ownership

Of the 440,000 acres that comprise the Northern Cheyenne Indian Reservation, 99% of the land is under tribal ownership. Most of this land is held in common by the Tribe and in trust with the federal government. Any private land holdings not held by tribal members are primarily agricultural land along the Tongue River and within the town of Lame Deer.

The Northern Cheyenne Tribe also owns off-reservation lands. One parcel is near the Tongue River Reservoir, south of the Reservation. Another parcel is south of the reservation, east of the off-reservation community of Birney. This parcel is ranch land and with no current plans for development. The third parcel is located in the Black Hills of South Dakota and currently there are no plans for development of this parcel. There is an existing house on the parcel.

[44] [44] U.S. Census Bureau, 2019. https://www.census.gov/quickfacts/fact/table/US/INC910219#INC910219

### *Land Use and Land Use Management*

The predominant land use on the Reservation is agricultural. Most of the population lives along main transportation routes or in Lame Deer. Development includes residential units developed privately or by the Northern Cheyenne Tribe, retail and commercial businesses, schools, churches, and other government buildings and structures. Most non-residential development is located in Lame Deer. Busby has a post office, youth detention facility, and K-12 public school. The St. Labre School is located near Ashland.

The Tribe has developed more than a dozen residential complexes, or subdivisions, in various locations on the Reservation. The Tribe generally does not sell lots within the subdivision, but rents or leases them out. There are no other developments for multiple houses on the Reservation other than the platted townsites of Busby and Lame Deer, and on lands managed directly by the federal government, such as the federal school complex and associated housing in Busby.

## Historic and Cultural Sites

***Figure 19: Moncure Tipi in Big Horn County***

Historic and cultural sites are particularly important to tribal members and may require specific protection. Sites that contain cultural resources such as old buildings, fossils, tipi rings, fire pits, old bones and flake chips from the making of arrowheads are protected. To aid in their protection, their locations are not public information. One historic point of interest is the Chief Two Moons Monument. The National Register of Historic Places for Montana identifies one historical site within the reservation, the Moncure Tipi near Busby. The tipi was constructed in 1931 and was a site for tribal give-away ceremonies and dances. The Cheyenne people are known for their reverence and connection to the buffalo. The Tribe manages a buffalo herd of approximately 250 head with grazing land located in the eastern portion of the reservation.

Of specific cultural importance to the Northern Cheyenne Tribe is the traditional language of Algonquin. The local planning team noted during the COVID-19 pandemic the Tribe suffered a significant loss of life, knowledge, and language as elders were the most heavily affected by the pandemic. NCT has a strong oral history tradition in which stories and aspects of local culture are passed down orally in Algonquin. As fluent speakers and elders with those stories passed during the pandemic, those deaths had a reverberating impact throughout the spiritual, mental, and emotional health of the tribal community. The local Chief Dull Knife College has a Language Revitalization program available for students; however, it would benefit the overall tribal community to expand this program into other schools and made available for Cheyenne youth.

The Northern Cheyenne Tribe and FEMA also have an agreement in place under Section 106 Tribal Consultation for cultural resources. FEMA tribal consultation is the process for communicating and collaborating with federally recognized Indian tribal governments to exchange information, receive input, and consider their views on actions that have tribal implications. This agreement would be triggered during major disaster events and is designed to ease communication process between tribe and federal agency.

## Transportation

Transportation routes are necessary for delivery of critical supplies and as potential evacuation routes. The main transportation routes on the Northern Cheyenne Indian Reservation consist of U.S. Route 212 and paved roads such as Montana Highway 39, Highway 4, County Road 312, Muddy Creek Rd, and Birney Rd. The main populated areas of Busby and Lame Deer are located along these major roadways. There are no airports or rail lines on the Reservation. The mean travel time to work is 19.9 minutes. Most commuters drive alone to work (69.8%), while 14% carpool and 6.9% walk.

***Table 17: Major Transportation Routes***

| ROAD NAME | LOCAL REFERENCE | DESCRIPTION | PAVED | MAINTAINED BY |
|---|---|---|---|---|
| Highway 212 | Highway 212 | Interstate highway | Yes | State of Montana |
| Highway 39 | Colstrip Road | Lame Deer to Colstrip and I-94 | Yes | State of Montana |
| Highway 314 | Kirby-Busby Road | Interstate Highway from Wyoming to Highway 212 | Yes | Unknown |
| BIA Route 11 | Ashland-Birney Road | South from Ashland on west side of Tongue River | Yes | BIA |
| BIA Route 4 | Birney-Lame Deer Road | Birney Day School site to Lame Deer | Portions | BIA |
| BIA Route 5 | Muddy Creek Road | South from Highway 212 along Muddy Creek | Yes | BIA |

Primarily other roads throughout the reservation are used for recreational purposes or hunting and are dirt roads, many of which are two-track or rough 4-wheel vehicle trails. Roads identified by the BIA as fire access routes and/or access to fire towers or the communication tower are maintained by the BIA as bladed dirt roads. Some known issues with existing roadways include:

- Severe cracking on the Muddy Creek Road (BIA Route #5)
- Some homes near Busby are reached by roads that cross the creek but where there are no bridges.
- Poor road conditions, including steep grades and inadequacy or lack of bridges, can make access difficult or impossible for wildland fire fighting equipment

## Development Trends

**D1 Element and Requirements §201.7(d)(3):** Was the plan revised to reflect changes in development?

a. The plan shall describe changes in development that have occurred in hazard prone areas since the last plan was approved. Not all development will affect a tribal government's vulnerability. If no changes are identified, plan updates shall validate the information in the previously approved plan.

Development across the Northern Cheyenne reservation has been primarily limited to within community centers, specifically in Lame Deer. The reservation's population has declined slightly in the past five years; however total number of families in the reservation remains relatively stable. Several new businesses have opened in the past five years including a new restaurant and local shops. The primary focus on development in the reservation is

for adequate housing for tribal residents. Available housing is severely lacking, and many existing homes are in severe disrepair or dilapidated conditions.

The Tribe is currently exploring options to develop housing between Muddy and Busby on the south side of the highway. The Tribe recently also acquired land south of Muddy to be developed for housing purposes. Housing Assistance Funding is occasionally available for home improvements; however, the Housing Authority noted the majority of these funds are used for maintenance and repair of existing properties rather than available for future developments. As of 2022, the Tribe was using some CDBG funds for housing improvement projects in Muddy and Busby.

Housing Authority and the Tribal Council are currently exploring the possibility of a Supportive Housing Solution to help support and provide housing to low-income, vulnerable populations, or those struggling with addiction or mental illness. These community-based housing options would provide support, counseling, and other social services through a long-term housing solution. As of summer 2022, Housing Authority is working on a reservation-wide needs assessment and identifying potential locations.

## Critical Facilities and Infrastructure

Critical facilities and infrastructure are vital to the continued delivery of key resources and services, as well as recovery efforts. The loss of these services significantly impacts the Tribe's ability to care for residents and to recover from a disaster event.

Critical facilities were identified and reviewed during this 2022 HMP update. Critical facilities were identified to align with FEMA's Community Lifelines approach. These lifelines and their subcomponents include, but are not limited to:

- Safety and Security – law enforcement, fire services, search and rescue, government services, and community safety buildings
- Food, Water, & Shelter
- Health and Medical – medical care, patient movement, public health, fatality management, and medical supply chain
- Energy – power (grid) and fuel centers
- Communications – infrastructure, alerts/warnings/messages, 911 call centers, responder communications, and finance
- Transportation – highway/roadways, mass transit, railway, aviation
- Hazardous Materials – Tier II facilities and HAZMAT

Facilities that may cause secondary impacts if damaged, contaminated, or destroyed, such as hazardous materials storage sites, are also considered critical facilities. The following table and figure provide a summary of the critical facilities for the Northern Cheyenne Tribe and key information. Due to the lack of a DFIRM for the reservation, a Level 1 HAZUS analysis was used to determine potential flood risk. Critical facilities located in the Flood Risk Hazard Area (FRHA), in wildfire priority areas (WPA), and/or in the wildland urban interface (WUI) are noted in the tables below. This does not constitute a comprehensive list of facilities. Note that due to security concerns for some specific types of critical facilities, not all facilities are mapped. Critical facilities should be reviewed and updated regularly by the local planning team during the annual review.

***Table 18: Safety and Security Lifelines***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| SAFETY AND SECURITY | Law Enforcement Security | 1 | Youth Detention Facility | |
| | | 2 | Adult Detention Center & Jail | Located in WPA |
| | | - | Northern Cheyenne Criminal Investigation Office | Not mapped – currently moving |
| | Fire Service | 3 | Northern Cheyenne Volunteer Fire Department Equipment Barn | |
| | | 4 | St. Labre Volunteer Fire Department | Located in FHRA<br>Located in WPA |
| | Search and Rescue | - | NONE | Currently working to establish a team |
| | Government Service | 5 | Northern Cheyenne Tribal Council and Office Building | Located in WPA |
| | | 6 | Tribal Forestry | Located in WPA |
| | | 7 | Bureau of Indian Affairs Office | Located in WPA |
| | | 8 | Housing Authority | Located in FHRA<br>Located in WPA |
| | Community Safety | 9 | Utilities Department | Located in WPA |
| | | 10 | Department of Em6ergency Services | Located in WPA |

***Table 19: Food, Water, and Shelter Lifelines***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| FOOD, WATER, SHELTER | Food | 11 | Lame Deer Trading Post | Located in WPA |
| | | 12 | Ashland Warrior Grocery | Located in WPA |
| | Water | 13 | Busby Water Treatment | |
| | | 14 | Northern Cheyenne Water Plant – Lame Deer | Located in WPA |
| | | 15 | Water Tank | |
| | | 16 | Lame Deer Lagoons | Located in FHRA<br>Located in WPA |
| | | 17 | Ashland Lagoons | |
| | Shelter | 18 | Community Building – Muddy | |
| | | 19 | Community Building – Busby | |
| | | 20 | Community Building – Birney | |
| | | 21 | Community Building – Rabbit Town | |
| | | 22 | Christ the King Catholic Church | Located in WPA |
| | | 23 | St. Labre Indian School HS Gym | 500 capacity |
| | | 24 | Lame Deer School Elementary Gymnasium | 200 Capacity<br>Located in WPA |
| | | 25 | Boys and Girls Club of NCT Gymnasium | 100 capacity<br>Located in WPA |
| | | 26 | Baptist Church | 100 capacity<br>Located in WPA |
| | | 27 | Ashland Community Health Center | 5 capacity, to be used for mass clinic site<br>Located in WPA |

| | | | | |
|---|---|---|---|---|
| | | 28 | NC Community Health Center | 30 capacity, to be used for mass clinic site<br>Located in WPA |

***Table 20: Health and Medical Lifelines***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| HEALTH AND MEDICAL | Medical Care | 29 | Indian Health Services Office & Clinic | Located in WPA |
| | Fatality Management | 30 | Ambulance Service | Located in WPA |
| | Public Health | 31 | Public Health and Human Services | Located in WPA |
| | | 32 | NCT Board of Health | Located in WPA |
| | | 33 | Temporary Housing (used for quarantine) | |

***Table 21: Energy Lifelines***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| ENERGY | Power Grid | 34 | Substation | Located in WPA |
| | | 35 | Substation | Located in WPA |
| | Fuel | 36 | Conoco – Gas Station | Located in FHRA<br>Located in WPA |
| | | 37 | Exxon – Gas Station | |
| | | 38 | Conoco – Gas Station | Located in WPA |
| | | 39 | Sinclair – Gas Station | Located in WPA |
| | | 40 | Travel Center (Cheyenne Depot #3) | Under development |

***Table 22: Communications Lifelines***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| COMMUNICATIONS | Infrastructure | - | Cell Towers | Not mapped – currently adding additional towers in Busby and Lame Deer<br>Wildfire, Severe storms – damage or power loss |
| | Alerts, Warnings, and Messages / 911 and Dispatch | 41 | Siren | Located in WPA |

Most communities in the Reservation are located along Highway 212 and have coverage by the major mobile wireless carriers such as AT&T, Version, and T-Mobile. According to the US Census in 2019 13% of all housing units were without any kind of telephone service (including land line service) which is a significant decrease since the 2000 census (anticipated 25% of all homes lack telephone service). Cell phone reception may become unavailable in the more remote, undeveloped parts of the Reservation, especially during a disaster event. Most of the Reservation is within receiving range of two NOAA Weather Radio Transmitters, WNG724 Hardin or WXM46 Sheridan. Parts of the Reservation may also receive alerts from the NOAA Weather Radio in Forsyth. Severe weather warnings for the Reservation are issued by KIKC radio station out of Forsyth, Montana. KIKC is the only radio station that can be received in Lame Deer.

***Table 23: Transportation Lifelines***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| TRANSPORTATION | Highway | - | Highway 212 | Not mapped<br>Blocked access for evacuation<br>High heat causing buckling |
| | | - | Highway 39 | Not mapped<br>Blocked access for evacuation |
| | | - | Highway 314 | Not mapped<br>Blocked access for evacuation |
| | | - | BIA Route 11 | Not mapped<br>Blocked access for evacuation |
| | | - | BIA Route 4 | Not mapped<br>Blocked access for evacuation |
| | | - | BIA Route 5 | Not mapped<br>Blocked access for evacuation<br>Portions unpaved |
| | | 42 | Transportation Building | Located in WPA |
| | Aviation | - | NONE | |
| | Railway | - | NONE | |

***Table 24: Hazardous Materials Lifelines***

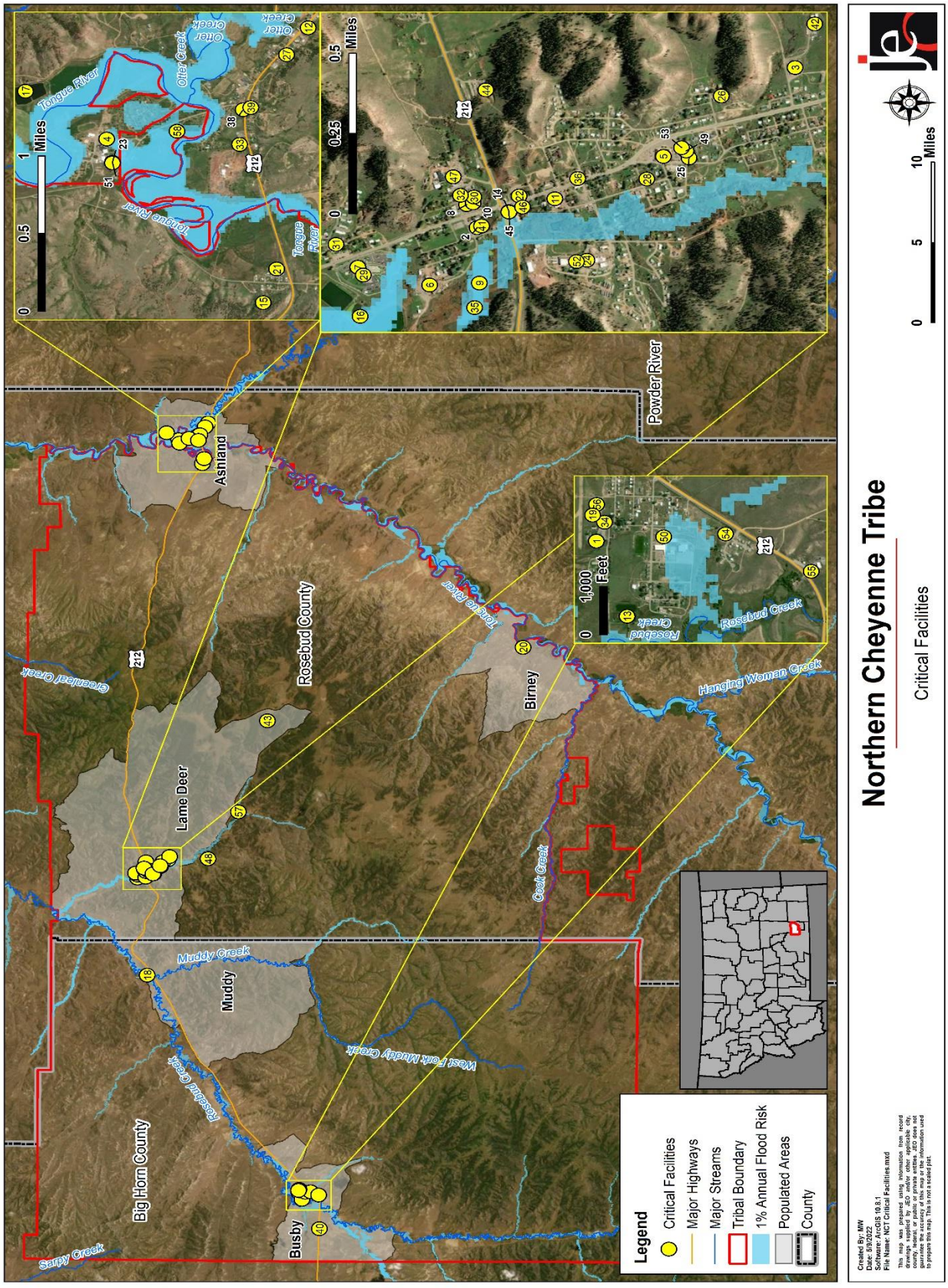
| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| HAZARDOUS MATERIALS | Facilities | 43 | Tier II Facility – Lame Deer Dam | Hazardous Material Release |
| | HAZMAT, Pollutants, Contaminants | - | None | |

***Table 25: Other Key Critical Facilities or Infrastructure***

| | COMPONENTS | # | CRITICAL FACILITY | NOTES OR CONCERNS |
|---|---|---|---|---|
| OTHER KEY CRITICAL FACILITIES | Key Businesses | 44 | Charging Horse Casino | Located in WPA |
| | Key Businesses | 45 | Commerce Center (key local businesses) | Located in WPA |
| | Key Businesses | 46 | Flower Grinder (local business) | Located in WPA |
| | Schools | 47 | Chief Dull Knife College | Located in WPA |
| | Schools | 48 | Lame Deer High School | Located in WPA |
| | Schools | 49 | Lame Deer Elementary | Located in WPA |
| | Schools | 50 | Northern Cheyenne Tribal School | |
| | Schools | 51 | St. Labre Indian School | |
| | Schools | 52 | Lame Deer School District | Located in WPA |
| | Child Care | 53 | Headstart Childcare | Located in WPA |
| | Cultural Sites | 54 | Indian Chief Two Moons Historical Monument | |
| | Cultural Sites | 55 | Moncure Tipi | |
| | Cultural Sites | 56 | Powwow Circle | |
| | Cultural Sites | 57 | Lame Deer Powwow Circle | Located in WPA |
| | Cultural Sites | 58 | Ashland Teepee Circle | Located in FHRA |

Local concerns exist if power supplies were out for any extended period of time, public water supply systems could be drained within days, depending on the amount of water in storage at the time of the power outage. All public water supply systems on the reservation are from wells which require power to pump from the source to the storage/distribution systems. Virtually all homes in areas not served by public systems are also on wells. There are a number of springs on the Reservation, which could be used to some extent as back-up water supply in an emergency, but severe weather, snow, or wildfires could hinder ability to access these springs.

***Figure 20: Critical Facilities***



## *Water Utilities*

The Northern Cheyenne Utilities Commission (NCUC) provides and services the water and sewer services for tribal residents. NCUC operates systems in all five districts and receives service fees from hooked up residents to fund operations. As of 2022 the commission services approximately 1,500 residents across the reservation. Many residents across the reservation also utilize their own septic sewer tank systems (approximately 550 homes) which are not connected to the NCUC system. NCUC raised rates in 2021 for the first time in over a decade in order to address lagging funds and limited financial ability to update, repair, or extend service infrastructure.

Water service and outages are a major concern for the commission and residents. Water outages have lasted up to a month at times and a boil notice is required for any outage over 24 hours. Water quality issues also exist in several areas including heavy metals and brown water in Busby. Pipes throughout each of the districts are composed of various materials, including clay, rubber, and cast iron. NCUC recently completed a mapping project to digitally map all service lines. However, the last full renovation of water systems and existing lagoons was completed in the 1980s.

There are water tanks located in each district and each district has two wells apart from Birney which has only one well. A well pump in Lame Deer was replaced since 2019. Water tanks and wells throughout the reservation are used for residential and commercial use, as well as may be utilized for wildland fire response to fill tankers and tenders. The local planning team noted current water tanks are inadequate for fire response. Specifically, the water tank in Lame Deer has major pressure issues, partially due to developments located at a higher elevation than the gravity-fed water infrastructure. These developments and homes struggle to receive adequate water supply and pressure.

Specific projects identified by NCUC to pursue in the coming decade to address local concerns included building an additional water tank in Lame Deer and/or renovate the existing tank, a new well in Busby to address water quality concerns, a new well in Birney to address supply issues, installing backup generators in each districts' pump house, and upgrades to lagoons (Lame Deer lagoon renovations and new lagoon currently under construction near Ashland).

## *Emergency Services*

The Northern Cheyenne have an Emergency Operation Plan, coordinated by the Northern Cheyenne Disaster and Emergency Services (DES). The Northern Cheyenne Tribal Emergency Response Services have executed general mutual aid agreements with nearby emergency response services. Any disaster within the Reservation may require the coordination, communication, and cooperation of several governments and federal agencies. These may include but are not limited to:

- Northern Cheyenne Tribal Government
- Bureau of Indian Affairs
- Indian Health Service
- Rosebud County Department of Emergency Services
- Big Horn County Department of Emergency Services
- Crow Tribe
- Montana Department of Natural Resources and Conservation
- Montana Department of Emergency Services
- US Department of Interior
- US Department of Health and Human Services

- US Federal Emergency Management Agency

Fire service is provided by various entities on the Reservation including the Northern Cheyenne Volunteer Fire Department at Lame Deer and a volunteer fire department at the St. Labre Mission. These fire departments are responsible for responding to all structural fire events across the reservation. The BIA in Lame Deer has wildland fire fighting capabilities and responds to grass or wildfire events alongside the volunteer fire departments. In addition, nearby towns of Colstrip and Ashland have apparatus and volunteer fire departments which may be tapped for support during large fire events.

Law enforcement is provided by the Northern Cheyenne Agency BIA. Ambulance service is provided by the Northern Cheyenne Ambulance Service, with a crew on call 24 hours/day, supported by the Quick Response Unit in Ashland. There is a 24-hour/day emergency dispatch center at the Northern Cheyenne BIA Law Enforcement Center. The Emergency Medical Services have their own 24-hour dispatch and receive emergency calls in the BIA Law Enforcement Dispatch Center by a telephone line established in the community as a hot-line.

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# CHAPTER 4: HAZARD ANALYSIS AND RISK ASSESSMENT

**B3 Element and Requirements §201.7(c)(2)(ii):** Does the plan include a description of [each] identified hazard's impact, as well as an overall summary of the vulnerability of the tribal planning area?

a. The plan shall describe the potential impacts of each of the identified hazards on the tribal planning area.
b. The plan shall provide an overall summary of the vulnerability of the tribal planning area to the identified hazards. An overall summary of vulnerability identifies structures, systems, populations, and other assets as defined by the tribal government.

The ultimate purpose of this hazard mitigation plan is to minimize the loss of life and property damage across the planning area. The basis for the planning process is the regional and local risk assessment. This section contains a description of potential hazards, regional vulnerabilities and exposures, probability of future occurrences, and potential impacts and losses. By conducting a holistic risk assessment, the Tribe can develop specific strategies to address areas of concern identified through this process. The following table defines terms that will be used throughout this section of the plan.

- Hazard - A potential source of injury, death, or damages
- Asset - People, structures, facilities, and systems that have value to the community
- Risk - The potential for damages, loss, or other impacts created by the interaction of hazards and assets
- Vulnerability - Susceptibility to injury, death, or damages to a specific hazard
- Impact - The consequence or effect of a hazard on the community or assets
- Historical Occurrence - The number of hazard events reported during a defined period of time
- Extent - The strength or magnitude relative to a specific hazard
- Probability - Likelihood of a hazard occurring in the future

## Methodology

The risk assessment methodology utilized for this plan follows the same methodology as outlined in the FEMA Local Mitigation Planning Handbook. This process consists of four primary steps:

1) Describe the hazard;
2) Identify vulnerable community assets;
3) Analyze risk; and
4) Summarize vulnerability.

When describing the hazard, this plan will examine the following items: previous occurrences of the hazard within the planning area; locations where the hazard has occurred in the past or is likely to occur in the future; extent of past events and likely extent for future occurrences; and probability of future occurrences. Risk analysis will include both qualitative (i.e., description of historic or potential impacts) and quantitative data (i.e., assigning values and measurements for potential loss of assets). For each of the hazards profiled the best and most appropriate data available have been considered.

### *Average Annual Damages and Frequency*

**B2 Element and Requirements §201.7(c)(2)(i):** Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for the tribal planning area?

a. The plan shall include the history of previous events for each of the identified hazards.
b. The plan shall include the probability of future events for each identified hazard. Probability must include considerations of future conditions, including the effects of long-term changes in weather patterns on identified hazards.

FEMA suggests that when the appropriate data is available, hazard mitigation plans should also provide an estimate of potential dollar losses for structures in vulnerable areas. This risk assessment methodology includes an overview of assets at risk and provides historic average annual dollar losses for all hazards for which historic event data are available. Additional loss estimates are provided separately for those hazards for which sufficient data is available. These estimates can be found within the relevant hazard profiles.

Average annual losses from historical occurrences can be calculated for those hazards which there is a robust historic record and for which monetary damages are recorded. There are three main pieces of data used throughout this formula.

- Total Damages in Dollars: This is the total dollar amount of all property damages and crop damages as recorded in federal, state, and local data sources. The limitation to these data sources is that dollar figures usually are estimates and often do not include all damages from every event, but only officially recorded damages from reported events.
- Total Years of Record: This is the span of years there is data available for recorded events.
- Number of Hazard Events: This shows how often an event occurs. The frequency of a hazard event will affect how a jurisdiction responds. A thunderstorm may not cause much damage each time, but multiple storms can have an incremental effect on housing and utilities. In contrast, a rare tornado can have a widespread effect on the area.

An example of the Event Damage Estimate is found below:

$$Annual\ Damages\ (\$) = \frac{Total\ Damages\ (\$)}{Total\ Years\ Recorded\ (\#)}$$

Each hazard will be included, while those which have caused significant damages or occurred in significant numbers are discussed in greater detail. It should be noted NCEI data are not all inclusive and the database provides very limited information on crop losses. To provide a better picture of the crop losses associated with the hazards within the planning area, crop loss information provided by the Risk Management Agency (RMA) of the USDA was also utilized for this update of the plan for counties with available data. The collected data were from 2000 to 2021. Data for all the hazards are not always available, so only those with an available dataset are included in the loss estimation.

Annual probability can be calculated based on the total years of record and the total number of years in which an event occurred. An example of the annual probability estimate is found below:

$$Annual\ Probability\ (\%) = \frac{Total\ Years\ with\ an\ Event\ Occurring\ (\#)}{Total\ Years\ Recorded\ (\#)}\ x\ 100$$

The annual probability percentage was then categorized into one of four categories as described in the

table below.

***Table 26: Probability Rating and Categories***

| RATING | LIKELIHOOD | FREQUENCY OF OCCURRENCE |
|---|---|---|
| **1** | Unlikely | 0%-5% probability to occur based on historical record |
| **2** | Possible | 6%-49% probability to occur based on historical record |
| **3** | Likely | 50%-79% probability to occur based on historical record |
| **4** | Highly Likely | 80%-100% probability to occur based on historical record |
| **5** | Unknown | No data available for determination |

## *Hazard Identification*

The identification of relevant hazards for the planning area began with a review of the prior FEMA approved Northern Cheyenne Tribe HMP (2006) and the 2018 State of Montana Hazard Mitigation Plan. The Planning Team reviewed the list of hazards addressed in the state mitigation plan and the previous HMP at the kick-off meeting to determine which hazards were appropriate for discussion relative to the planning area. The hazards for which a risk assessment was completed are included in the following table.

***Table 27: Hazards Evaluated in 2022 Plan***

| HAZARDS ADDRESSED IN THE PLAN | | | |
|---|---|---|---|
| Drought and Extreme Heat | Hazardous Material Spills | Thunderstorms (includes hail, lightning, and heavy rain) | Volcanic Eruptions |
| Earthquake | Landslides | Terrorism | Wildfire (includes grass, wildfire, and coal seam) |
| Flooding (includes flooding from dam failure) | Public Health Concerns (includes agricultural disease, water quality, and public health epidemics) | Tornadoes and High Winds | Winter Storms (includes extreme cold, blizzards, ice, and heavy snow) |

## *Hazard Elimination or Changes*

Given the location and history of the planning area the following hazards listed in the 2018 State of Montana HMP and/or previous NCT HMP were not included in this HMP. A brief explanation of why the hazards were eliminated is provided below.

- Avalanche – This hazard was identified as no longer a concern for the planning area.
- Power outages/Loss of Communication – Power failure commonly occurs as an impact after major hazard events. Additionally, there are limited data resources available to quantify power failure events and cost estimates.

Changes to hazards in this plan include the following:

- Severe Thunderstorms, Hail, Wind, and Tornadoes – High wind and tornadoes have been separated as an individual hazard. Severe Thunderstorms now includes only thunderstorm wind, hail, heavy rain, and lightning.
- Hazardous Materials/Transportation-Related Accidents – Transportation-Related Accidents have been removed from the HMP. Relevant transportation concerns are included in Section Three.
- Epidemics/Water Contamination – This hazard has been renamed to Public Health Concerns and

includes discussion of agricultural plant and animal disease, water quality concerns, and public health.

**B1 Element and Requirements §201.7(c)(2)(i):** Does the plan include a description of the type, location, and extent of all natural hazards that can affect the tribal planning area?

a. The plan shall include a description of the tribal planning area
b. The plan shall include a description of the natural hazards that can affect the tribal planning area.
c. The plan shall provide the rationale for the omission of any natural hazards that are commonly recognized to affect the tribal planning area.
d. The description shall include information on the location and the extent of each identified hazard.

## *Hazard Assessment Summary Tables*

The following table provides an overview of the data contained in the hazard profiles. Hazards listed in this table and throughout the section are in alphabetical order. This table is intended to be a quick reference for people using the plan and does not contain source information. Source information and full discussion of individual hazards are included in individual hazard profiles.

***Table 28: Hazard Risk Occurrence for NCT***

| HAZARD | | PREVIOUS OCCURRENCE EVENTS | APPROXIMATE ANNUAL PROBABILITY | LIKELY EXTENT |
|---|---|---|---|---|
| **DROUGHT & EXTREME HEAT** | Drought | 527/1,523 months | 33% | Mild Drought (D1) |
| | Extreme Heat | Avg. 3 days per year >90°F | 69/94 = 73% | Temps in excess of 90°F annually |
| **EARTHQUAKES** | | 3 | 3/32 = 9% | ~2.0-3.0 magnitude |
| **FLOODING** | Flood | 24 | 14/26 = 54% | Inundation of structures and roads near streams likely. Some evacuations of people may be necessary. Moderate flooding extent anticipated. |
| | Flash Flood | 28 | | |
| **HAZARDOUS MATERIALS** | Fixed Site | 1 | 1/32 = 3% | Localize to the facilities and adjacent surroundings |
| | Transportation | 1 | 1/51 = 2% | Limited (<0.5 mile) from release site, anticipated highway closures |
| **LANDSLIDES** | | 0 | Unknown | Risk to rural homes, transportation corridors, and businesses near slopes |
| **PUBLIC HEALTH CONCERNS** | Agricultural Disease | 35 Plant Disease; 8 Animal Disease | 15/22 = 68% 13/13 = 100% | Unknown for plant disease. Avg. 7 animals per outbreak. |
| | Water Quality | Unavailable | Unavailable | May range from single wells to whole drainage basin |
| | Public Health | >1 | Unknown | Varies by event; >1 injury of fatality |

| HAZARD | | PREVIOUS OCCURRENCE EVENTS | APPROXIMATE ANNUAL PROBABILITY | LIKELY EXTENT |
|---|---|---|---|---|
| THUNDER-STORMS | Hail | 488 | 26/26 = 100% | Range 0.75”-4.0” Avg. 1.14” |
| | Heavy Rain | 8 | 3/26 = 12% | Inundation of some structures, overwhelmed stormwater system |
| | Lightning | 3 | 3/26 = 12% | Damaged property, trees; Wildfire ignitions |
| | Thunderstorm Wind | 279 | 24/26 = 92% | Range 50-100mph Avg. 59 mph |
| TERRORISM | | 0 | <1% | Varies by event. |
| TORNADOES & HIGH WINDS | High Winds | 124 | 22/26 = 84% | Level 9 BWR () |
| | Tornadoes | 7 | 4/26 = 15% | EF0 |
| VOLCANIC ERUPTIONS | | 0 | Unknown | Moderate to Significant ashfall (300-1,000mm) |
| WILDFIRE | | 34 | 4/14 = 29% Likely | Avg. fire >12,000 acres; Moderate risk to homes and structures threatened or at risk |
| WINTER STORMS | Blizzards | 32 | 6/26 = 23% | .5 - 1.5” ice 20-40°below zero (wind chills) 6-10” snow 25-40 mph winds |
| | Extreme Cold | 4 | 1/26 = | |
| | Heavy Snow | 80 | 16/26 = 62% | |
| | Ice Storm | 4 | 3/26 = 12% | |
| | Winter Storms | 131 | 15/26 = 58% | |
| | Winter Weather | 5 | 4/26 = 15% | |

## Historical Disaster Declarations

The following tables show past disaster declarations that have been granted within the planning area.

### *Presidential Disaster Declarations*

The presidential disaster declarations involving the planning area from 1978 to 2020 are summarized in the following table. Prior to 2013, tribal reservations were included in County or State based Presidential emergency or major disaster declarations. The Sandy Recovery Improvement Act of 2013 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act to allow federally recognized Indian tribal governments the ability to request a disaster declaration.

***Table 29: Presidential Disasters***

| DISASTER DECLARATION NUMBER | YEAR | TITLE | DESIGNATED AREAS |
|---|---|---|---|
| DR-558-MT | 1978 | SEVERE STORMS & FLOODING | Rosebud (County), Big Horn (County) |
| DR-777-MT | 1987 | SEVERE STORMS & FLOODING | Rosebud (County) |
| DR-1340-MT | 2000 | WILDFIRES | Northern Cheyenne Indian Reservation, Big Horn (County), Rosebud (County) |
| DR-1377-MT | 2001 | SEVERE WINTER STORMS | Big Horn (County) |
| EM-3253-MT | 2005 | HURRICANE KATRINA EVACUATION | Big Horn (County), Rosebud (County) |
| DR-1996-MT | 2011 | SEVERE STORMS AND FLOODING | Northern Cheyenne Indian Reservation, Big Horn (County), Rosebud (County) |
| FM-2989-MT | 2012 | ASH CREEK FIRE | Rosebud (County) |
| DR-4074-MT | 2012 | WILDFIRE | Rosebud (County) |
| DR-4127-MT | 2013 | FLOODING | Rosebud (County) |
| DR-4172-MT | 2014 | ICE JAMS AND FLOODING | Rosebud (County) |
| EM-3476-MT | 2020 | COVID-19 | Northern Cheyenne Indian Reservation, Big Horn (County), Rosebud (County) |
| DR-4508-MT | 2020 | COVID-19 PANDEMIC | Northern Cheyenne Indian Reservation, Big Horn (County), Rosebud (County) |
| FM-5345-MT | 2020 | SNIDER/RICE FIRE COMPLEX | Rosebud (County) |

*Source: Federal Emergency Management Agency, 2001-2021*[45]
**Only counties within planning area are included.*

[45] Federal Emergency Management Agency. 2021. "Disaster Declarations." Accessed July 2021. https://www.fema.gov/disasters.

## Drought and Extreme Heat

Drought is generally defined as a natural hazard that results from a substantial period of below normal precipitation. Drought is a slow-onset, creeping phenomenon that can affect a wide range of people, livestock, and industries. Summer-time droughts can often coexist with periods of extreme heat, which together can cause significant social stress, economic losses, and environmental degradation. Extreme heat can also be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulty cooling through the normal method of the evaporation of perspiration. Both physical and mental health risks arise when a person is overexposed to heat or prolonged drought conditions. Extreme heat can also cause people to overtax air conditioners, which can lead to high energy use and power failures. Power outages for prolonged periods increase the risk of heat stroke and subsequent fatalities due to loss of cooling and proper ventilation.

The planning area is primarily rural with a few unincorporated community centers which present added vulnerabilities to extreme heat and drought events including significant distance to medical resources for many tribal residents and negative impacts to the local environment, agricultural land, or businesses in the area.

While many impacts of these hazards are non-structural, there is the potential that during extreme heat or prolonged drought events structural impacts can occur. Drought normally affects more people than other natural hazards, and its impacts are spread over a larger geographical area. As a result, the detection and early warning signs of drought conditions or long-term extreme heat and assessment of impacts are more difficult to identify than that of quick-onset natural hazards (e.g., flood) that results in more visible impacts. According to the National Drought Mitigation Center (NDMC), droughts are classified into four major types:

- **Meteorological Drought** – is defined based on the degree of dryness and the duration of the dry period. Meteorological drought is often the first type of drought to be identified and should be defined regionally as precipitation rates and frequencies (norms) vary.
- **Agricultural Drought** – occurs when there is deficient moisture that hinders planting germination, leading to low plant population per hectare and a reduction of final yield. Agricultural drought is closely linked with meteorological and hydrological drought; as agricultural water supplies are contingent upon the two sectors.
- **Hydrological Drought** – occurs when water available in aquifers, lakes, and reservoirs falls below the statistical average. This situation can arise even when the area of interest receives average precipitation. This is due to the reserves diminishing from increased water usage, usually from agricultural use of high levels of evapotranspiration, resulting from prolonged high temperatures. Hydrological drought often is identified later than meteorological and agricultural drought. Impacts from hydrological drought may manifest themselves in decreased hydropower production and loss of water-based recreation.
- **Socioeconomic Drought** – occurs when the demand for an economic good exceeds supply due to a weather-related shortfall in water supply. The supply of many economic goods includes, but are not limited to: water, forage, food grains, fish, and hydroelectric power.[46]

For the State of Montana, drought is primarily measured through a combination of available soil moisture and the Standardized Snow Water Equivalent (SWE). The NOAA National Weather Service's National Operational Hydrologic Remote Sensing Center (NOHRSC) SNOw Data Assimilation System (SNODAS)

[46] National Drought Mitigation Center. 2017. "Drought Basics." http://drought.unl.edu/DroughtBasics.aspx.

calculates estimates of standardized snow pack for the north western portion of the United States. SNODAS is a modeling and data assimilation system developed by NOHRSC to provide the best possible estimates of snow cover and associated parameters to support hydrologic modeling and analysis. Standardization is conducted using a similar framework to computation of the standardized precipitation index (SPI).

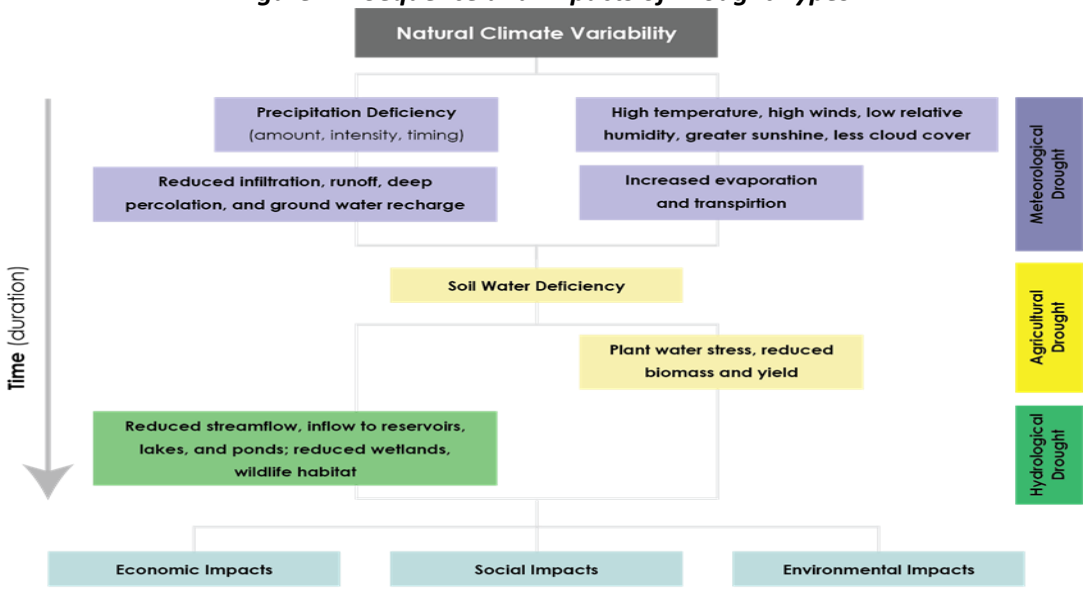
The NWS is responsible for issuing excessive heat outlooks, excessive heat watches, and excessive heat warnings.

- Excessive heat outlooks are issued when the potential exists for an excessive heat event in the next 3 to 7 days. Excessive heat outlooks can be utilized by public utility staffs, emergency managers, and public health officials to plan for extreme heat events.
- Excessive heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours.
- Excessive heat warnings are issued when an excessive heat event is expected in the next 36 hours. Excessive heat warnings are issued when an extreme heat event is occurring, is imminent, or has a very high probability of occurring.

Along with humans, animals also can be affected by high temperatures, drought conditions, and humidity levels. For instance, horses, cattle, and other farm animals respond to heat by reducing feed intake, increasing their respiration rate, and increasing their body temperature. These responses assist the animal in cooling itself, but this is usually not sufficient. When animals overheat, they will begin to shut down body processes not vital to survival, such as milk production, reproduction, or muscle building. Additionally, government authorities report that civil disturbances and riots are more likely to occur during heat waves or when water supplies are threatened.

The following figure indicates different types of droughts, their temporal sequence, and the various types of effects they can have on a community.

***Figure 21: Sequence and Impacts of Drought Types***




*Source: National Drought Mitigation Center, University of Nebraska-Lincoln, 2017*[47]

[47] National Drought Mitigation Center. 2017. "Types of Drought." http://drought.unl.edu/DroughtBasics/TypesofDrought.aspx.

### *Location*

The entire planning area is susceptible to impacts resulting from drought and extreme heat. The local planning team noted most residents have their own wells. Lame Deer and Busby have a water treatment system while the Muddy district uses a water tank for local water supplies. The tribe has two mesonet weather/climate stations as of June 2021 with two additional stations scheduled to be installed by USACE by end of 2023. The first station installed, Busby North, is northeast of Lame Deer in the Sarpy Mountains and the second station, Birney North, is in the southeast portion of the Reservation.

### *Historical Occurrences*

The Palmer Drought Severity Index (PDSI) is utilized by climatologists to standardize global long-term drought analysis. The PDSI was developed in 1965 to measure dryness based on recent precipitation and temperatures. The data for the planning area was collected from NOAA's Climate Division 5 – South Central Montana which covers Big Horn County and Climate Division 7 – Southeastern Montana which includes Rosebud County between the years of 1895 and 2021.[48] The table below shows details of the Palmer classifications. The figures below show the data from this time period from NCEI. The negative Y axis represents a drought, for which '-2' indicates a moderate drought, '-3' a severe drought, and '-4' an extreme drought.

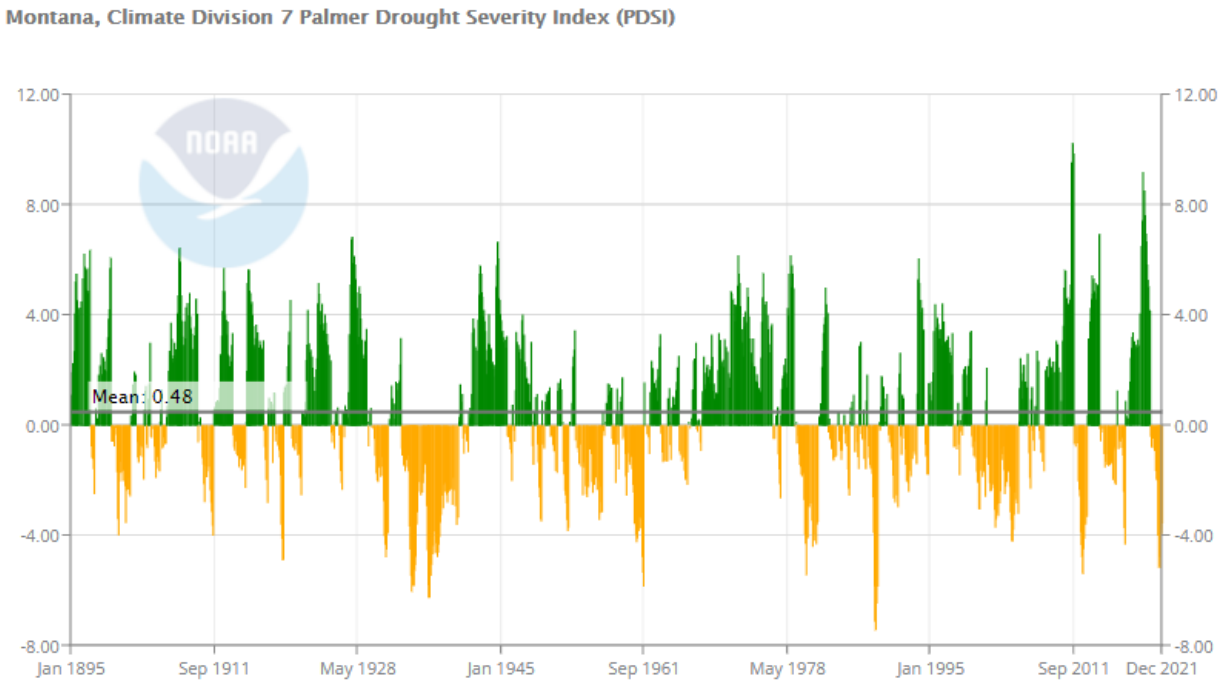
***Table 30: Palmer Drought Magnitude***

| NUMERICAL VALUE | DESCRIPTION | NUMERICAL VALUE | DESCRIPTION |
|---|---|---|---|
| **4.0 OR MORE** | Extremely Wet | **-0.5 to -0.99** | Incipient Dry Spell |
| **3.0 TO 3.99** | Very Wet | **-1.0 to -1.99** | Mild Drought |
| **2.0 TO 2.99** | Moderately Wet | **-2.0 to -2.99** | Moderate Drought |
| **1.0 TO 1.99** | Slightly Wet | **-3.0 to -3.99** | Severe Drought |
| **05.TO 0.99** | Near Normal | **-4.0 or less** | Extreme Drought |
| **0.49 TO -0.49** | Near Normal | **--** | -- |

*Source: NCEI*

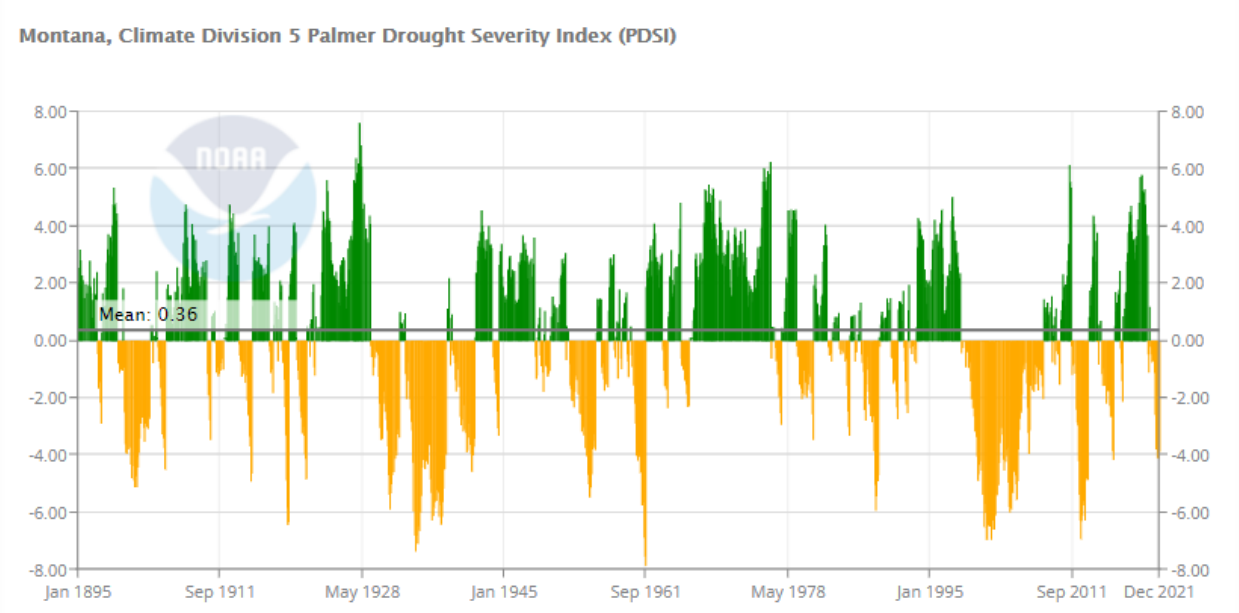
[48] NCEI. 2020. "Climate at a Glance: Divisional PDSI Data". https://www.ncdc.noaa.gov/cag/divisional/time-series/2505/pdsi/all/7/1895-2021?base_prd=true&begbaseyear=1901&endbaseyear=2000

***Figure 22: Palmer Drought Severity Index – Southeastern***




*Source: NOAA*

***Figure 23: Palmer Drought Severity Index – South Central***




*Source: NOAA*

The following table indicates it is reasonable to expect drought to occur regularly across the reservation. The planning area has experienced every drought condition, with Mild Drought the most frequent.

***Table 31: Historic Drought Events and Probability***

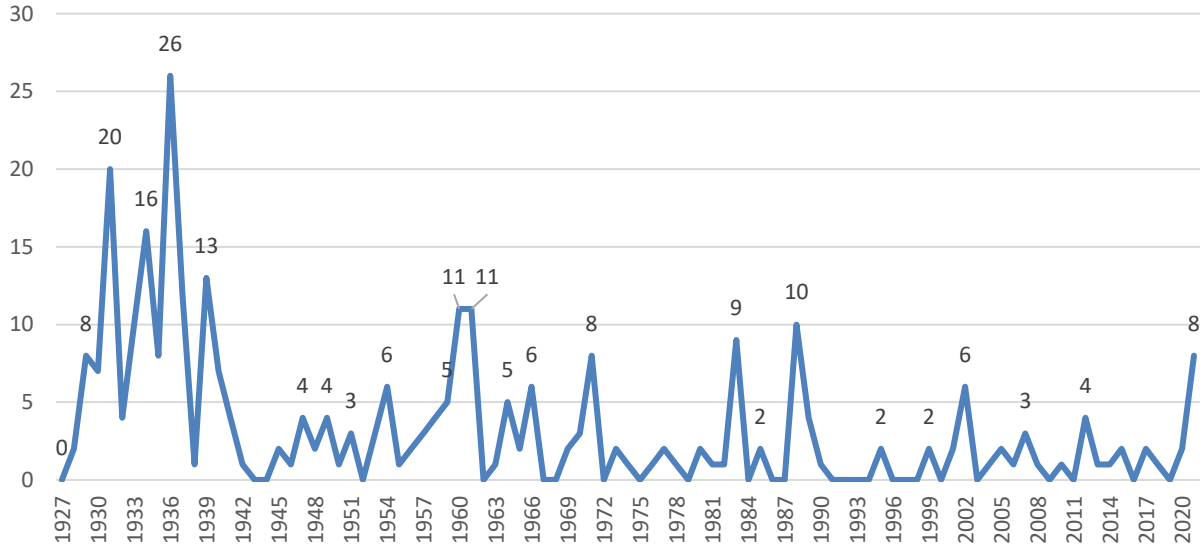
| DROUGHT MAGNITUDE | MONTHS IN DROUGHT CLIMATE DIVISION 5 | MONTHS IN DROUGHT CLIMATE DIVISION 7 | OVERALL PERCENTAGE |
|---|---|---|---|
| **-1 MAGNITUDE (MILD)** | 162/1,523 | 219/1,523 | 12.5% |
| **-2 MAGNITUDE (MODERATE)** | 96/1,523 | 127/1,523 | 7.3% |
| **-3 MAGNITUDE (SEVERE)** | 94/1,523 | 69/1,523 | 5.4% |
| **-4 MAGNITUDE OR GREATER (EXTREME)** | 175/1,523 | 63/1,523 | 7.8% |
| **TOTAL MONTHS IN DROUGHT** | 527/1,523 | 478/1,523 | 33% |

*Source: NOAA, Jan 1895-Dec 2021*[49]

Using the data from the PDSI, the planning area has experienced exceptional droughts approximately 19 times since 1895. Some of the exceptional drought events have lasted for multiple years (1900-1903, 1930-1932, 1933-1938, 1953-1955, 1979-1981, 1999-2005). The tribal Drought Contingency Plan discussed the most recent significant drought in 2017 which developed quickly. Big Horn County were in drought for over 500 weeks while Rosebud County was in drought conditions for over 350 weeks between 2000 and 2017.

The High Plains Regional Climate Center (HPRCC) has a station in Lame Deer MT which has tracked monthly maximum temperatures since 1927. According to the HPRCC, on average, the planning area experiences approximately three days per year with temperatures above 100°F. Overall days per year over 100°F ranged from zero days (most recently in 2019) to 26 days over 100°F reported in 1936. The local planning team noted past extreme heat events have caused buckling on Highway 212 which has been repaired several times.

***Figure 24: Number of Days above 100°F***

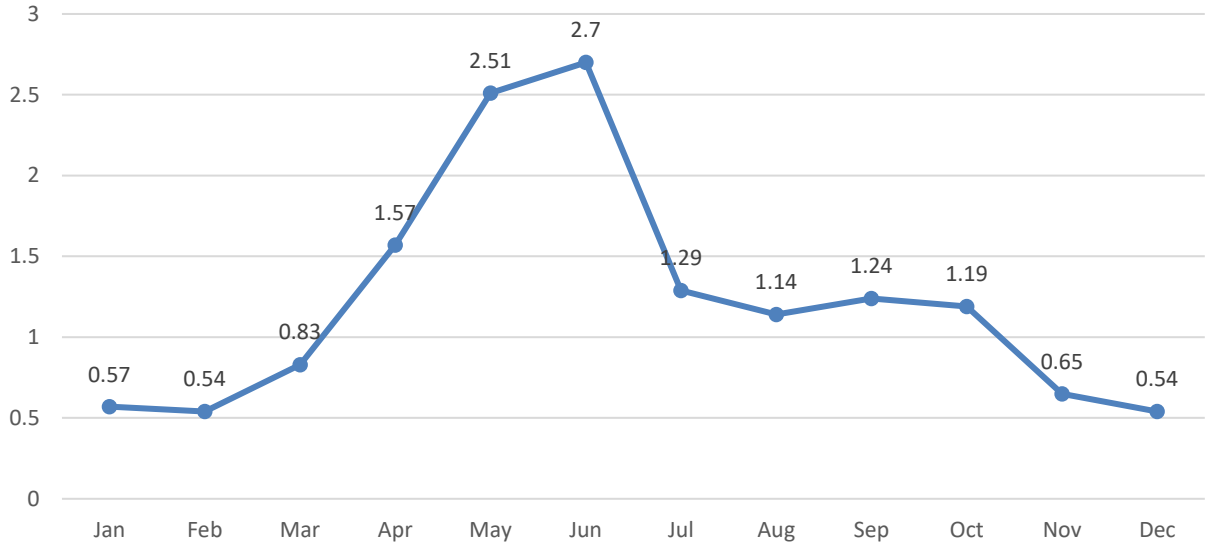



*Source: HPRCC, 2022*

49 NCEI. 2022. "Climate at a Glance: Divisional PDSI Data". https://www.ncdc.noaa.gov/cag/divisional/time-series/2505/pdsi/all/7/1895-2021?base_prd=true&begbaseyear=1901&endbaseyear=2000

On average, the planning area receives approximately 14.78 inches of precipitation annually.[50] The following figure shows average precipitation per month in the planning area. The months of May and June experiences the most significant average increase in precipitation and indicate periods of time when flooding may be most prevalent. Prolonged deviations from the norm showcase drought conditions and influence growing conditions for farmers or resource management needs for local agricultural producers.

***Figure 25: Average Monthly Precipitation***




*Source: WRCC, Jan 2022*

### *Average Annual Losses*

The annual property estimate was determined based upon NCEI Storm Events Database since 1996. The annual crop loss was determined based upon the RMA Cause of Loss Historical Database since 2000. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of extreme heat and drought are difficult to quantify. Potential losses such as power outages could affect businesses, homes, and critical facilities. High demand and intense use of air conditioning or water pumps can overload the electrical systems and cause damage to infrastructure. The NCEI did not report property damages from drought or extreme heat during the period of record while the RMA reported over $28M in crop damages in Big Horn and Rosebud Counties. RMA data is not available for the NCT reservation individually.

***Table 32: Drought and Extreme Heat Losses***

| HAZARD TYPE | TOTAL PROPERTY LOSS[2] | AVERAGE ANNUAL PROPERTY LOSS | TOTAL CROP LOSS[3] | AVERAGE ANNUAL CROP LOSS |
|---|---|---|---|---|
| **DROUGHT** | $0 | $0 | $22,035,634 | $1,001,619 |
| **EXTREME HEAT** | $0 | $0 | $6,209,815 | $282,264 |

*Source: USDA RMA (2000-2021)*

**Estimated Loss of Electricity**

According to the FEMA Benefit Cost Analysis (BCA) Reference Guide, if an extreme heat event occurred within the planning area, the following table assumes the event could potentially cause a loss of electricity

50 Western Regional Climate Center. January 2022. "Montana Climate Summaries: Colstrip." [POR 7/2/1948-12/31/2005] https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?mtcols.

for 10 percent of the population at a cost of $126 per person per day.[51] In inaccessible or rural areas, the percent of the population affected and duration may increase during extreme events. The assumed damages do not take into account physical damages to utility equipment and infrastructure.

***Table 33: Loss of Electricity – Assumed Damage***

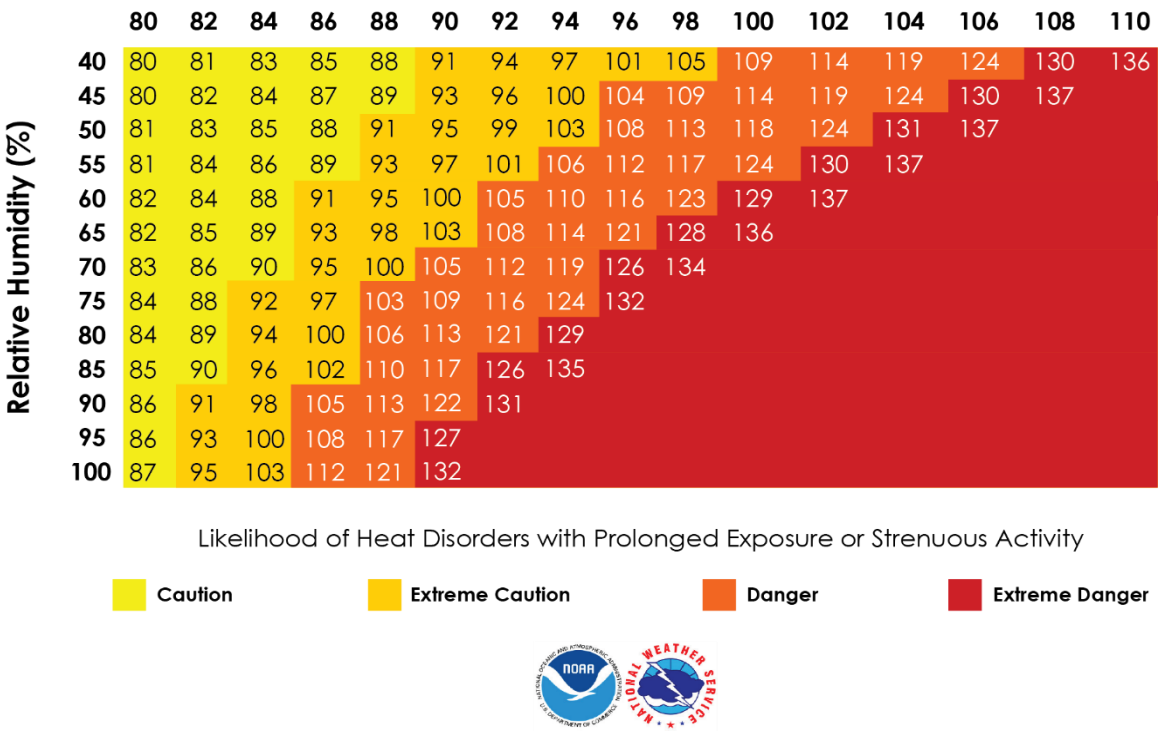
| PLANNING AREA | 2019 (EST.) POPULATION | POPULATION AFFECTED (ASSUMED 10%) | ELECTRIC LOSS OF USE ASSUMED DAMAGE PER DAY |
|---|---|---|---|
| NORTHERN CHEYENNE TRIBE | 4,827 | 483 | $60,858 |

### *Extent*

A key factor to consider regarding drought and extreme heat situations is the humidity level relative to the temperature. As is indicated in the following figure from the National Oceanic and Atmospheric Administration (NOAA), as the relative humidity increases, the temperature needed to cause a dangerous situation decreases. For example, for 100 percent relative humidity, dangerous levels of heat begin at 86°F whereas a relative humidity of 50 percent requires 94°F. The combination of relative humidity and temperature result in a Heat Index as demonstrated below:

$$100\%\ \boldsymbol{Relative\ Humidity} + 86°\boldsymbol{F} = 112°\boldsymbol{F}\ \boldsymbol{Heat\ Index}$$

***Figure 26: NOAA Heat Index***

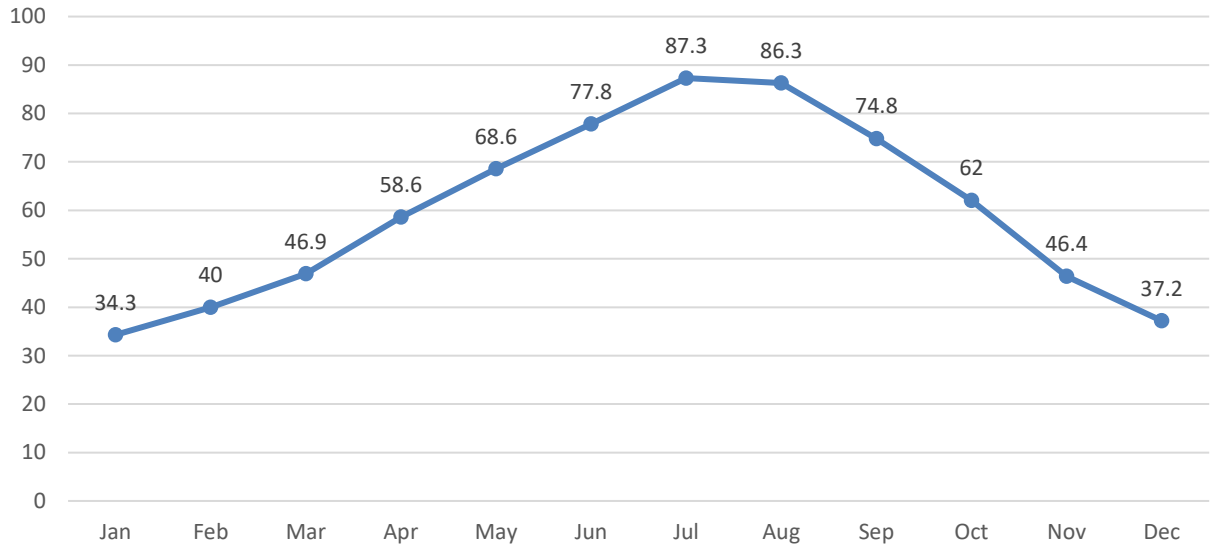



The figure above is designed for shady and light wind conditions. Exposures to full sunshine or strong hot winds can increase hazardous conditions and raise heat index values by up to 15°F. For the purposes of

[51] Federal Emergency Management Agency. June 2009. "BCA Reference Guide."

this plan, extreme heat is being defined as temperatures of 90°F or greater. For the planning area the months with the highest average temperatures are July and August.

***Figure 27: Monthly Climate Normals Max Temperature (1981-2010)***




*Source: NCEI, 2019*

Overall, the planning area the most common type of drought has been mild drought (12.5% of total months) and the planning area is likely to experience mild drought most commonly in the future.

### *Probability*

Extreme heat is a regular part of the climate for the Northern Cheyenne Tribe, with 69 years within the 94-year period of record (1927-2021) reporting at least one day over 100°F. The probability that extreme heat will occur in any given year in the planning area is 73 percent.

Drought conditions are also likely to occur regularly in the planning area. The following table summarizes the magnitude of drought and monthly probability of occurrence.

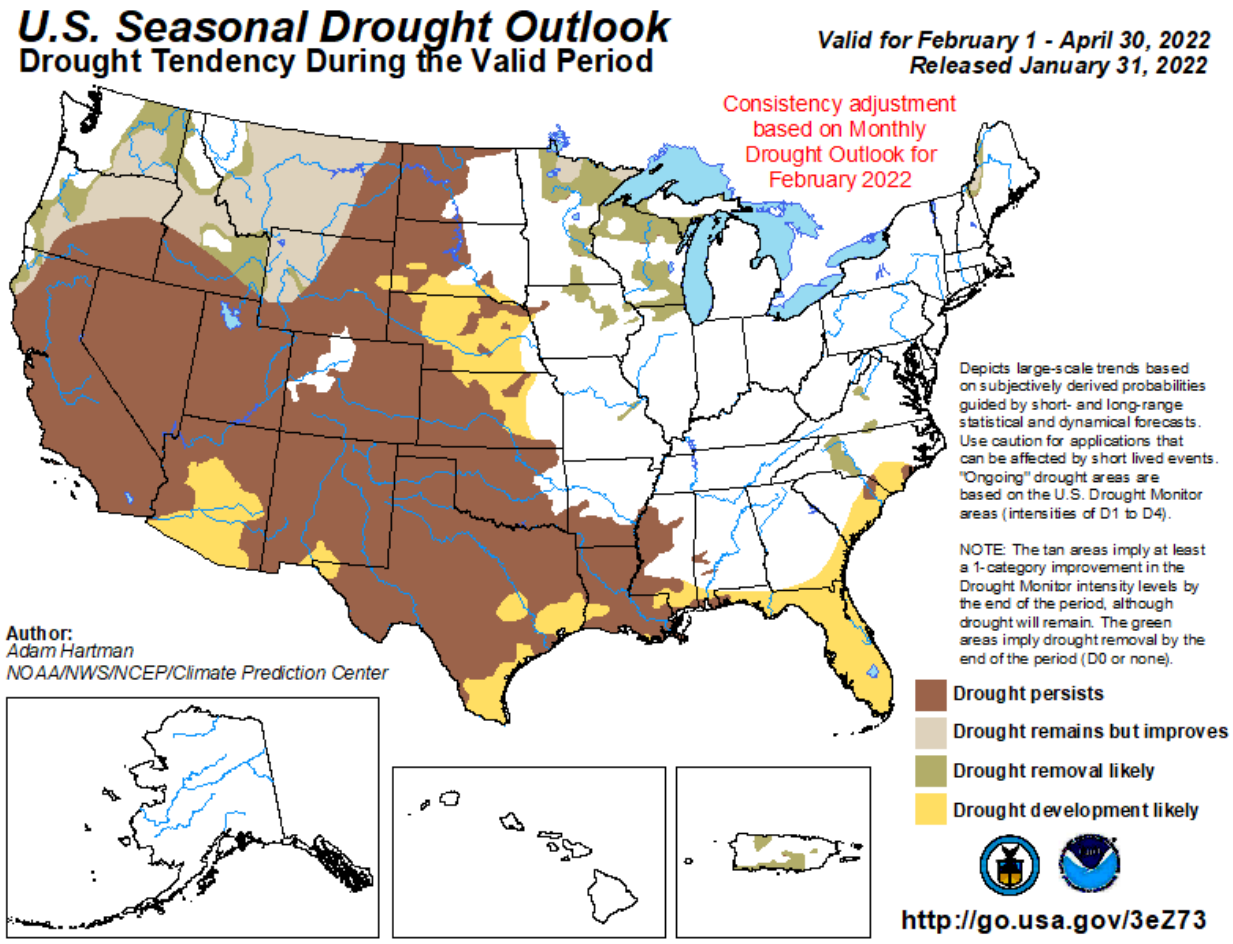
***Table 34: Record of Drought in the Planning Area***

| DROUGHT MAGNITUDE | MAGNITUDE | MONTHS IN DROUGHT | PERCENTAGE |
|---|---|---|---|
| **4 OR MORE TO -0.99** | No Drought | 1,021/1,523 | 67.0% |
| **-1 TO -1.99** | Mild Drought | 191 | 13.9% |
| **-2 TO -2.99** | Moderate Drought | 112 | 7.2% |
| **-3 TO -3.99** | Severe Drought | 82 | 6.3% |
| **-4.0 OR LESS** | Extreme Drought | 119 | 5.4% |
| **TOTAL MONTHS LIKELY IN DROUGHT** | | 503/1,523 months | 33.0% |

*Source: NCEI, Jan 1895-November 2021*

The U.S. Seasonal Drought Outlook (below) provides a short-term drought forecast that can be utilized by local officials and residents to examine the likelihood of drought developing or continuing depending on the current situation. The drought outlook is updated consistently throughout the year and should be reviewed on an ongoing basis. The following figure provides the drought outlook from February to April 2022 as an example.

***Figure 28: U.S. Seasonal Drought Outlook***




*Source: NCEI, February 2022*

The Union for Concerned Scientists released a report in July 2019 titled *Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days*[52] which included predictions for extreme heat events in the future dependent on future climate actions. These figures show the average number of days per year above a selected heat index, or "feels like" temperature, for three different time periods: historical, midcentury, and late century. The table below summarizes those findings for the planning area. It is worth noting period of records and available data used in the following report is different than information provided by the more local WRCC and may not be fully reflected.

***Table 35: Extreme Heat Predictions for Days over 100F and 90F***

| COUNTY | HISTORICAL AVERAGE 1971-2000 (DAYS PER YEAR) | | MIDCENTURY PREDICTION 2036-2065 (DAYS PER YEAR) | | LATE CENTURY 2070-2099 (DAYS PER YEAR) | |
|---|---|---|---|---|---|---|
| | 90F | 100F | 90F | 100F | 90F | 100F |
| BIG HORN | 11 | 0 | 38 | 5 | 65 | 21 |

[52] Union of Concerned Scientists. 2019. "Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days." https://www.ucsusa.org/sites/default/files/attach/2019/07/killer-heat-analysis-full-report.pdf.

| COUNTY | HISTORICAL AVERAGE 1971-2000 (DAYS PER YEAR) | | MIDCENTURY PREDICTION 2036-2065 (DAYS PER YEAR) | | LATE CENTURY 2070-2099 (DAYS PER YEAR) | |
|---|---|---|---|---|---|---|
| ROSEBUD | 14 | 0 | 44 | 9 | 70 | 26 |

*Source: Union of Concerned Scientists, 1971-2000*[53]

Based on this historical record, the annual probability of extreme heat occurring in the future is *Likely*. Based on this historical record, the annual probability of drought occurring in the future is *Possible*.

### *Regional Vulnerabilities & Problem Statements*

The Tribe developed a Drought Contingency Plan in March 2022 which included a vulnerability risk assessment across various sectors for the reservation. Specific vulnerabilities identified in this analysis for Domestic Water; Agriculture/Rangelands; Agriculture/Farmland and Pastureland; Wildland Fire; Land & Wildlife-Wetlands; Land & Wildlife-Vegetation; Land & Wildlife – Fish and Wildlife; Cultural Resources; and Recreation are included in the table below from the report.

***Table 36: Drought Risk Vulnerabilities by Sector***

| SECTOR | IMPACTS | DROUGHT RISK VULNERABILITIES |
|---|---|---|
| **Domestic Water** | From springs, wells from alluvium in stream valleys | • Low Risk for new wells<br>• Low Risk for existing wells/aquifers outside of the alluvium<br>• High Risk for springs and for wells less than 100 feet in the alluvium |
| **Agriculture – Rangelands** | Livestock watering from streams/rivers, and stock ponds (such as earth dikes, reservoirs, dugouts, and other collection developments), springs, wells (via pipeline) from alluvium in stream valleys | • High Risk for forage/vegetation<br>• High Risk for wells less than 100 feet in the alluvium<br>• Medium-High Risk for surface water (depending on stream flow)<br>• Extra High Risk for grazing units lacking adequate infrastructure/water source, and range units in poor condition and/or presence of noxious weeds |
| **Agriculture – Farmland and Pastureland** | Farm/pasturelands under irrigation (active and flood); water sources used on agricultural lands include earth dikes (from streambeds, ponds, springs), wells, tanks, and one pipeline; use pivot irrigation systems from alluvial wells along Rosebud Creek, water spreading from Rosebud Creek and Davis Creek drainages | • Low-Medium Risk for groundwater outside of the alluvium<br>• Medium-High Risk for surface water (depending on stream flow)<br>• High Risk for wells less than 100 feet in the alluvium<br>• Extra High Risk for farm/pasturelands lacking adequate infrastructure/poor condition water source, and/or farm/pasturelands with presence of noxious weeds |

[53] Union of Concerned Scientists. 2019. "Extreme Heat and Climate Change: Interactive Tool". https://www.ucsusa.org/resources/killer-heat-interactive-tool.

| SECTOR | IMPACTS | DROUGHT RISK VULNERABILITIES |
|---|---|---|
| **Wildland Fire** | Suppression from reservoirs, stock ponds, springs, and wells, including municipal system | • Low Risk to rangelands and farm/pasture lands not under irrigation A-3 NORTHERN CHEYENNE SECTOR IMPACTS DROUGHT RISK wells, including municipal system<br>• Low-Medium Risk to groundwater depending on location<br>• Medium-High Risk to wildlife depending on mobility and habitat types<br>• High Risk to rangelands<br>• High Risk to surface water<br>• Extra High Risk to timber areas and forested habitat<br>• Extra High Risk for WUI areas and towns/communities in each district |
| **Land & Wildlife – Wetlands** | Precipitation, snowmelt, streams, rivers, reservoirs, springs | • Low-Extra High Risk for wetland depending on location |
| **Land & Wildlife – Vegetation** | Precipitation, snowmelt | • Medium-High Risk for vegetation depending on health |
| **Land & Wildlife – Fish and Wildlife** | Water source from rivers, stock ponds/tanks, springs, wells, i.e. same sources as agricultural rangelands | • High Risk for forage/vegetation<br>• High Risk for wells less than 100 feet in the alluvium<br>• Medium-High Risk for surface water (depending on stream flow)<br>• Extra High Risk for fish habitat<br>• Extra High Risk for habitat lacking a water source, and habitat in poor condition and/or presence of noxious weeds |
| **Cultural Resources** | Water source from precipitation, rivers, stock ponds/tanks, springs, wells; i.e., same sources as fish and wildlife and vegetation | • High Risk for forage/vegetation<br>• Medium-High Risk for surface water (depending on stream flow)<br>• High Risk for wells depending on location<br>• Extra High Risk for all lands A-4 NORTHERN CHEYENNE SECTOR IMPACTS DROUGHT RISK lacking adequate infrastructure poor condition water source, and presence of noxious weeds |
| **Recreation** | Water source from precipitation, rivers, stock ponds/tanks, springs, wells, i.e., same sources as fish and wildlife and vegetation | • High Risk for forage/vegetation for and game species<br>• Medium-High Risk for surface water (depending on stream flow)<br>• Low-Medium Risk for groundwater<br>• High Risk for wells less than 100 feet<br>• Extra High Risk for fish habitat |

| SECTOR | IMPACTS | DROUGHT RISK VULNERABILITIES |
|---|---|---|
| | | • Extra High Risk for all lands lacking adequate infrastructure poor condition water source, and presence of noxious weeds |

*Source: NCT Drought Contingency Plan, 2022*

The Drought Impact Reporter is a database of drought impacts throughout the United States with data going back to 2000. The more impacts that are reported to the National Drought Mitigation Center the more severe the drought. The Drought Impact Reporter has recorded a total of 42 drought-related impacts as provided for Big Horn and Rosebud Counties. This is not a comprehensive list of droughts which may have impacted the reservation as individual reports for Indian nations are not available and not all drought events had reported impacts.

***Table 37: Drought Impacts in Planning Area***

| CATEGORY | DATE | AFFECTED COUNTIES | TITLE |
|---|---|---|---|
| Society & Public Health | 7/22/2005 | Big Horn County | Society & Public Health impact from Media submitted on 7/22/2005 |
| Society & Public Health | 7/22/2005 | Big Horn County | Society & Public Health impact from Media submitted on 7/22/2005 |
| Agriculture | 8/4/2005 | Big Horn County | Agriculture impact from Media submitted on 8/4/2005 |
| Water Supply & Quality | 10/6/2005 | Big Horn County, Rosebud County | Water Supply & Quality impact from Media submitted on 10/6/2005 |
| Relief, Response & Restrictions | 10/6/2005 | Big Horn County, Rosebud County | Relief, Response & Restrictions impact from Media submitted on 10/6/2005 |
| Relief, Response & Restrictions | 10/13/2005 | Rosebud County | Relief, Response & Restrictions impact from Media submitted on 10/13/2005 |
| Fire | 7/17/2006 | Big Horn County, Rosebud County | Fire impact from Government submitted on 7/17/2006 |
| Fire, Society & Public Health | 8/1/2006 | Big Horn County | Fire, Society & Public Health impact from Media submitted on 8/1/2006 |
| Relief, Response & Restrictions | 8/31/2006 | Big Horn County, Rosebud County | Relief, Response & Restrictions impact from Media submitted on 8/31/2006 |
| Society & Public Health | 9/11/2006 | Big Horn County | Society & Public Health impact from Media submitted on 9/11/2006 |
| Plants & Wildlife, Society & Public Health | 9/12/2006 | Big Horn County | Plants & Wildlife, Society & Public Health impact from Media submitted on 9/12/2006 |
| Relief, Response & Restrictions | 9/19/2006 | Big Horn County, Rosebud County | Relief, Response & Restrictions impact from Media submitted on 9/19/2006 |

| CATEGORY | DATE | AFFECTED COUNTIES | TITLE |
|---|---|---|---|
| Society & Public Health, Water Supply & Quality | 2/6/2007 | Big Horn County | Water Supply & Quality, Society & Public Health impact from Media submitted on 2/6/2007 |
| Agriculture, Relief, Response & Restrictions | 12/1/2009 | Rosebud County | Natural disaster declaration for 13 Montana counties |
| Business & Industry, Relief, Response & Restrictions | 1/15/2010 | Rosebud County | Federal assistance for thirteen Montana counties |
| Agriculture | 7/18/2012 | Rosebud County | The winter wheat near Forsyth, Montana did not produce enough grain to harvest |
| Agriculture, Relief, Response & Restrictions | 8/10/2012 | Big Horn County, Rosebud County | CRP Emergency Haying & Grazing expanded to 48 Montana counties |
| Agriculture, Relief, Response & Restrictions | 8/13/2012 | Rosebud County | Glacier County, Montana, approved for emergency haying and grazing of CRP acres |
| Agriculture, Relief, Response & Restrictions | 9/17/2012 | Big Horn County, Rosebud County | USDA Designates 13 Counties in Montana as Primary Natural Disaster Areas With Assistance to Producers in Surrounding States |
| Agriculture, Relief, Response & Restrictions | 9/21/2012 | Big Horn County, Rosebud County | USDA Designates 6 Counties in Montana as Primary Natural Disaster Areas With Assistance to Producers in Surrounding States |
| Agriculture, Plants & Wildlife | 10/9/2012 | Rosebud County | A rancher in Rosebud County, Montana lost $2 for each pound his calves lost this summer |
| Agriculture | 10/9/2012 | Rosebud County | Half of the cows belonging to a rancher in Rosebud County, Montana were not pregnant after a stressful summer of drought |
| Agriculture, Relief, Response & Restrictions | 4/12/2013 | Big Horn County | Counties in Wyoming, Colorado and Montana eligible for emergency loans from the Farm Service Agency |
| Agriculture, Relief, Response & Restrictions | 5/17/2013 | Big Horn County, Rosebud County | Drought-related USDA disaster declarations in 2013 |

| CATEGORY | DATE | AFFECTED COUNTIES | TITLE |
|---|---|---|---|
| Fire, Relief, Response & Restrictions | 8/22/2013 | Big Horn County | Fire restrictions in five state parks in south central Montana |
| Agriculture | 11/12/2014 | Big Horn County, Rosebud County | Montana ranchers needing hay pay very high prices |
| Relief, Response & Restrictions, Society & Public Health | 5/26/2015 | Rosebud County | Six Montana counties urged to convene drought committees |
| Agriculture | 7/15/2015 | Rosebud County | Drought reduced wheat yield, brought early harvest in Forsyth, Montana |
| Agriculture, Relief, Response & Restrictions | 2/25/2016 | Big Horn County, Rosebud County | Drought-Related USDA Disaster Declarations in 2016 |
| Agriculture | 7/21/2016 | Big Horn County | Dryland hay harvest down in Montana |
| Fire, Relief, Response & Restrictions | 7/21/2016 | Big Horn County, Rosebud County | Fire, helicopter crews positioned across south central, southeastern Montana |
| Agriculture, Relief, Response & Restrictions | 6/26/2017 | Rosebud County | Drought emergency in eastern Montana |
| Agriculture, Relief, Response & Restrictions | 6/29/2017 | Big Horn County, Rosebud County | Hay Hotline available in Montana |
| Agriculture, Business & Industry, Fire, Water Supply & Quality | 7/10/2017 | Rosebud County | Drought affecting eastern Montana producers, businesses |
| Agriculture, Relief, Response & Restrictions | 7/11/2017 | Big Horn County, Rosebud County | Early haying of CRP acres began July 16 in Dakotas, Montana |
| Agriculture, Relief, Response & Restrictions | 8/18/2017 | Big Horn County, Rosebud County | Drought disaster in 31 Montana counties |
| Plants & Wildlife | 10/4/2017 | Rosebud County | Drought lowered Montana's pheasant population |

| CATEGORY | DATE | AFFECTED COUNTIES | TITLE |
|---|---|---|---|
| Agriculture, Plants & Wildlife | 10/17/2017 | Rosebud County | Montana cattle being sold early |
| Agriculture, Plants & Wildlife | 3/31/2021 | Big Horn County, Rosebud County | Hay reserves low in southeast Montana |
| Agriculture, Plants & Wildlife, Relief, Response & Restrictions | 4/22/2021 | Rosebud County | Hay relief for ranchers in eastern Montana, western Dakotas |
| Plants & Wildlife | 9/24/2021 | Big Horn County, Rosebud County | Drought reduced pronghorn fawn survival in eastern Montana |
| Agriculture, Plants & Wildlife | 12/27/2021 | Rosebud County | Eastern Montana public grazing land affected by drought |

*Source: NDMC, 2000-2021*

All segments of the population are vulnerable to the effects of extreme heat, some specific groups have higher levels of vulnerability to extreme heat including tribal elders, residents in medical care facilities, children, those isolated from social interactions, and low-income groups. Elders and those in medical care facilities typically have lower tolerance for temperature extremes and can quickly feel the effects of extreme temperatures. Low-income populations and young children under the age of 5 are especially at risk and susceptible to the effects of extreme temperatures. Young children have a smaller body mass to surface ratio making them more vulnerable to heat-related morbidity and mortality. Children also become dehydrated more quickly than adults making for greater concern. Low-income people and families may lack resources that mitigate the impacts of extreme heat such as air conditioning. The agricultural economy, especially livestock, is highly vulnerable and at great risk during periods of extreme heat. Heat stress in feedlot cattle can cause reduced performance, and in the most severe cases, death of the animals, resulting in losses to the local agricultural industry.

Water availability is a major concern for the Northern Cheyenne Tribe. Drought affects both surface and groundwater sources. Groundwater resources are impacted at a much slower rate but also take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. The region primarily relies on soil moisture and snowpack to supply sufficient surface water for use. Without sufficient surface water resources the Tribe would be reliant on bottled water brought in from outside the reservation. During significant periods of water shortage the Tribal government purchases water and brings it in from surrounding communities or Billings. The Tribal Council is currently working to establish mutual aid agreements with providers for any future events. The area's drinking water comes from storage tanks and privately owned wells.

Past impacts from droughts that were reported by the planning team include shortages of water available for irrigation, water restrictions for households, shortages of potable water from wells, decreases in water quality, and excessive wear on water pumping equipment. Because agricultural production on the

Northern Cheyenne Indian Reservation is predominately livestock and associated hay production, significant drought has an economic impact as landowners commonly lease out land for cattle pasture or use the land to produce hay. Reduced hay yield impacts the overall number of cattle which can be supported by the land or owner. Due to drought and lack of water for livestock, pipelines have been established over the past decade that carry water from the Tongue River to stock watering locations up to 9 miles from the river.

Drought brings or intensifies other related hazards—reduced water supplies, grasshoppers, plant disease, wind erosion, and wildfires. In addition, extreme heat with or without prolonged drought can stress humans, crops, and animals, causing heat-related illness and in some cases, death. Temperatures of 109 degrees have been recorded in Busby (July 14, 2002) and Lame Deer (August 6, 1949). During drought conditions, the landscape becomes more susceptible to noxious weeds. As a drought intensifies or continues, invasive or noxious weeds become more competitive with native species and eventually be outcompeted. Common noxious or invasive weeds in the reservation include bull thistle, Canada thistle, dalmatian toadflax, houndstongue, leafy spurge, musk thistle, poison hemlock, Russian knapweed, salt cedar, spotted knapweed, sulfur cinquefoil, whitetop.

As the tribe maintains a herd of culturally significant bison, developing and implementing a buffalo management plan for the designated buffalo pasture, controlling grazing in sensitive/impacted areas, and developing and implementing a plan or lease language that requires leasees to maintain buffers to protect sensitive areas was identified as a key strategy to reduce adverse impacts to sensitive wildland areas during periods of drought.

Additionally, future development and growth in the planning area would likely increase the intensity of drought impacts including increased demand on water systems and supply, increased demand on electric providers, heat island effects, and increased dependence on agricultural industry. Water pressure across the reservation can be extremely low in the public systems from time-to-time; however this impact may exist due to the size and condition of the storage and distribution systems rather than declining water levels from drought. In 2017 the tribe developed the Northern Cheyenne Agricultural Resource Management Plan (ARMP) which asked residents via survey to rank the importance of water uses. In order of rank, these included *Drinking Water, Domestic Uses, Cultural Uses, Plant* and *Wildlife Uses.* Through this process the tribe identified the following sectors as being important to the Tribe and vulnerable to drought: Domestic Water Supply, Agriculture, Wildland Fire, Land and Wildlife, Cultural Resources, and Recreation.

Measures that have been taken to reduce drought effects on the Northern Cheyenne Indian Reservation have included:

- Piped in water to cattle "Tongue River Dam Project"—stored in 20,000 gallon tanks—this project is now completed—it was done in 2-3 areas along the Tongue River divide
- Guidelines for water use (for public water in Lame Deer/Busby)—restrictions on lawn watering, for example
- Water monitoring stations along the river and creeks

The following problem statements were identified regarding drought and extreme heat:

- Loss of power for residents and tribal facilities during extreme heat periods can cause severe health impacts.
- A lack of identified shelters in the reservation limits the ability of cooling centers to be set up during heat waves.

- Resident's health and safety is at risk during heat waves due to the lack of adequate health care facilities in the reservation.
- Highway 212 and other major transportation routes have been damaged by extreme temperature swings and should be reinforced.
- The current water distribution infrastructure in the reservation is aged, damaged, and inadequate to supply water throughout the reservation during dry periods.
- Many wells across the reservation are shallow (less than 100 feet in depth) and are at greatest risk to drying up during periods of drought.

## Earthquakes

An earthquake is the result of a sudden release of energy in the Earth's tectonic plates that creates seismic waves. The seismic activity of an area refers to the frequency, type, and size of earthquakes experienced over a period of record. Earthquake events typically occur along the western range in Montana; however, some isolated events have occurred in the planning area.

Earthquakes are measured by magnitude and intensity. Magnitude is measured by the Richter Scale, a base-10 logarithmic scale, which uses seismographs around the world to measure the amount of energy released by an earthquake. Intensity is measured by the Modified Mercalli Intensity Scale, which determines the intensity of an earthquake by comparing actual damage against damage patterns of earthquakes with known intensities. The following tables summarize the Richter Scale and Modified Mercalli Scale.

***Table 38: Richter Scale***

| RICHTER MAGNITUDES | EARTHQUAKE EFFECTS |
|---|---|
| ***LESS THAN 3.5*** | Generally not felt, but recorded |
| ***3.5 – 5.4*** | Often felt, but rarely causes damage |
| ***UNDER 6.0*** | At most, slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions |
| ***6.1 – 6.9*** | Can be destructive in areas up to about 100 kilometers across where people live |
| ***7.0 – 7.9*** | Major earthquake. Can cause serious damage over larger areas |
| ***8 OR GREATER*** | Great earthquake. Can cause serious damage in areas several hundred kilometers across. |

*Source: FEMA, 2016*[54]

***Table 39: Modified Mercalli Intensity Scale***

| SCALE | INTENSITY | DESCRIPTION OF EFFECTS | CORRESPONDING RICHTER SCALE MAGNITUDE |
|---|---|---|---|
| ***I*** | Instrumental | Detected only on seismographs | |
| ***II*** | Feeble | Some people feel it | < 4.2 |
| ***III*** | Slight | Felt by people resting, like a truck rumbling by | |
| ***IV*** | Moderate | Felt by people walking | |
| ***V*** | Slightly Strong | Sleepers awake; church bells ring | < 4.8 |
| ***VI*** | Strong | Trees sway; suspended objects swing, objects fall off shelves | < 5.4 |
| ***VII*** | Very Strong | Mild alarm; walls crack; plaster falls | < 6.1 |
| ***VII*** | Destructive | Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged | |
| ***IX*** | Ruinous | Some houses collapse; ground cracks; pipes break open | < 6.9 |
| ***X*** | Disastrous | Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread | < 7.3 |

[54] Federal Emergency Management Agency. 2020. "Earthquake Risk." https://www.fema.gov/emergency-managers/risk-management/earthquake

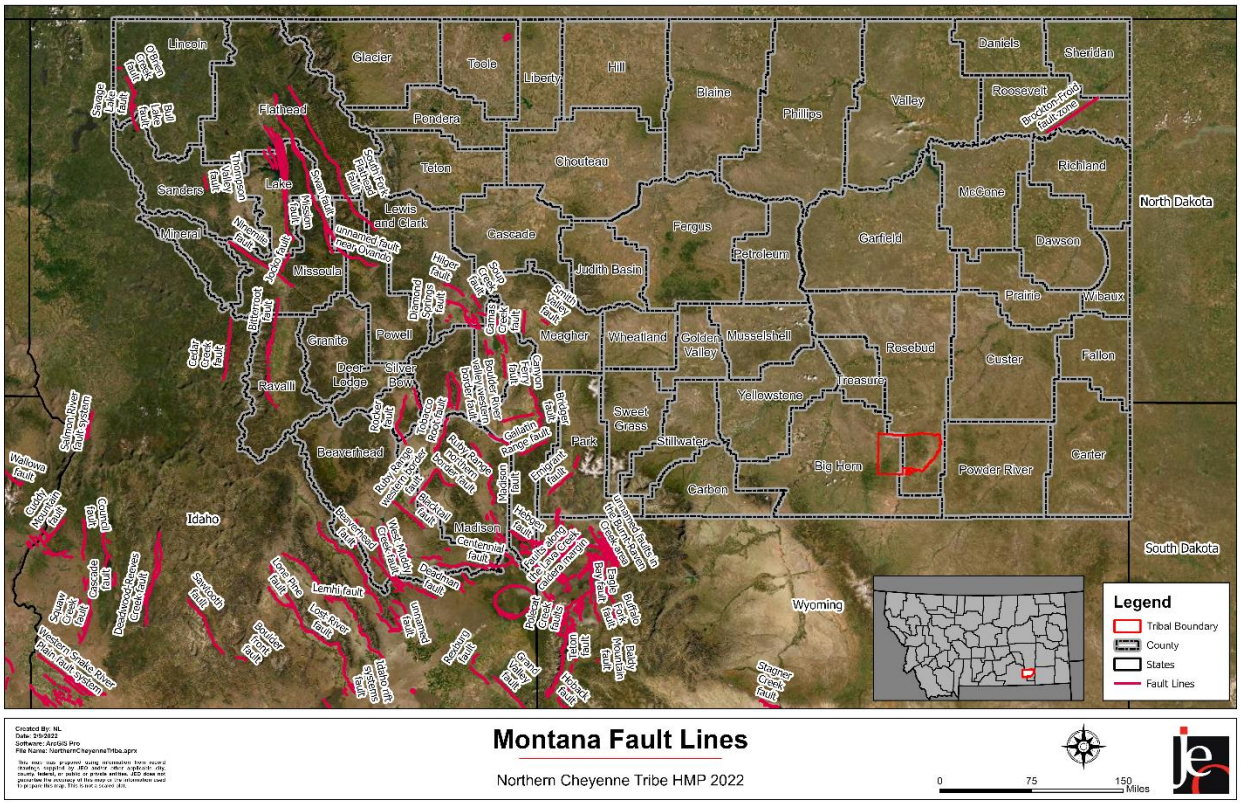
| SCALE | INTENSITY | DESCRIPTION OF EFFECTS | CORRESPONDING RICHTER SCALE MAGNITUDE |
|---|---|---|---|
| ***XI*** | Very Disastrous | Most Buildings and bridges collapse; roads, railways, pipes, and cables destroyed; general triggering of other hazards | < 8.1 |
| ***XII*** | Catastrophic | Total destruction; trees fall; ground rises and falls in waves | > 8.1 |

*Source: FEMA, 2020*

### *Location*

The most likely locations in the planning area to experience an earthquake are near a fault line. While there are no fault lines directly within or near the Northern Cheyenne Tribe reservation, a significant number of fault lines are identified in western Montana. Significant earthquakes in these regions can produce shockwaves or dispersed forces to the reservation.

***Figure 29: Fault Lines in Montana***




### *Historic Occurrences*

The following figure displays historical occurrences of earthquakes in and around the planning area. The information displayed is from the NEIC Earthquake Search database provided by the USGS Earthquake Hazards Program. According to the USGS database, three earthquake events have taken place which may have impacted the planning area. Each of the three events were caused by a mining explosion; however, no damages were reported from these events.

***Figure 30: Historical Earthquake Events***

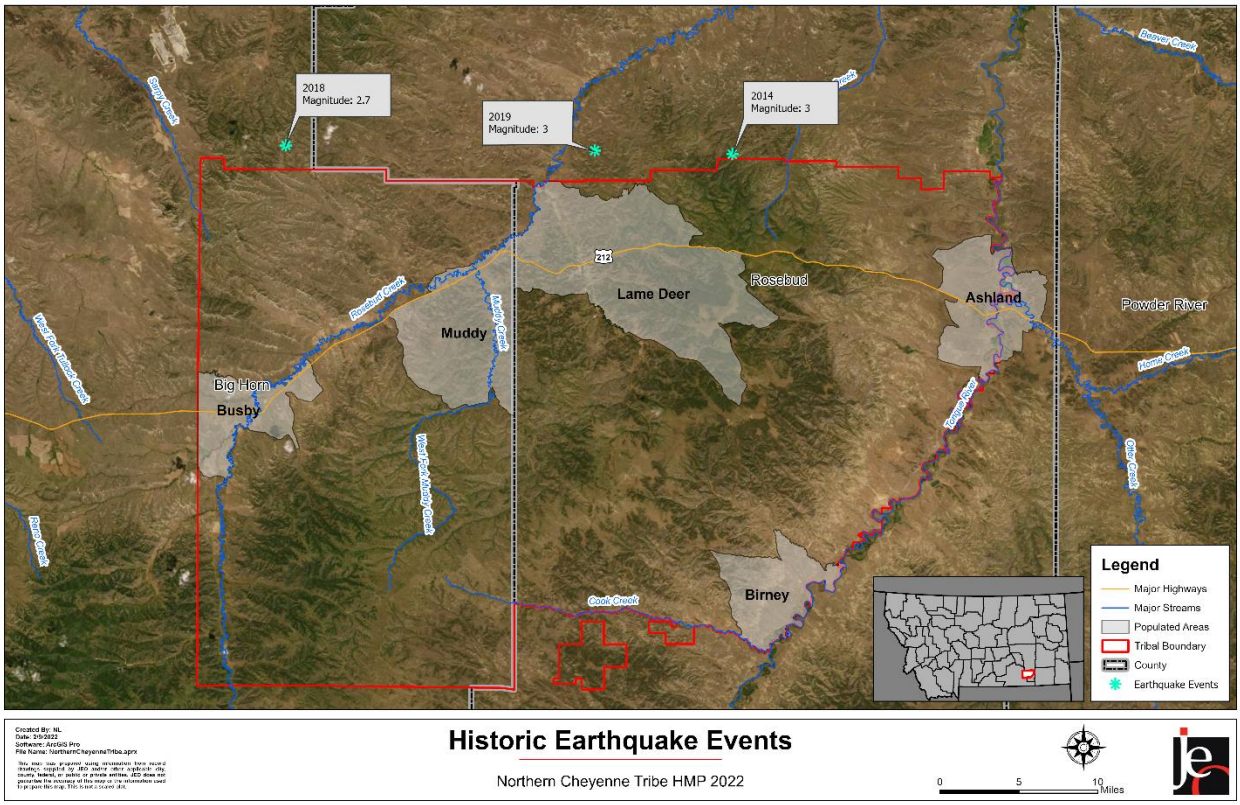


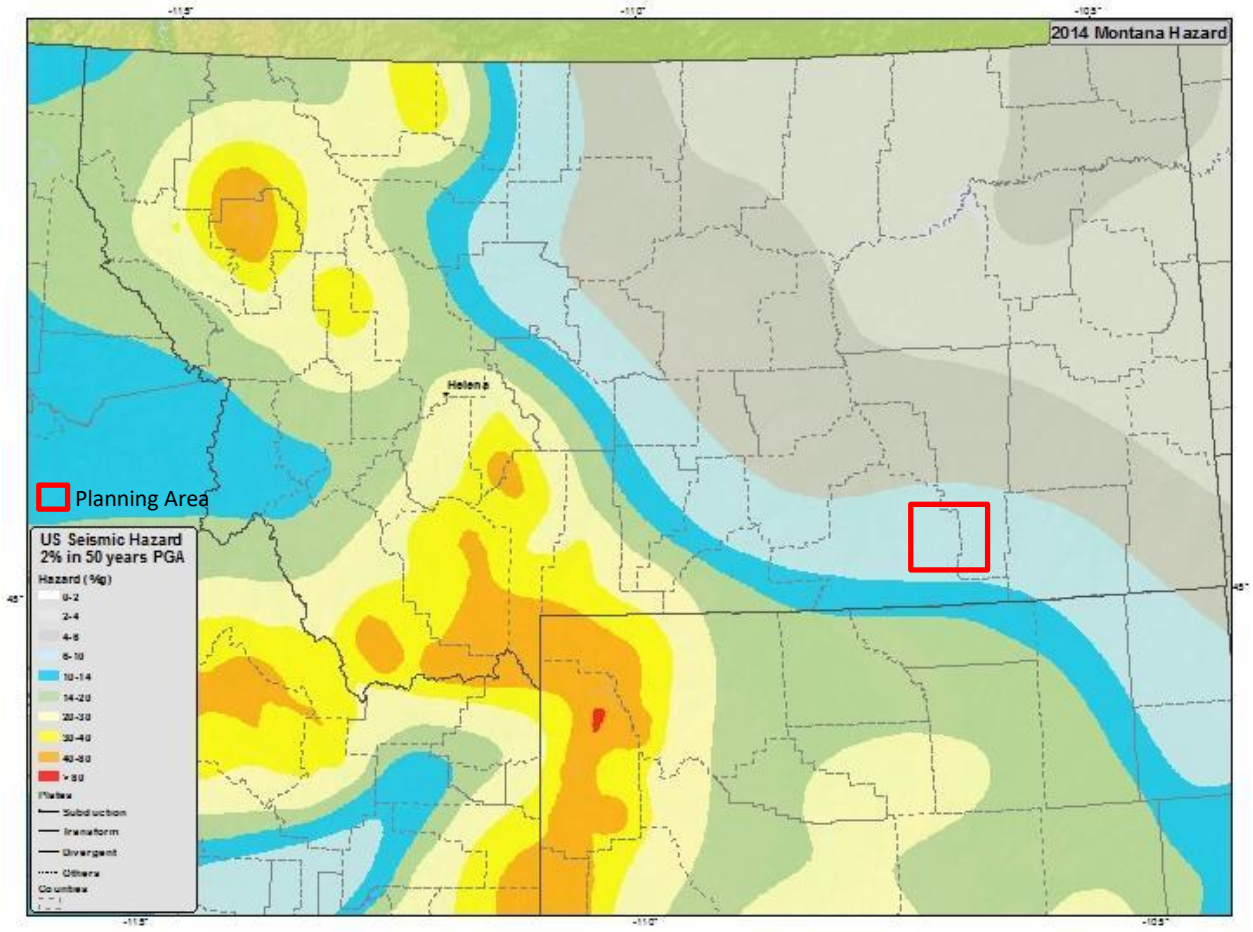

***Table 40: Historical Earthquake Events***

| YEAR OF EVENT | NEAREST LOCATION | MAGNITUDE | CAUSE |
|---|---|---|---|
| 12/16/2019 | Lame Deer | 3.0 | Mining Explosion |
| 4/20/2018 | Busby/Muddy | 2.7 | Mining Explosion |
| 7/29/2014 | Lame Deer | 3.0 | Mining Explosion |

### *Average Annual Losses*

There were no reported damages from earthquakes in the planning area. Due to the lack of sufficient earthquake data, limited resources, low earthquake risk for the area, and no recorded damages, it is not feasible to utilize the 'event damage estimate formula' to estimate potential losses for the planning area. The following figure shows the State of Montana's seismic hazard risk across the state. According to the USGS, the planning area has a 6-10%g change of damages from earthquakes.

***Figure 31: Seismic Hazard Map - Montana***




### *Extent*

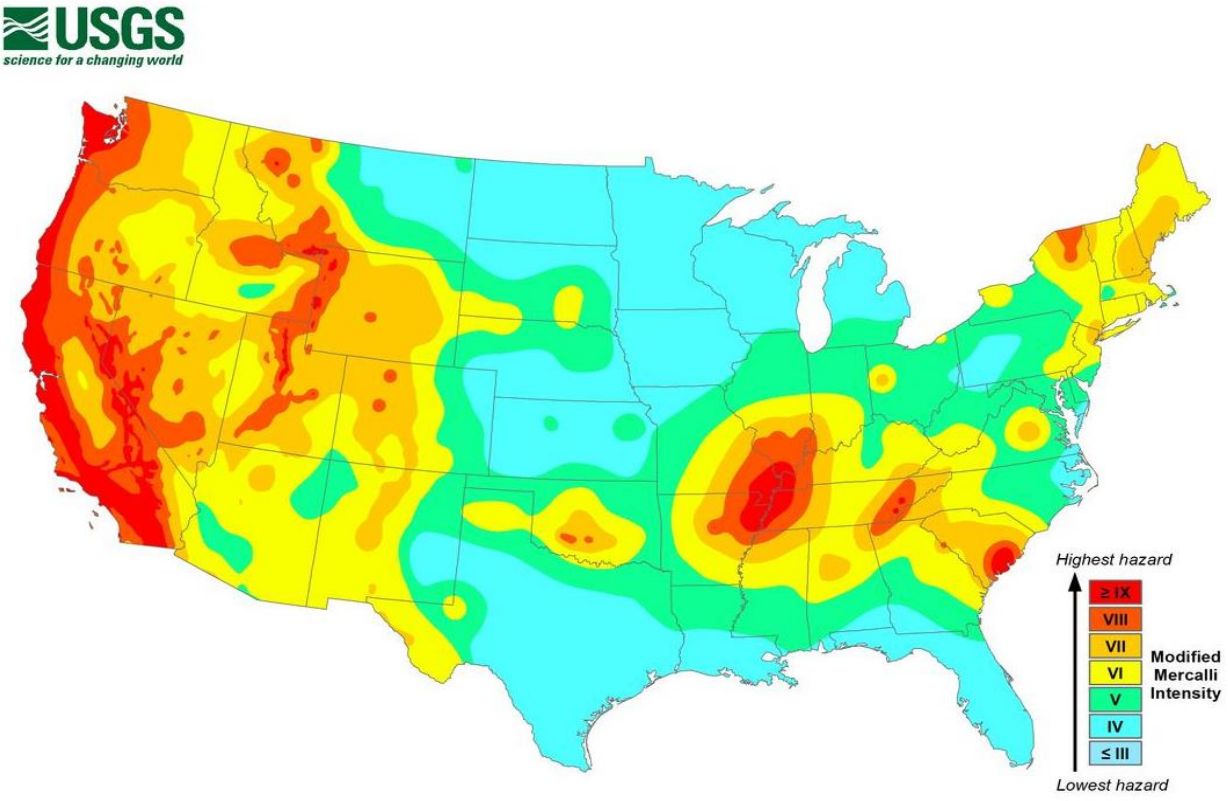
The extent of damages from earthquakes is often limited to areas near fault lines. The FEMA guidebook "Understanding Your Risks: Identifying Hazards and Estimating Losses" recommends that if there is an area of 3% g peak acceleration or more then the hazard should be profiled more closely. Earthquake severity is often expressed as a comparison to the normal acceleration due to gravity and is expressed as "g" force. A 100% g earthquake is very severe. Based on historical record, the magnitude for earthquakes in the planning area ranges from approximately 2 to 3 on the Richter Scale.

### *Probability*

The following figure summarizes the probability of an intense earthquake occurring in the planning area which may be classified as a low to moderate risk. Based on the three years with a recorded occurrence of an earthquake over a 32-year period (1990-2021), the probability of an earthquake in the reservation in any given year is approximately nine percent.

Based on this historical record, the annual probability of earthquakes occurring in the future is *Possible*.

***Figure 32: USGS Earthquake Probability***




**USGS map showing the intensity of potential earthquake ground shaking that has a 2% chance of occurring in 50 years**

### *Regional Vulnerabilities & Problem Statements*

Earthquakes will continue to occur in Montana, however the precise time, location, and magnitude of future events cannot be predicted. Due to this it is challenging to adequately prepare for or protect at risk populations or structures in areas with low probability of disaster events. Particularly vulnerable populations for earthquake include, but are not limited to:

- *Low income individuals*
    - Often, low income individuals and families live in lower cost homes (older homes, mobile homes) that are less able to withstand disaster.
- *Older homes and mobile homes*
    - These may not have been constructed using the most advanced building codes or have received updates and retrofits that would have increased their stability and ability to withstand seismic events. Damages resulting from the 1994 Northridge earthquake in California were disproportionately focused on low and moderate income rental housing units that were older and thus more vulnerable to seismic damages.
- *Elders*
    - Tribal elders living on fixed incomes or in remote areas may lack the resources necessary to upgrade their homes to withstand seismic events and/or lack the mobility required to implement low cost mitigation measures. A 2006 Census Bureau report found that 20-percent of the US Population age 65 and older report some level of disability.

The following problem statements were identified regarding earthquakes:

- Limited evacuation and transportation corridors may limit resident evacuation efforts if significant earthquakes occur
- Existing housing and building stock is not built to withstand significant earthquake events and therefore at risk of collapse or severe damage
- Lack of existing and redundant communication infrastructure puts residents at risk if unable to send alerts
- Loss of power for residents and tribal facilities is likely during earthquakes that damage utility facilities or power lines

# Flooding

### *Riverine Flooding, Flash Flooding, and Dam Failure*

Flooding due to rainfall can occur on a small-scale at the local level, but can also extend throughout the entire drainage basin. Heavy accumulations of ice or snow can also cause flooding during the melting stage. These events are complicated by the freeze/thaw cycles characterized by moisture thawing during the day and freezing at night. There are two main types of flooding in the planning area: riverine flooding and flash flooding.

**Riverine Flooding**

Riverine flooding, typically more slowly developing with a moderate to long warning time, is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater are called floodplains. A floodplain or flood risk area is defined as the lowland and relatively flat area adjoining a river or stream. The terms "base flood" and "100-year flood" refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin or watershed, which is defined as all the land draining to a river and its tributaries.

**Flash Flooding, including Levee or Dam Failure**

Flash floods, typically rapidly developing with little to no warning time, result from convective precipitation usually due to intense summer storms or sudden releases due to failure of an upstream impoundment created behind a dam, landslide, or levee. Flash floods are distinguished from regular floods by a timescale of fewer than six hours. Flash floods cause the most flood-related deaths as a result of this shorter timescale to respond to the rising waters. Flooding from excessive rainfall in Montana usually occurs between late spring and early fall.

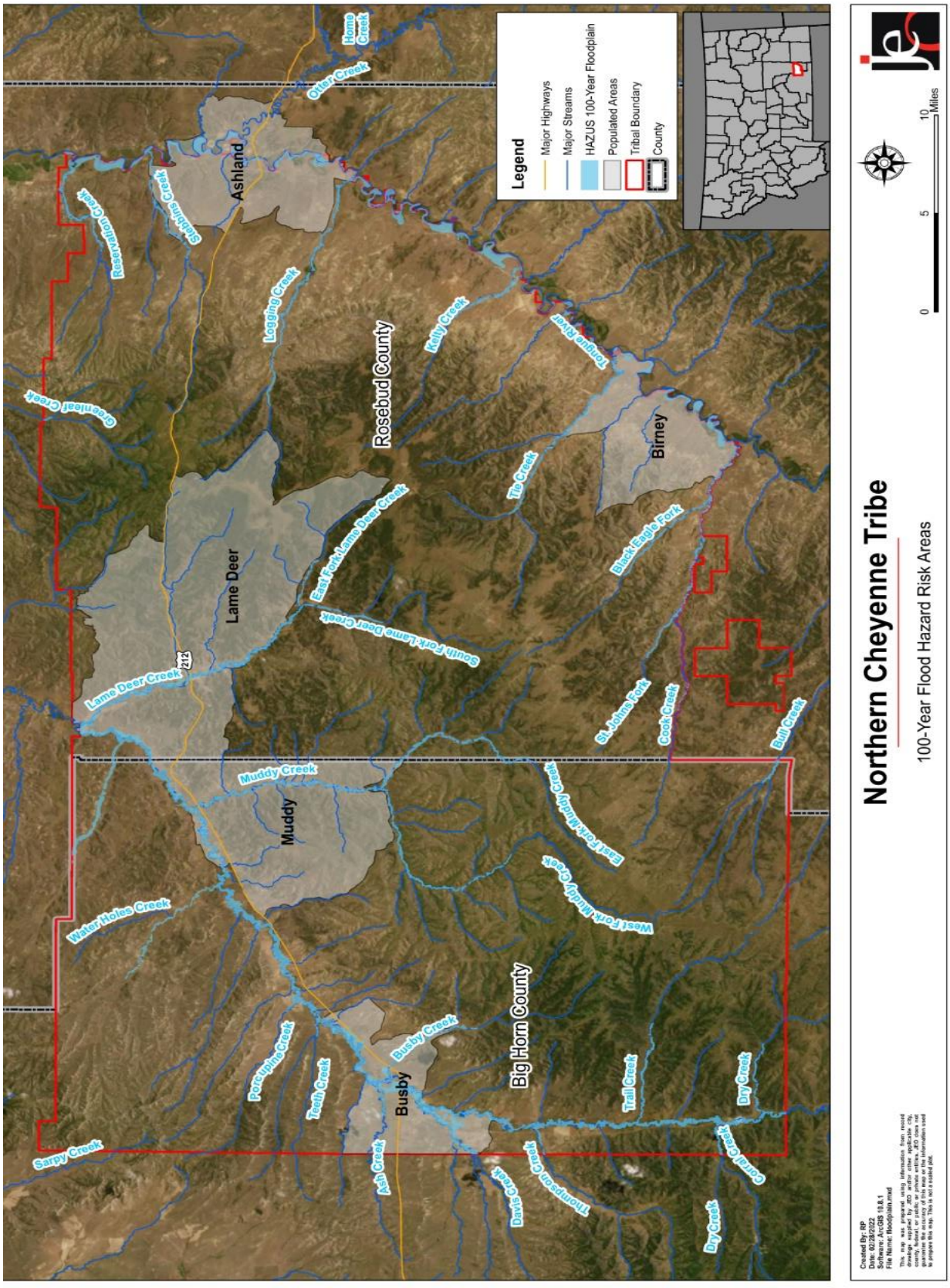
Big Horn County, Rosebud County, and the Northern Cheyenne Tribe reservation do not currently have FEMA approved delineated flood hazard risk areas or digital Flood Insurance Rate Maps (FIRMs) which identify the floodplain. For the purposes of this HMP, a Level 1 HAZUS analysis was run on both Big Horn and Rosebud Counties to help identify flood risk hazard areas in the Northern Cheyenne Tribe reservation. HAZUS is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters.

### *Location*

The reservation is bordered by the Rosebud Creek Watershed to the north and the Tongue River Watershed to the east. The Tongue River Watershed includes the eastern two-fifths of the reservation and the trust lands located south of the exterior borders. Major rivers and creeks include Tongue River, Rosebud Creek, Muddy Creek, Lame Deer Creek, and Cook Creek. In addition, there are a number of tributaries to these rivers and creeks with over 100 unnamed small drainages and more than 250 stream miles. There are no natural lakes in the reservation with most Ponds being seasonal or manmade. Flooding can occur throughout the Reservation as a result of snowmelt, widespread rainfall, or intense thunderstorms. High soil moisture, frozen ground, and rainfall on melting snowpacks contribute to the most severe floods. In addition, there is potential for flooding from dam failure.

The following map shows the estimated flood hazard risk areas in the NCT reservation using a Level 1 HAZUS analysis.

***Figure 33: NCT Flood Hazard Risk Areas***

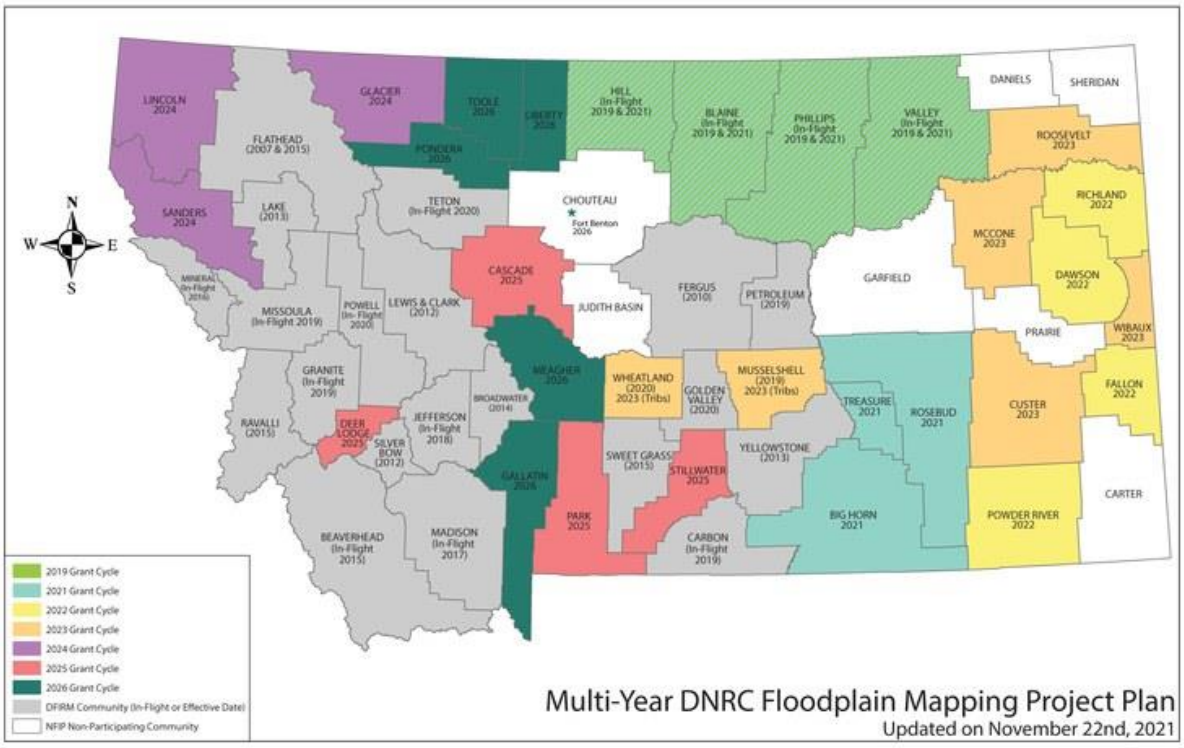


The local planning team identified specific areas of concern at Birney and Saint Labre as they are located near Walking Horse Creek and the Tongue River respectively and have experienced flooding. Route 566 between Birney and Ashland has been overtopped by flood waters from Tongue River in the past.

### *Flood Studies and Risk Products*

The Montana Department of Natural Resources and Conservation (MNRC) and the Federal Emergency Management Agency evaluate and manage many flood-related resources. As of February 2022, MNRC had prioritized funding for floodplain mapping projects for both Rosebud and Big Horn County; however current maps were not available for this planning process. The United States Geological Survey (USGS) developed flood hazard maps for the reservation in the early 1900s; however, these maps were not available during this risk assessment and were noted to be far out of date and do not meet current regulatory standards for flood risk hazard mapping by FEMA. However, as MNRC and FEMA are currently working to reevaluate flood risk in Rosebud and Big Horn Counties, USGS has expressed an interest to be a part of the process and add additional products such as updating flood frequency and real time flood map products to host online for emergency decision making (https://fim.wim.usgs.gov/fim/).

***Figure 34: Montana DNRC Floodplain Mapping Plan***




Risk Mapping, Assessment, and Planning (Risk MAP) is a FEMA program that provides communities with flood information and additional flood risk data (e.g. flood depth grids, percent chance grids, etc.) that can be used to enhance their mitigation plans and take action to better protect their residents. As of February 2022, no portions of the planning area are currently undergoing flood risk mapping activities.

Flood Insurance Studies for Big Horn County and Rosebud County have been developed by FEMA. Report information is shown in the table below; however, the Northern Cheyenne Tribe Reservation was not included in these reports.

***Table 41: Flood Insurance Study Information***

| PRODUCT ID | DOCUMENT NAME | EFFECTIVE DATE |
|---|---|---|
| 300143V000 | Flood Insurance Study: Town of Lodge Grass and Big Horn County, Montana Unincorporated Areas | 03/02/1981 |
| 30087CV000A | Flood Insurance Study: Rosebud County, Montana and Incorporated Areas | 11/15/2019 |

*Source: FEMA Flood Map Service Center*

### *Historic Occurrences*

The NCEI reports events as they occur in each community. A single flooding event can affect multiple communities and counties at a time; the NCEI reports these large scale, multi-county events as separate events. The result is a single flood event which exists in both Rosebud and Big Horn Counties could be reported by the NCEI as separate events. According to the NCEI, 28 flash flooding events resulted in $131,000 in property damage, while 24 riverine flooding events caused $4,225,000 in property damage. USDA RMA data does not distinguish the difference between riverine flooding damages and flash flooding damages. The total crop loss according to the RMA is $494,700.

Several flood events have directly impacted the Northern Cheyenne Reservation. Available reports from past events are described below.

- **1960s Flood** – Lame Deer and Lame Deer Creek
  The entire valley floor flooded in some areas. Culverts got jammed and backed up in snow/ice melt runoff. Limited physical damage reported due to lack of development in the area.
- **May 1978** – Flooding along Tongue River at St. Labre and other development near Ashland
  Widespread rain on saturated soils combined with snowmelt runoff led to significant flash flooding. Part of widespread flooding in the Yellowstone River Basin on the Big Horn, Tongue, and Powder Rivers and the Yellowstone River from Billings to Miles City. No reported property damage estimates listed for the Northern Cheyenne Reservation. People were evacuated; homes and structures flooded. It had rained for 11 days on the Reservation prior to the flood crest. FEMA provided nearly $4m in local aid.
- **June 2007** – Lame Deer
  A large spring storm associated with a cutoff upper level low, moved across the Northern Rockies on the afternoon of June 6th through the morning of June7th. Thunderstorms developed by early afternoon across northern Wyoming and southern Montana, with heavy rainfall beginning in Sheridan, Wyoming and Carbon County, Montana at 330pm and across much of southern Montana by 6pm. By 9pm Wednesday evening, heavy rainfall became more widespread across southern Montana and continued through the overnight hours. By mid morning on the 6th, rainfall had ended across the impacted area. Runoff from areas upstream of Rosebud County and the Tongue River Reservoir resulted in flooding downstream of the dam. Lame Deer was under 3 to 4 feet of water, with homes flooded, people stranded, and a propane tank floating in the street.
- **May 2011** – Lame Deer
  A Pacific low moved into the four corners region on the 17th and migrated northeast into the Dakotas through the 22nd, bringing another round of heavy precipitation aided by a tap of Gulf of Mexico moisture. Another system passed to the south on the 23rd and 24th, continuing the precipitation across the area. A new all-time daily precipitation record for Billings was set on May 24th. These two systems brought a total of 4 to 7 inches of precipitation to the area through the 25th. From May 29th through May 31st, another Pacific storm system moved northeast through the Billings Forecast Area, producing a half inch to 2 inches of precipitation across the area. A few areas received close to 3 inches of precipitation. The culmination of precipitation events resulted

in historic flooding across the Billings Forecast Area. The Montana Department of Transportation alone estimated over $36 million in damage to state and federal highways across the state of Montana. Hundreds of homes and trailers and multiple businesses experienced flood damage. There was damage to flood control dams. A persistent upslope northeast flow into the region resulted in another round of locally heavy rainfall again on May 29-30th. An additional 1-2 inches of rainfall were noted, especially for the Beartooth and Big Horn Mountain foothill areas. This resulted in prolonged or even renewed flooding in some locations through the end of the month. Highway 212 was closed on Lame Deer Divide due to the road sliding down a hill. Significant lowland flooding was also reported along Rosebud Creek. Sandbagging efforts were required on the Tongue River to avoid flooding of homes in the St Labre and Ashland areas.

- **February 2012** – Lame Deer
  An unstable northwest flow aloft brought heavy rain and snow showers to Eastern Big Horn and South Central Rosebud Counties. In addition, 3 to 5 inches of snow fell over the higher hills. The rain combined with the melting of snow on frozen ground resulted in minor flooding of low lying areas during the afternoon of the 22nd through the morning hours of the 23rd. County officials reported that minor flooding occurred across portions of Southern Rosebud County. Up to an inch of rain had fallen along with several inches of snow over the higher hills. The rain falling on frozen ground, combined with snow melt, resulted in minor flooding of low lying areas. Several ice jams were reported on Rosebud, Lame Deer and Muddy Creeks resulting in water over the roads in some locations, as well as the main road in the town of Birney. In addition, an ice jam was reported on the Tongue River and Hanging Woman Creek north and west of Birney. One rancher had to rescue calves from a flooded area. Another rancher had a chicken coup flooded killing 4 hens, as well as a stranded horse.

### *Average Annual Losses*

The average damage per event estimate was determined based upon the NCEI Storm Events Database since 1996 and number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury or loss of life. Flooding caused a total average of $4,355,000 in property damages and $22,486 in crop losses per year for the planning area.

***Table 42: Flooding Losses***

| HAZARD TYPE | # OF EVENTS[1] | AVERAGE # EVENTS PER YEAR | TOTAL PROPERTY LOSS[1] | AVERAGE ANNUAL PROPERTY LOSS | TOTAL CROP LOSS[2] | AVERAGE ANNUAL CROP LOSS |
|---|---|---|---|---|---|---|
| FLASH FLOOD | 28 | 1.1 | $130,000 | $5,000 | $494,700 | $22,486 |
| FLOOD | 24 | 0.9 | $4,225,000 | $162,500 | | |
| **TOTAL** | **52** | **2** | **$4,355,000** | **$166,731** | **$494,700** | **$22,486** |

*Source: 1 NCEI (1996-2021), 2 USDA RMA (2000-2021)*

### *Extent*

The NWS has three categories to define the typical severity of a flood once a river reaches flood stage as indicated in Table 43.

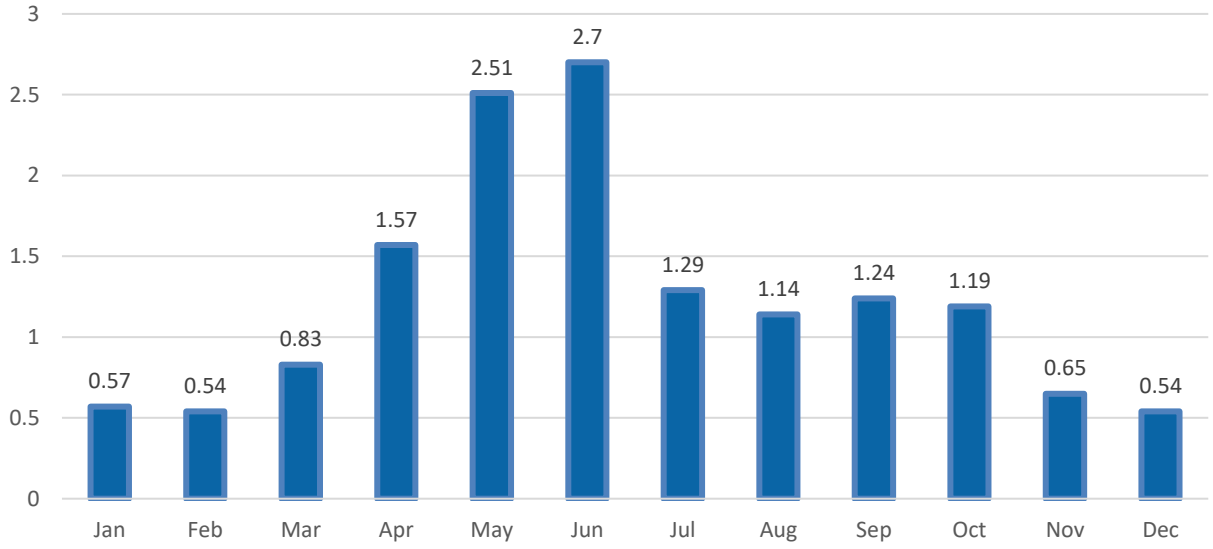
***Table 43: Flooding Stages***

| FLOOD STAGE | DESCRIPTION OF TYPICAL FLOOD IMPACTS |
|---|---|
| **MINOR FLOODING** | Minimal or no property damage, but possibly some public threat or inconvenience |
| **MODERATE FLOODING** | Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary |
| **MAJOR FLOODING** | Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations |

*Source: NOAA, 2017*[55]

The following figure shows the normal average monthly precipitation for the planning area, which is helpful in determining whether any given month is above, below, or near normal in precipitation. The most common month for flooding within the planning area is in June. The planning area is likely to experience minor to moderate flooding regularly.

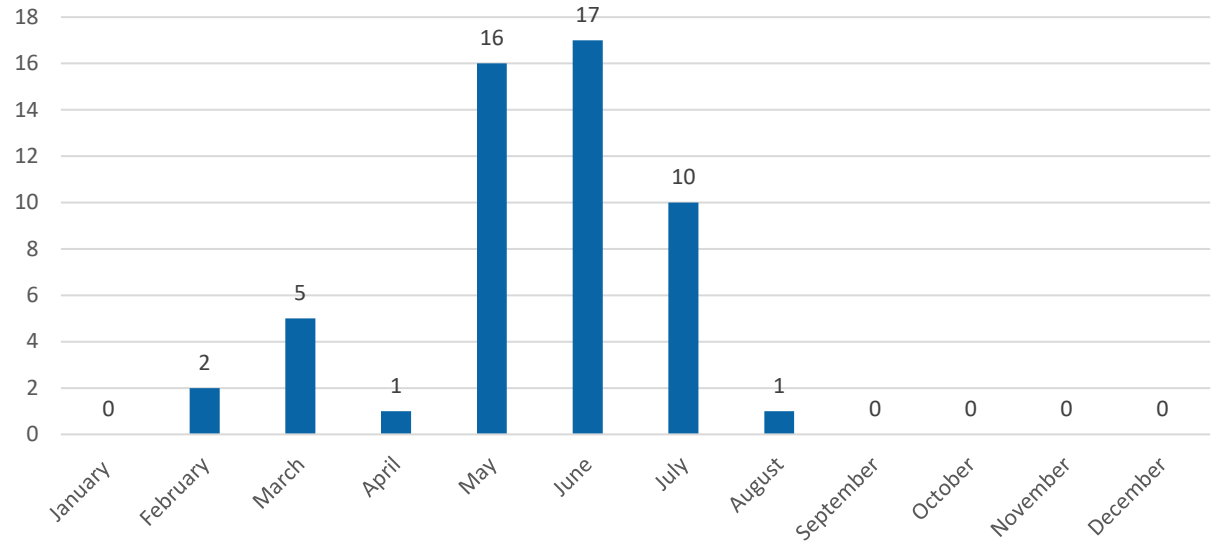
***Figure 35: Average Total Precipitation***




*Source: WRCC*

[55] National Weather Service. 2017. "Flood Safety." http://www.floodsafety.noaa.gov/index.shtml.

***Figure 36: Flood Events by Month***




*Source: NCEI*

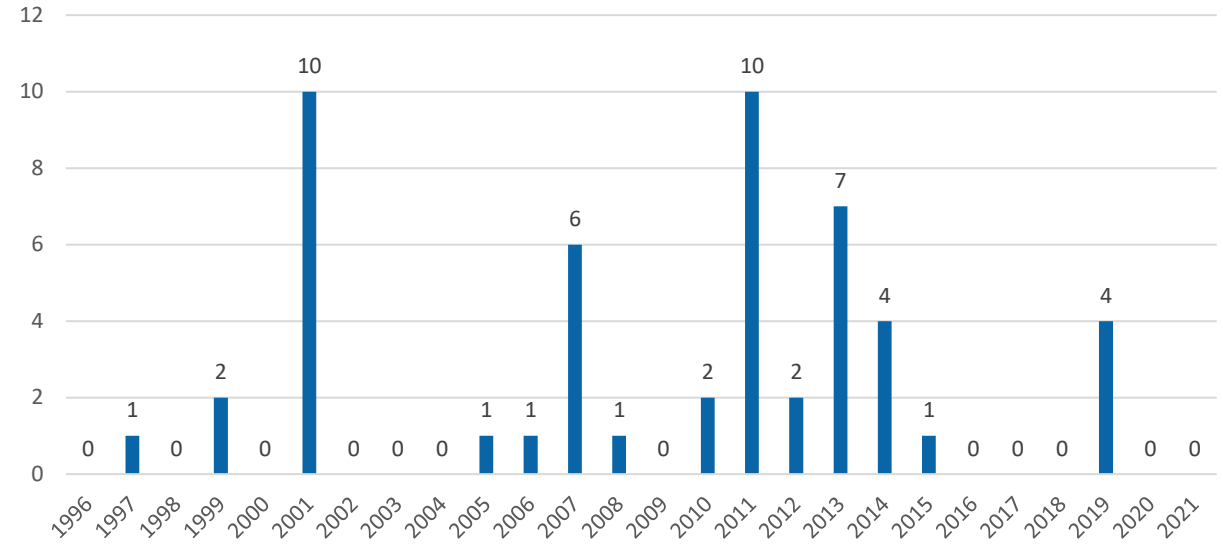
### *National Flood Insurance Program*

The NFIP was established in 1968 to reduce flood losses and disaster relief costs by guiding future development away from flood hazard areas where feasible; by requiring flood resistant design and construction practices; and by transferring the costs of flood losses to the resident of floodplains through flood insurance premiums. In return for availability of federally backed flood insurance, jurisdictions participating in the NFIP must agree to adopt and enforce floodplain management standards to regulate development in special flood hazard areas (SFHA) as defined by FEMA's flood maps. As of January 2022, the Northern Cheyenne Tribe does not participate in the NFIP. The local planning team will revisit NFIP participation once floodplain mapping efforts are completed through Montana DNRC.

### *Probability*

The NCEI reports 24 flooding and 28 flash flooding events from January 1996 to December 2021 in Rosebud and Big Horn Counties. Some years had multiple flooding events. The following figure shows the events broken down by year. Based on the historic record and reported incidents by participating communities, there is a 54 percent probability that flooding will occur annually in these two counties (14 out of 26 years with a reported event).

***Figure 37: NCEI Flash Flood and Flood Events by Year***




*Source: NCEI*

Based on this historical record, the annual probability of flooding occurring in the future is *Likely*.

### *Flood Impacts from Dam Failure*

Floodwaters may arise from heavy precipitation, high water flows in rivers, or from a sudden release due to dam failure on upstream portions of waterways. Dam failure, as a hazard, is described as a structural failure of a water impounding structure. Structural failure can occur during extreme conditions, which include but are not limited to:

- Reservoir inflows in excess of design flows
- Flood pools higher than previously attained
- Unexpected drop in pool level
- Pool near maximum level and rising
- Excessive rainfall or snowmelt
- Large discharge through spillway
- Erosion, landslide, seepage, settlement, and cracks in the dam or area
- Earthquakes
- Vandalism
- Terrorism

Dam safety experts have classified dams by the potential hazard each poses to human life and economic loss. The following are classifications and descriptions for each hazard class:

- **Minimal Hazard Potential** - failure of the dam expected to result in no economic loss beyond the cost of the structure itself and losses principally limited to the owner's property.
- **Low Hazard Potential** - failure of the dam expected to result in no probable loss of human life and in low economic loss. Failure may damage storage buildings, agricultural land, and county roads.
- **Significant Hazard Potential** - failure of the dam expected to result in no probable loss of human life but could result in major economic loss, environmental damage, or disruption of lifeline facilities. Failure may result in shallow flooding of homes and commercial buildings or damage to main highways, minor railroads, or important public utilities.

- **High Hazard Potential** - failure of the dam expected to result in loss of human life is probable. Failure may cause serious damage to homes, industrial or commercial buildings, four-lane highways, or major railroads. Failure may cause shallow flooding of hospitals, nursing homes, or schools.

According to the U.S. Army Corps of Engineers (USACE) National Inventory of Dams, there are 359 dams located in Big Horn and Rosebud Counties. Of those 342 are classified as low hazard, eight are significant hazard, and nine are high hazard. There is one privately owned dam located within the reservation. Lost Leg Dam is a low hazard dam built in 1968 and is located approximately eleven miles south of Lame Deer.

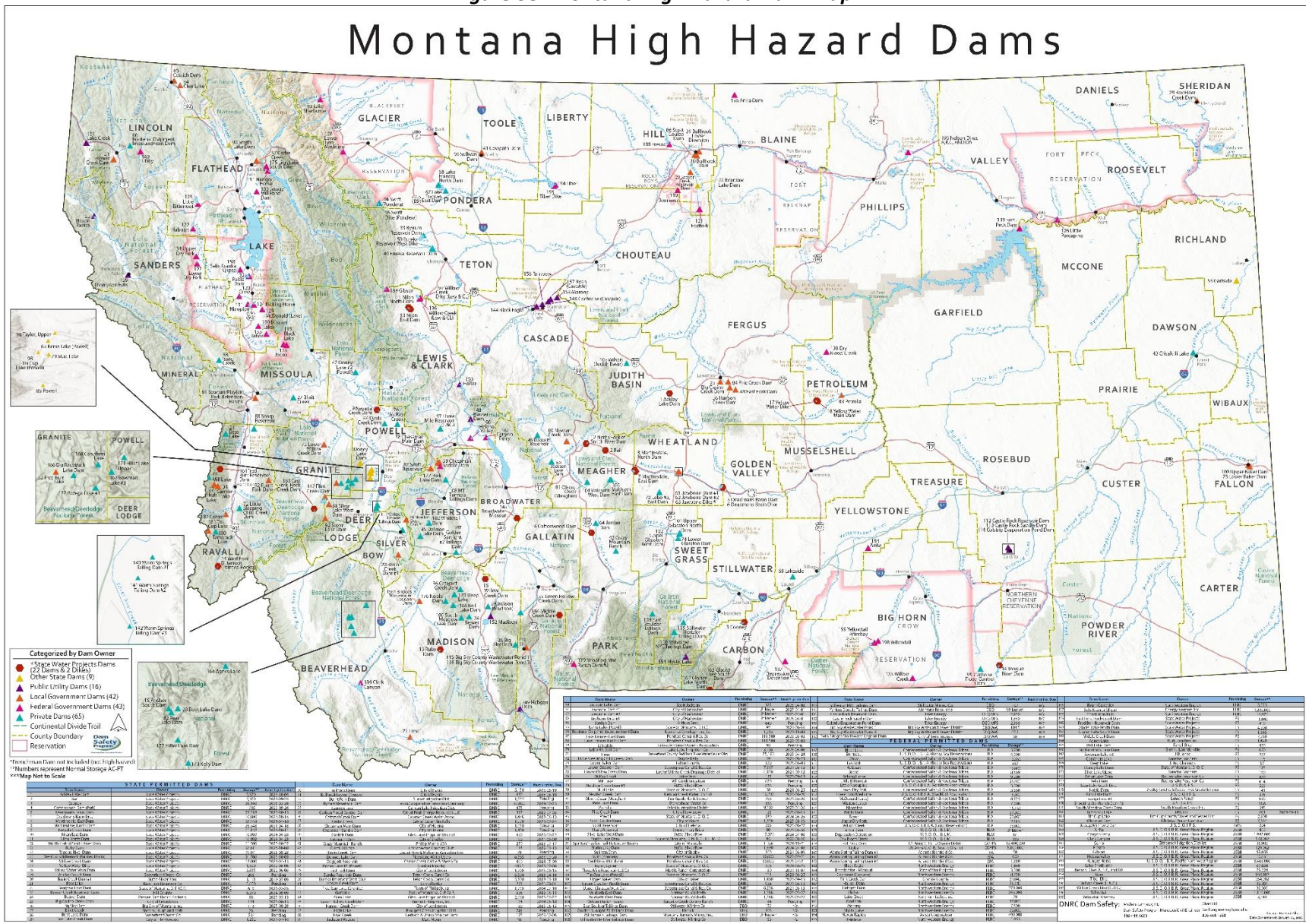
There are High Hazard dams located throughout the State of Montana (Figure 38). A high hazard state water project and state permitted dam south of the reservation is of concern to the local planning team. This earthen dam, the Tongue River Dam, is owned and operated by the State of Montana and was constructed in 1939 and rehabilitated in 1999. The dam is 93 feet high and 1,824 feet long. Total capacity of the reservoir at the spill way crest is 79,071 acre-feet.

If the Tongue River Dam were to fail, impacts would be felt through the Birney and Ashland areas in the Northern Cheyenne Reservation. All high hazard dams are required to be inspected at least once every five years and to have an Emergency Operations Plan. The Tongue River Dam Emergency Operations Plan describes potential inundation from two different breach scenarios. One is a clear-weather breach, or a sudden breach from an earthquake or a piping failure. The second scenario is a storm-induced breach resulting in the probable maximum flood for the Tongue River. The storm-induced breach is the worst-case scenario, resulting in catastrophic wave height at Birney Day School of 44.8 feet within 5.5 hours and a wave eight of 34.1 feet at Ashland within 8 hours. If Tongue River Dam were to fail, the community of Ashland would likely be entirely inundated and face catastrophic damage. The potential for dam failure on the Tongue River is low, based on past experience and the procedures and safeguards required at high hazard dams, but the severity would be catastrophic in the event of failure or breach of the Tongue River Dam.

No dam failure events have been reported in the planning area or from the Tongue River Dam. According to a FEMA report in 2018, the leading problem for dams in Montana is due to failure of corrugated metal pipe outlets.[56] In May 2020 Montana DNRC evaluated Tongue River Dam for feasibility of hydropower development and determined the dam did not produce a favorable benefit-cost analysis for full analysis.[57]

[56] FEMA. December 2018. "Dams in Montana." http://dnrc.mt.gov/divisions/water/operations/docs/dam-safety/publications/DamsinMontana12282018.pdf.
[57] Montana DNRC & Great West Engineering. May 2020. "Montana Dams & Hydropower." http://dnrc.mt.gov/divisions/water/operations/docs/dam-safety/publications/dnrc-hydropower-brochure-5-5-20.pdf.

***Figure 38: Montana High Hazard Dam Map***



### *Regional Vulnerabilities & Problem Statements*

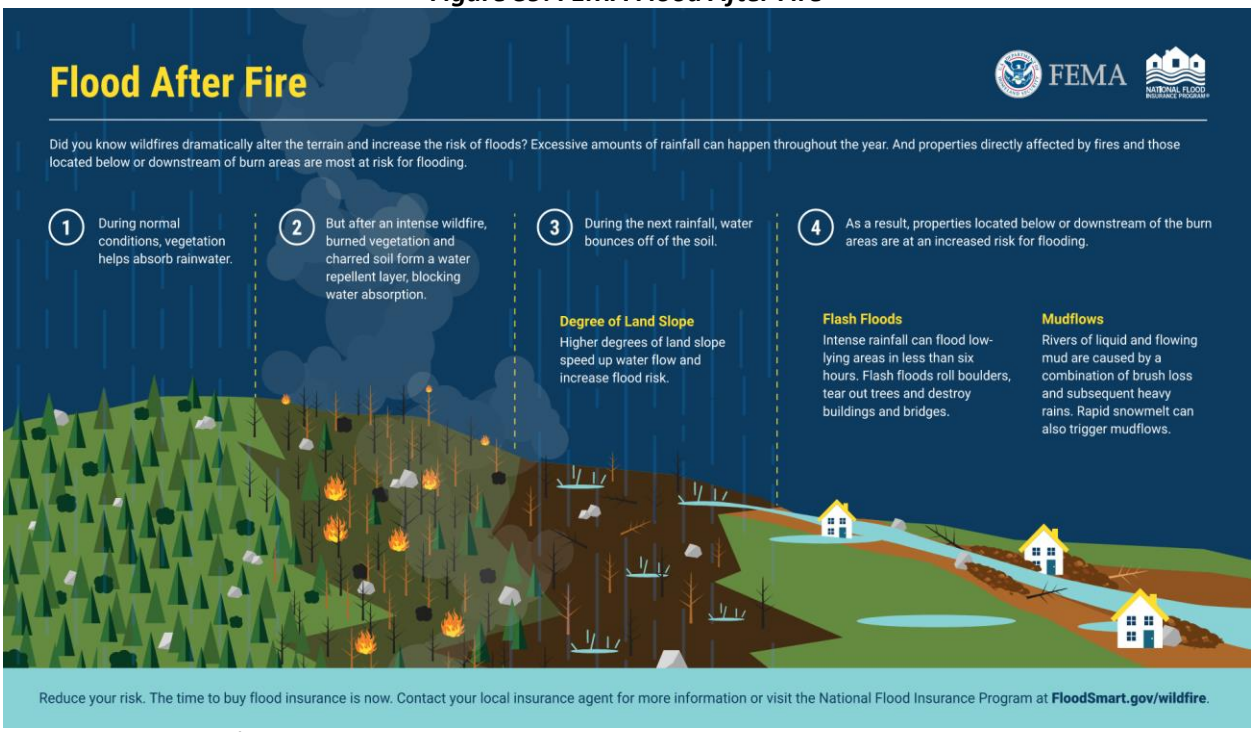
Flooding on the Northern Cheyenne Indian Reservation has occurred from storm events, snow melt, ice jams, and flash floods. Winters have been generally warmer over the past decade with little associated ice formation and potential for ice jams. Despite general drought conditions over the past decade, rainfall can be intense and erratic with potential for flash flooding in localized areas.

An updated national study examining social vulnerability as it relates to flood events found that low-income and minority populations, including tribal populations, are disproportionately vulnerable to flood events.[58] These groups may lack needed resources to mitigate potential flood events as well as resources that are necessary for evacuation and response. Flash floods are more often responsible for injuries and fatalities than prolonged flood events. Flash flooding can occur anywhere on the reservation and additionally can be exacerbated by recent wildfires which may leave large areas without vegetation to retain water runoff. Other groups that may be more vulnerable to floods, specifically flash floods, include the elderly, those outdoors during rain events, and those in low-lying areas. Tribal elders may suffer from a decrease or complete lack of mobility and as a result, be caught in flood-prone areas. Residents in rural areas, campgrounds, or open park space may be more vulnerable to flooding events. Many of these areas exist in natural flood hazard risk areas and can experience rapid rise in water levels resulting in injury or death.

Flooding issues are particularly pronounced in recently burned areas from wildfire events. Wildfire can cause complete vegetation mortality and reduce permeability of soil. Limited retention, an undersized stormwater management system and water storage options in the reservation produce increased vulnerability to flood impacts. FEMA has provided additional information in recent years detailing the relationship between wildfire and flooding. Wildfire events remove vegetation and harden soil, reducing infiltration capabilities during heavy rain events. Subsequent severe storms that bring heavy precipitation can then escalate into flash flooding, dealing additional damage to structural inventory, utilities, and transportation corridors.

58 Tate, E., Rahman, M.A., Emrich, C.T. et al. Flood exposure and social vulnerability in the United States. Nat Hazards (2021). https://doi.org/10.1007/s11069-020-04470-2

***Figure 39: FEMA Flood After Fire***




*Source: FEMA, 2020*[59]

Any future development in flood hazard risk areas should be discouraged to protect future assets. Land-use regulations should be used to limit development in flood hazard risk areas and other flood prone areas as well as protecting natural flood mitigation features. Buyout programs can be used to eliminate properties located in flood hazard risk areas, especially properties that have experienced repetitive losses. The Tribe may also consider incorporating "Green Infrastructure" to address flooding concerns, and examples of this would include using permeable surfaces for parking areas, using rainwater retention swales, developing rain gardens, developing green roofs, and establishing greenways along creeks, tributaries, or rivers.

The following problem statements were identified regarding flooding:

- Lack of available floodplain data (i.e. FIRMs) in the reservation prohibit effective floodplain management for new development, building code requirements, or emergency response.
- Insufficient stormwater management system with undersized culverts or storage space will contribute to flash flood impacts

59 FEMA and NFIP. 2020. "Flood After Fire." Accessed September 2020. https://www.fema.gov/media-library-data/1573670012259-3908ab0344ff8fbf5d537ee0c6fb531d/101844-019_FEMA_FAF_Infographic-ENG-web_v8_508.pdf

# Hazardous Materials

### *Fixed Sites and Transportation Spills*

The following description for hazardous materials is provided by the Federal Emergency Management Agency (FEMA):

> *Chemicals are found everywhere. They purify drinking water, increase crop production and simplify household chores. But chemicals also can be hazardous to humans or the environment if used or released improperly. Hazards can occur during production, storage, transportation, use or disposal. You and your community are at risk if a chemical is used unsafely or released in harmful amounts into the environment where you live, work or play.*[60]

Hazardous materials in various forms can cause fatalities, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes and businesses routinely. Chemicals posing a health hazard include carcinogens, toxic agents, reproductive toxins, irritants, and many other substances that can harm human organs or vital biological processes. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials

Hazardous material incidents generally involve releases at fixed-site facilities that manufacture, store, process or otherwise handle hazardous materials or along transportation routes such as major highways, railways, navigable waterways and pipelines. A large number of spills also occur during the loading and unloading of chemicals.

The Environmental Protection Agency (EPA) requires the submission of the types and locations of hazardous chemicals being stored at any facility within the state over the previous calendar year. This is completed by submitting a Tier II form to the EPA as a requirement of the Emergency Planning and Community Right-to-Know Act of 1986. Likewise, the U.S. Department of Transportation, through the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA), has broad jurisdiction to regulate the transportation of hazardous materials, including the discretion to decide which materials shall be classified as hazardous. These materials are placed into one of nine hazard classes based on their chemical and physical properties. The hazard schedules may be further subdivided into divisions based on their characteristics. Because the properties and characteristics of materials are crucial in understanding the dynamics of a spill during a transportation incident, it is important for response personnel to understand the hazard classes and their divisions. The following table demonstrates the nine classes of hazardous material according to the 2012 Emergency Response Guidebook.

***Table 44: Hazardous Material Classes***

| CLASS | TYPE OF MATERIAL | DIVISIONS |
|---|---|---|
| **1** | Explosives | 1.1 Explosives with a mass explosion hazard<br>1.2 Explosives with a projection hazard but not a mass explosion hazard<br>1.3 Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard<br>1.4 Explosives which present no significant blast hazard<br>1.5 Very insensitive explosives with a mass explosion hazard |

60 Federal Emergency Management Agency. 2017. "Hazardous Materials Incidents." https://www.ready.gov/hazardous-materials-incidents.

| CLASS | TYPE OF MATERIAL | DIVISIONS |
|---|---|---|
| | | 1.6 Extremely insensitive articles which do not have a mass explosion hazard |
| **2** | Gases | 2.1 Flammable gases<br>2.2 Non-flammable, non-toxic gases<br>2.3 Toxic gases |
| **3** | Flammable liquids (& combustible liquids) | |
| **4** | Flammable solids; Spontaneously combustible materials | 4.1 Flammable solids, self-reactive substances and solid desensitized explosives<br>4.2 Substances liable to spontaneous combustion<br>4.3 Substances which in contact with water emit flammable gases |
| **5** | Oxidizing substances and Organic peroxides | 5.1 Oxidizing substances<br>5.2 Organic peroxides |
| **6** | Toxic substances and infectious substances | 6.1 Toxic substances<br>6.2 Infectious substances |
| **7** | Radioactive materials | |
| **8** | Corrosive materials | |
| **9** | Miscellaneous hazardous materials/products, substances, or organisms | |

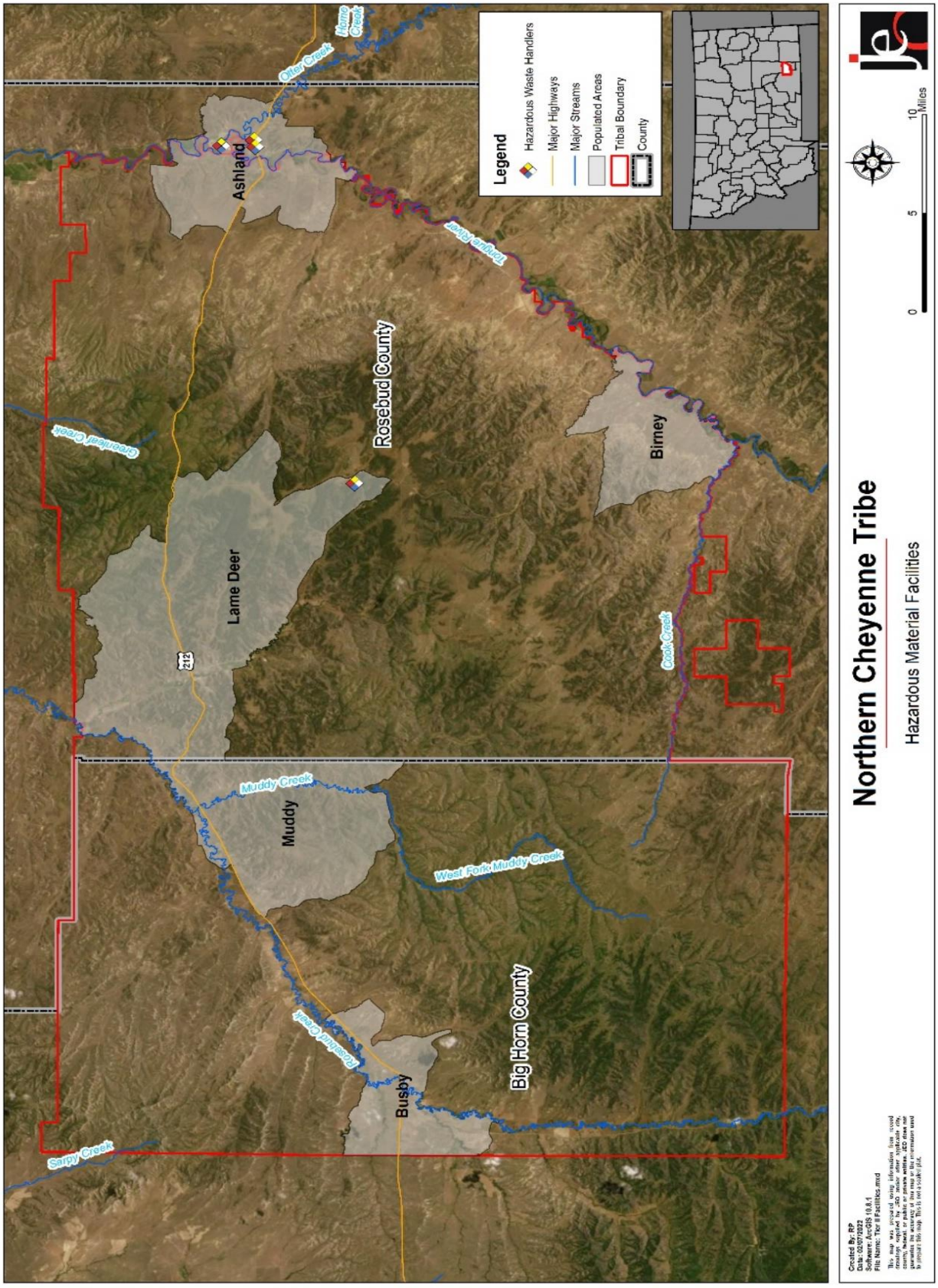
*Source: Emergency Response Guidebook, 2016*[61]

### *Location*

On the Northern Cheyenne Indian Reservation fixed facilities are limited to storage tanks (commercial or residential). There are no pipelines that cross the Reservation according to the National Pipeline Mapping System. Highways and local roads are key transportation corridors at risk of hazardous material transportation spills on the Reservation. The following figure maps identified Tier II facilities as listed by the State of Montana. There is one chemical storage fixed site located within the reservation while several facilities are located in Ashland outside the tribal boundary. If a spill were to occur at these sites tribal resources would be utilized in cleanup efforts.

[61] U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. 2016. "2016 Emergency Response Guidebook." https://www.phmsa.dot.gov/hazmat/outreach-training/erg.

***Figure 40: Tier II Hazardous Material Facilities***



### *Historical Occurrences*

The National Response Center (NRC) is the national point of contact for reporting oil and chemical spills in the United States and the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) reports transportation of chemical material incidents. While these agencies provide information for both Big Horn and Rosebud counties, for the purpose of this plan, only historical events which occurred within the reservation are included here. According to the NRC, there has been one fixed site chemical spill between 1990 and 2021 within the reservation. The following table lists those events with relevant information including quantity spilled, injuries or fatalities, and reported property damages.

***Table 45: Chemical Fixed Site Incidents***

| YEAR | LOCATION | QUANTITY SPILLED | MATERIAL | INJURED/EVACUATED | PROPERTY DAMAGE |
|---|---|---|---|---|---|
| **2021** | Lame Deer | Unknown | Motor Oil | None | $0 |

According to PHMSA, only one hazardous material transportation spill has been reported within the reservation boundary between 1971 and 2021. This does not mean other spill events did not occur in the planning area, simply that they may not be reported here. No injuries or evacuations were reported during this event however total damages were estimated at $16,000. The PHMSA event narrative described the event as:

> "*Truck was headed east bound on I-94 at approx. mm106. Truck was heading up a slight uphill when it lost traction causing it to spin out. The truck then went sideways driver corrected truck went to median where the pup trailer overturned. No release of cargo shell of trailer was dented.*"

### *Average Annual Losses*

There has been one chemical fixed site spill in the planning area reported from the NRC and one transportation spill as reported by PHMSA. Neither the NRC nor PHMSA track crop losses from chemical spills. These events reported $16,000 total in property damages. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life.

***Table 46: Hazardous Material Event Losses***

| HAZARD TYPE | NUMBER OF EVENTS | TOTAL INJURIES | TOTAL EVACUATED | TOTAL LOSS |
|---|---|---|---|---|
| **CHEMICAL FIXED SITE SPILLS** | 1 | 0 | 0 | $0 |
| **CHEMICAL TRANSPORTATION** | 1 | 0 | 0 | $16,000 |

*Source: NRC, 1990-2021; PHMSA, 1971-2021*

### *Extent*

The extent of chemical spills at fixed sites varies and depends on the type of chemical that is released with a majority of events localized to the facility. The probable extent of chemical spills during transportation is difficult to anticipate and depends on the type and quantity of chemical released. There have been two total hazardous material spills in the planning area. Total quantity spilled from each event were not provided; however, it is likely to assume each event was small scaled. No spill events led to injuries, fatalities, or injuries. Based on historic records, it is likely that any spill involving hazardous materials will not affect an area larger than a quarter mile from the spill location.

### *Probability*

Given the historic record of occurrence for fixed chemical spill events (one year with an event in the 32-period of record), for the purposes of this plan, the annual probability of a fixed chemical spill is 3 percent. Given the historic record of occurrence for chemical transportation spill events (one year with an event in the 51-period of record), for the purposes of this plan, the annual probability of chemical transportation occurrence is 2%.

Based on this historical record, the annual probability of hazardous material spills occurring in the future is *Unlikely*.

### *Regional Vulnerabilities & Problem Statements*

Resident safety is a major vulnerability during hazardous material spills due to the potential for negative health impacts and the need to evacuate. Elders or those with disabilities may have trouble evacuating during chemical releases. A major concern for hazardous materials for the planning area pertain to accidents and subsequent spills on Highway 122. A large proportion of residents for the Tribe live within close proximity (approximately within ¼ mile) of the highway and it is the major transportation corridor through Lame Deer, Busby, and Muddy. Additionally emergency responders have limited transportation corridors to both access spill sites and/or direct evacuations from.

To reduce the risk to people and property damage, future development should encourage chemical storage and manufacturing facilities to be built away from critical facilities or vulnerable areas such as medical facilities, schools, daycares, tribal elder residences, or culturally significant areas. Specific vulnerabilities exist for critical facilities or vulnerable population centers (schools, daycares, medical facilities, etc.) which are most heavily populated during the daytime as most chemical transportation incidents occur during the weekday daytime hours.

The following problem statements were identified regarding hazardous material spills:

- The Tribe's ability to clean or remediate hazardous materials spill debris is limited.
- Resident's health and safety is at risk during severe spills due to the lack of adequate health care facilities in the reservation.

# Landslides

According to the USGS a landslide can include but is not limited to rock falls, deep failure slopes, and shallow debris flows. According to the Landslide Hazards Program, landslides occur primarily because the force of gravity acts on steep slopes. However, landslides can occur due to the following factors:

- erosion by rivers, glaciers, or ocean waves create over steepened slopes
- rock and soil slopes are weakened through saturation by snowmelt or heavy rains
- earthquakes create stresses that make weak slopes fail
- earthquakes of magnitude 4.0 and greater have been known to trigger landslides
- volcanic eruptions produce loose ash deposits, heavy rain, and debris flows
- excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures

Landslides also occur when the ground becomes saturated after heavy rains or snow falls causing debris flow or mud flow. These flows can cause a wave of mud and debris that can knock down trees, damage houses, creating "dams" that cause localized flooding.

### *Location*

The area's most vulnerable to this hazard are the rural sections of the planning area, used primarily for ranching. Area in the planning area that have development near land slopes may be more susceptible to this hazard.

### *Historic Occurrences*

According to the USGS Landslide Hazard Program's Inventory, no landslides have been reported in the reservation. However, there are likely landslides which have occurred in rural portions of the reservation which have not been reported.

### *Average Annual Losses*

Due to a lack of reported landslide events, it is not possible to calculate average annual loss for landslides in the planning area.

### *Extent*

Given a lack of reported landslide impacts, no reported economic damages, and the rural nature of this region, the extent of a landslide event is likely minimal. The most vulnerable locations for landslides in the reservation are near community centers or homes in non-developed, rural areas.

### *Probability*

Due to a lack of reported landslide events, it is not possible to calculate landslide probability for the Northern Cheyenne Tribe reservation. Based on this historical record, the annual probability of landslides occurring in the future is *Unknown*.

### *Regional Vulnerabilities & Problem Statements*

Vulnerabilities to landslide events exist for both residents and the built environment. Injuries can occur when landslides occur near developed areas, primarily if residents are unable to avoid debris flows. Other vulnerabilities exist for agricultural land and injuries to cattle, horses, or other livestock; and to underground infrastructure such as water pipes. Existing water pipes in the reservation are aged and

brittle in many areas. In addition, as climate change continues to impact local weather events in the area, the risk of landslides may increase alongside increasing frequency and magnitude of heavy rain or drought events.

The following problem statements were identified regarding landslides:

- The Tribe's ability to clear debris from landslides is limited.
- Existing utility lines (water pipes) in the reservation are aged and at greater risk to landslides.

# Public Health Concerns

### *Agricultural Disease, Public Health Epidemics, and Water Quality*

The Northern Cheyenne Tribe determined Public Health Concerns to be an ongoing and significant concern for the overall safety of tribal members and the general environment. For the purposes of this plan, three specific types of public health concerns are discussed here together. These are impacts from agricultural disease, human disease outbreaks, and water quality issues.

**Agricultural Disease**

Agricultural disease is any biological disease, virus, or infection that can reduce the quality or quantity of either livestock or vegetative crops. Farming and ranching make up key portions of the Northern Cheyenne Tribe's economy. According to the USDA Census of Agriculture for American Indian Reservations in 2017, the market value of tribal agricultural products sold was estimated at $3.87 million, this total is split between crops (estimated $392,000) and livestock (estimated $3.478 million).[62] Table 47 shows the population of livestock within the planning area. This count does not include wild populations that are also at risk from animal diseases.

***Table 47: Livestock Inventory of the Northern Cheyenne Reservation***

| Market Value of 2017 Livestock Sales | Cattle and Calves | Horse and Ponies | Bison | Layers | Hogs and Pigs | Sheep and Lambs |
|---|---|---|---|---|---|---|
| $3,478,000 | 7,023 | 1,831 | (D) | 127 | 0 | 0 |

*Source: U.S. Census of Agriculture for American Indian Reservations*
*(D) Withheld to avoid disclosing data for individual farms.*

Wildlife in the reservation includes populations of antelope, coyote, deer, fox, and prairie dogs. There are several prairie dog towns located across the reservation, predominantly along the eastern edge of the reservation in Rosebud County. In 2009 there were approximately 10,000 acres of prairie dog inhabited land. However, bubonic plague carried by fleas decimated local populations over the past decade with current estimates at approximately 500 acres of inhabited land. The bacteria — Yersinia pestis — thrives in prairie dog fleas. Once infected, prairie dogs typically die within a few days within their burrows. Other animals who can carry the disease include deer mice, rats, badgers, coyotes, bobcats, and antelopes. Residents are encouraged to avoid prairie dog towns and keep pets away from contacting prairie dogs; however, loose dogs are a common occurrence across the reservation. The tribe has also reintroduced the endangered black-footed ferrets to the reservation which are also susceptible to plague. The tribe, BIA, and USDA have undertaken efforts in the past to dust prairie dog mounds either with diatomaceous earth or other pesticides to manage flea populations.

The combination of severe weather events such as drought and agricultural disease can influence wildfire risk and contribute to large wildfires. Drought-stressed trees are more susceptible to infestation from insects and incidents of disease. The mountain pine beetle (*Dendroctonus ponderosae*) and pine engraver beetle (*Ips pini*) cause the most damage in over-stocked and stressed stands of ponderosa pine (*Pinus ponderosa*) on the Reservation and can lead to fuels that generate extreme heat causing very dangerous fire behavior conditions.

According to the USDA, the primary crops planted in the state of Montana include wheat, hay, and barley.

[62] U.S. Department of Agriculture. 2017. "2017 Census of Agriculture for American Indian Reservations".

Montana State University lists hay and haylage, winter wheat, barley, spring wheat, safflower, and peas dry edible as the top crops of Rosebud and Big Horn Counties. The USDA Census of Agriculture for American Indian Reservations report estimated 8,206 acres of Northern Cheyenne forage land was used for all hay and haylage, grass silage, and greenchop in 2017. No other crops were reported as having planted acreage on tribal land. The following table provides the value and acres of land in farms for the planning area.

***Table 48: Land and Value of Farms within the Northern Cheyenne Reservation***

| NUMBER OF FARMS | LAND IN FARMS (ACRES) | TOTAL CROPLAND | MARKET VALUE OF 2017 CROP SALES |
|---|---|---|---|
| 69 | 499,738 | 12,703 | $392,000 |

*Source: U.S. Census of Agriculture for American Indian Reservations*

**Public Health Epidemics**

According to the World Health Organization, a public health emergency is:

> "an occurrence or imminent threat of an illness or health condition, caused by bio terrorism, epidemic or pandemic disease, or (a) novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human facilities or incidents or permanent or long-term disability" (WHO/DCD, 2001). The declaration of a state of public health emergency permits the governor to suspend state regulations, change the functions of state agencies.[63]

The number of cases that qualifies as a public health emergency depends on several factors including the illness, its symptoms, ease in transmission, incubation period, and available treatments or vaccinations. With the advent of sanitation sewer systems and other improvements in hygiene since the 19th century, the spread of infectious disease has greatly diminished. Additionally, the discovery of antibiotics and the implementation of universal childhood vaccination programs have played a major role in reducing human disease impacts. Today, human disease incidences are carefully tracked by the Centers for Disease Control and Prevention (CDC) and state organizations for possible epidemics and to implement control systems. Novel illnesses or diseases have the potential to develop annually and significantly impact residents and public health systems. Both chronic and infectious diseases can become epidemic in a population, but for the purposes of this plan, infectious diseases are of more concern because of their generally acute effects resulting in higher mortality and morbidity rates.

A key priority for the Northern Cheyenne Tribe is to provide comfort and dignity to Cheyenne members during illness and during end-of-life care.

**Water Quality**

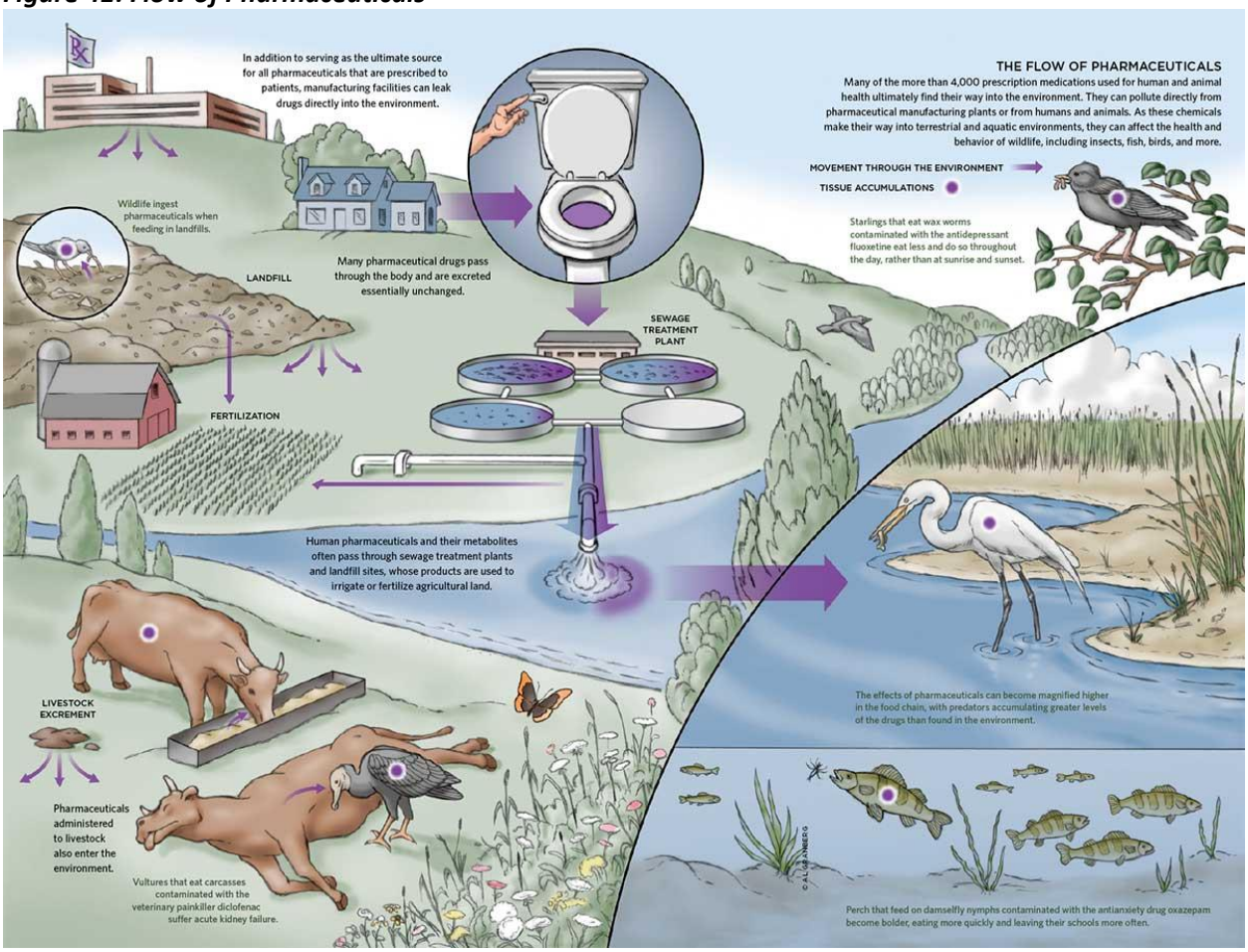
Threats to water quality in the planning area include both natural hazard events (droughts, floods, and other extreme climate events) and man-made hazard types (wastewater discharge, pollution, and medical waste). In Montana, reduced streamflow in late summer can lead to warming water temperatures, and stress water supplies which can lead to increased disease carried by vectors such as mosquitos, fish kills, loss of ceremonial water supplies and aquatic species, decreased food availability, and increased mental health concerns. Water quality issues resulting from climate change can also be caused by changes to precipitation runoff, land use, and the way agricultural lands are managed. Increased runoff can introduce non-point source pollution such as fertilizers and pesticides into streams, and in warmer waters, potentially decrease dissolved oxygen levels and lead to toxic cyanobacterial harmful algae blooms

[63] World Health Organization. 2008. Accessed April 2020. "Glossary of humanitarian Terms." https://www.who.int/hac/about/definitions/en/.

(cyanoHABs), which can be harmful to both animal and human health. Water supplies can also be disrupted during extreme flooding events which carry water-borne pathogens and other contaminants. Wells are especially susceptible to contamination from flood events which can increase exposure to toxic substances and pathogens released by flood waters. An additional environmental stressor on residents is the potential for floods increasing the risk of mold formation in homes.

The local planning team noted concerns for water quality issues stemming from medications being flushed or improperly disposed of. Where there has been little evidence pharmaceuticals in the water have harmed people directly, medications discharged into effluent and local waterways negatively interact with the local wildlife and the natural environment. The tribe regularly experiences power and water utility outages which can impede effective water treatment activities.

***Figure 41: Flow of Pharmaceuticals***




*Source: USGS Water Science School*

The Environmental Protection Department's Water Quality Division upholds the local water code and water quality standards for the tribe. The department monitors numerous factors which effect water quality including pH, temperature, dissolved oxygen, conductivity, turbidity, total suspended solids, total nitrogen, phosphorous, pathogens, sodium, calcium, magnesium, and metals. According to the Tribal Drought Contingency Plan (March 2022), water quality on the reservation has been degraded by increased sediment and nutrient loads from livestock grazing.

The most recent assessment of ground water quality on the Reservation occurred in the 1970s. Water quality data are available for the Fort Union and alluvial aquifers. Generally, ground water on the Reservation ranges from soft to very hard, and the dominant ions in the ground water consist of sodium, magnesium, calcium, bicarbonates, and sulfate. Overall, most of the ground water is suitable for consumption; however, samples from some ground water wells have exceeded the Primary Drinking Water Standards for chromium, fluoride, and/or cadmium. In addition, some ground water samples have exceeded the Secondary Drinking Water Standards for total dissolved solids, sulfate, iron, and manganese. Secondary Drinking Water Standard exceedances do not represent a health risk; rather, they indicate that the water is less desirable for drinking water use because of aesthetic reasons. Finally, the high salinity of some of the ground water makes it unsuitable for irrigation; however, it is acceptable for livestock use.[64]

### *Location*

Public Health Concern impacts can occur anywhere in the planning area. Epidemic threshold levels are dependent on disease, location, and season. Normal infectious disease patterns are changing due to increasing human mobility globally and climate change. Agricultural diseases have the potential to occur across the planning area with impacts to the economy of the Northern Cheyenne Tribe if a major outbreak were to occur. Animal and plant diseases would occur on agricultural lands, range or pasture lands, and forests.

Tribal members who work in rural areas of the reservation or who work in the agricultural sector are particularly at risk from animal-related diseases, tularemia, West Nile Virus, influenza, and pesticide poisoning. Populated areas of the reservation are particularly at risk from community spread type illnesses such as influenza, norovirus, and other communicable diseases. All residents throughout the planning area are at risk during public health emergencies.

The majority of tribal residents have individual wells to supply water to homes or personal properties. Water quality concerns including algae, cyanoHABs, pesticides/herbicides, or other pollutants may occur at any point-source of water. The local planning team noted specific concerns regarding aged and damaged water infrastructure which may be cracked, leaking, or leaching contaminants.

Coal mines in the area may cause other potential sources of water quality contamination. For instance, the largest coal mine in Montana, the *Westmoreland's Rosebud Mine,* is located approximately 20 miles north of the Northern Cheyenne Tribe in Colstrip. Mining operations can impact water supplies by contaminating nearby rivers, lakes, and aquifers with highly acidic water containing heavy metals like arsenic, copper, and lead. The reservation resides in the Powder River Basin, a geologic structural basin encompassing southeast Montana and northeast Wyoming and is known for extensive coal reserves. Most mining in Montana occurs in the Powder River Basin east and south of Billings. Most coal in the state is mined on federal lands, with a significant portion coming from Indian reservations.

### *Historic Occurrences*

There is little to no available historical data regarding specific impacts from Public Health Concerns for the Northern Cheyenne Reservation.

**Public Health Epidemics**

Many pandemics are widespread (global or national) disease outbreaks. These types of illnesses, such as

[64] Northern Cheyenne Tribe. 2022. "Drought Contingency Plan."

influenza, can spread easily person-to-person, cause severe illness, and are difficult to contain. An especially severe pandemic can lead to high levels of illness, death, social disruption, and economic turmoil. Past large-scale public health emergency events include:

- 1918 Spanish Flu: the H1N1 influenza virus spread world-wide during 1918 and 1919. It is estimated that at least 50 million people worldwide died during this pandemic with about 675,000 deaths alone in the United States. No vaccine was ever developed and control efforts included self-isolation, quarantine, increased personal hygiene, disinfectant use, and social distancing.
- 1957 H2N2 Virus: a new influenza A (H2N2) virus emerged in Eastern Asia and eventually crossed into coastal U.S. cities in summer of 1957. In total 1.1 million people worldwide died of the flu with 116,000 of those in the United States.
- 1968 H3N2 Virus: an influenza A virus discovered in the United States in September 1968 which killed over 100,000 citizens. The majority of deaths occurred in people 65 years and older.
- 2009 H1N1 Swine Flu: a novel influenza A virus discovered in the United States and spread quickly across the globe. This flu was particularly prevalent in young people while those over 65 had some antibody resistance. The CDC estimated the U.S. had over 60.8 million cases and 12,469 deaths.
- 2019 COVID-19: the coronavirus disease 2019 is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which originated in Wuhan China and spread globally. As of December 2021 the CDC reported in the U.S. over 50 million cases and 800,000 deaths attributed to COVID-19. Efforts to control and limit the virus included face coverings, self-isolation, quarantine, increased cleaning measures, and social distancing. Significant impacts to the national and global economy have been caused by COVID-19.

**Agricultural Disease**

The Montana Department of Livestock's Animal Health Bureau produces an annual report listing livestock diseases that occurrence within the state throughout the fiscal year. The following table outlines all diseases that have occurred at least once from 2009 to 2021[65]. In some cases, the reports state what county the outbreaks occurred in, but tribal historical occurrences of animal disease are not available. The local planning team noted specific outbreaks of both bubonic plague in prairie dog towns and chronic wasting disease in local deer populations.

***Table 49: Montana Livestock Diseases***

| Disease Names | | |
|---|---|---|
| Anaplasmosis | Chronic Wasting Disease [Z, F, S] | Salmonella pullorum |
| Avian Influenza [Z, F, S] | Covid-19 [Z] | Seneca Valley Virus [F, S] |
| Bluetongue [S] | Eastern Equine Encephalitis (EEE) | Strangles [S] |
| Bovine Herpes Virus (BHV-1) | Equine Herpes Virus (EHV) | Swine Enteric Coronavirus Disease (SECD) |
| Bovine Leukemia Virus | Equine Infectious Anemia [F, S] | Tuberculosis [Z, F, S] |
| Bovine Viral Diarrhea | Johne's Disease | Trichinellosis |
| Brucellosis [Z] | Malignant Catarrhal Fever [F, S] | Trichomoniasis [S] |
| Brucella ovis | Ovine Progressive Pneumonia/Caprine Arthritis Encephalitis | Vesicular Stomatitis [Z, F, S] |
| Bubonic Plague | Rabies [Z, S] | West Nile Virus [Z, S] |
| Campylobacter | Salmonella enteritidis | |

*"Z" – zoonotic disease, "F" – Federally Reportable, "S" – State Reportable*
*Source: Montana Department of Livestock*

[65] Montana Department of Livestock. 2009-2021. "Animal Health Bureau Annual Report" https://liv.mt.gov/Animal-Health/Annual-Reports.

A variety of different diseases can also impact crops and often vary from year to year. The most prevalent crop in both Big Horn and Rosebud County is hay and haylage, followed by wheat and finally barley. The following table lists the most common plant diseases for these crops.

***Table 50: Common Crop Diseases in Montana by Crop Type***

| CROP | DISEASES | |
|---|---|---|
| **Hay and Haylage** | • Anthracnose<br>• Aphanomyces root rot<br>• Bacterial wilt<br>• Common leaf spot and lepto leaf spot<br>• Fusarium wilt | • Phytophthora root rot<br>• Root-lesion nematodes<br>• Sclerotinia crown and stem rot<br>• Spring black stem<br>• Verticillium wilt |
| **Wheat** | • Barley yellow dwarf virus<br>• Black chaff/Bacterial leaf blight/Bacterial stripe<br>• Bunt (dwarf and common)<br>• Cephalosporium stripe<br>• Common root rot<br>• Dry seed decay<br>• Eyespot<br>• Ergot<br>• Fusarium crown rot | • Fusarium head blight/scab<br>• Loose smut<br>• Powdery mildew<br>• Rusts (Leaf, stem, stripe)<br>• Septoria leaf blotch<br>• Snow mold<br>• Take-all<br>• Tan spot<br>• Triticum mosaic virus<br>• Wheat streak mosaic virus |
| **Barley** | • Bacterial kernel blight<br>• Bacterial blight/black chaff bacterial leaf streak<br>• Barley stripe<br>• Barley yellow dwarf virus<br>• Barley yellow streak mosaic virus<br>• Damping-Off<br>• Ergot<br>• Fusarium head blight/scab | • Net blotch<br>• Physiological leaf spot<br>• Root rot<br>• Rusts (leaf, stem, stripe)<br>• Septoria leaf blotch<br>• Scald<br>• Smuts (covered and loose)<br>• Spot blotch<br>• Tan spot |

*Source: Montana State University Extension*[66]

**Water Quality**

There is little available data to showcase specific water quality issues which have impacted the Northern Cheyenne Tribe in the past. However, the neighboring Crow Tribe directly west of NCT provided several observations in the Climate Change and Human Health in Montana report developed by Montana State University's Center for American Indian and Rural Health Equity. These observations included impacts on traditional food and water sources, changes to the health and distribution of fish species, and the introduction and spread of contaminants in water sources reducing the availability of water sources for ceremonial purposes.

66 Montana State University. "Plant Pathology Resources". Accessed April 2022. https://plantpath.msuextension.org/resources/index.html#plant-diseases-and-management

### *Average Annual Losses*

**Agricultural Disease**

Using data from the USDA RMA (2000-2021), annual crop losses from plant disease can be estimated for the planning area. Crop loss events are categorized by county, so some events may be included which did not affect the Northern Cheyenne Reservation.

***Table 51: Agricultural Plant Disease Losses***

| COUNTY | NUMBER OF EVENTS | TOTAL CROP LOSS | AVERAGE ANNUAL CROP LOSS |
|---|---|---|---|
| Big Horn | 21 | $972,469 | $44,203 |
| Rosebud | 14 | $330,826 | $15,037 |
| **TOTAL** | **35** | **$1,303,295** | **$59,240** |

*Source: USDA RMA, 2000-2021*

The number of livestock deaths due to animal diseases are included in the Montana Department of Livestock's Annual Report, however the economic losses are not possible to estimate. As reported by the Montana Department of Livestock, Big Horn County experienced seven events of livestock disease and Rosebud County experienced only one from 2009 to 2021.

**Public Health Epidemics**

The national economic burden of influenza medical costs, medical costs plus lost earnings, and total economic burden was $10.4 billion, $26.8 billion, and $87.1 billion respectively in 2007.[67] However, associated costs with pandemic response are much greater. As of December 2020, estimated costs for COVID-19 in the United States exceed $16 trillion. Estimated costs specific for the Northern Cheyenne Tribe are unknown at this time. Specific costs do not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of significant health impacts are difficult to quantify and will vary depending on the type and spread of the virus. Other notable impacts to the local economy or planning area due to public health impacts included: widespread PPE and medical supply shortages; short or long-term business closures (due to lack of available staffing, safety considerations, or lack of customers); and closure of schools or child-care facilities.

**Water Quality**

Due to a lack of available data, it is not possible to determine the average annual losses for water quality concerns. However, it is anticipated that the Tribe must spend a significant portion of available tribal funds updating, maintaining, and improving the existing water infrastructure or remediating potential contamination.

### *Extent*

Those most affected by public heath emergencies are typically the very young, the very old, the immune-compromised, the economically vulnerable, and the unvaccinated. Roughly 38% of the planning area's population is 18 years old or younger, and over 12% of the planning area is over 60 years old, while over a quarter of the population lives below the poverty line. Current estimates for vaccination rates are not publicly available. As of December 2021, vaccines and subsequent booster shops for COVID-19 were available to all residents.

It is not possible to determine the extent of individual public health concern events, as the type and

[67] Molinari, N.M., Ortega-Sanchez, I.R., Messonnier, M., Thompson, W.W., Wortley, P.M., Weintraub, E., & Bridges, C.B. April 2007. "The annual impact of seasonal influenza in the US: measuring disease burden and costs." DOI: 10.1016/j.vaccine.2007.03.046.

severity of either novel diseases, agricultural disease outbreaks, or water contamination cannot be predicted. However, depending on the outbreak type, a significant portion of residents may be at risk to illness or death. The extent of a public health emergency is also closely tied to the proximity or availability of health centers. There are no hospitals currently within the NCT reservation and only one health care facility – the Indian Health Service clinic in Lame Deer. The local planning team identified a high priority need to build additional health care clinics and a long-term care or nursing home with hospice facilities within the reservation. Local capacity to staff a facility is likely present as many tribal residents have pursued a health care education; however, they must travel outside of the reservation for work due to the lack of facilities in NCT.

There is no standard for measuring the magnitude of agricultural diseases. Historical events have impacted a relatively small number of livestock and/or crops and governing bodies such as the USDA, Montana Department of Livestock, and NCT are quick to implement quarantines on farms and are willing to cull herds if highly contagious and/or dangerous diseases are discovered.

Water quality concerns may range from a small, contained area to entire drainage areas depending on the potential contaminant. It is not currently feasible to estimate anticipated extent of water quality concerns in the Northern Cheyenne Reservation. However, for the purpose of this plan, potential impacts may affect only a few private wells, to the entire public water supply due to aging infrastructure.

### *Probability*

While there is little available data regarding public health concerns, anecdotal evidence suggests the annual probability of public health concerns, whether from agricultural disease, water quality issues, or public health epidemics, occurring in the future is *Likely*.

Given the historical record of occurrence of 35 plant disease outbreaks reported in 22 years, for the purposes of this plan, the annual probability of agricultural plant disease occurrence is 100 percent. Agricultural animal disease and water quality probability cannot be calculated due to lack of available sufficient data.

### *Regional Vulnerabilities & Problem Statements*

There are numerous factors which influence overall vulnerability to public health concerns. Poverty, diabetes, rurality, and alcohol use for instance increase chronic and infectious disease rates. Large scale or prolonged events may cause businesses to close temporarily or permanently, leading to significant revenue loss and loss of income for workers. Persons in direct contact with livestock or animal care are at greater risk to contracting or spreading zoonotic diseases. Health care access is critical for those affected by public health concerns. There is one medical facility located in Lame Deer.

A concern for the Northern Cheyenne reservation also includes blocked transportation routes if quarantine measures were required. Due to the limited number of primary transportation corridors and tribal residents living in inaccessible areas, lack of adequate access can pose a major hinderance to receiving adequate health care. The existing health care facility in the reservation can also be quickly overwhelmed by large scale events.

The local planning team noted specific concerns regarding access to key emergency health care equipment during large scale events. Access to PPE during the COVID-19 pandemic was a significant concern and local medical facilities struggled to adequately staff and provide equipment. Space and storage ability for excess equipment is a limiting factor in preparing for large scale outbreaks. Maintaining

adequate stores of PPE and medical equipment is a continual need. Indian Health Services (IHS) has updated their stores as of 2022 and maintaining equipment is an ongoing priority.

An independent study by Trust for America's Health (2019) evaluated each state in the nation based on their efforts to reduce vulnerability to the spread of infectious diseases.[68] While specific scores are not available for tribal nations, the study gave the State of Montana a score of five out of ten for their efforts. This score is based on the state's overall public health department funding, National Health Security Preparedness Index score, public health department accreditation, flu vaccination rate, climate change preparedness, food safety, mitigation of healthcare-associated infections, public health laboratory biosafety training and expertise, and emergency healthcare access. This moderate score suggests that Montana is vulnerable to epidemic outbreaks. Trust for America provided suggestions for the State to improve their preparedness score which are listed below.

***Table 52: Potential Public Health Preparedness Improvements***

| INDICATOR | DESCRIPTION |
|---|---|
| National Health Security Preparedness index | Meet or exceed the overall national average score (6.7) for the National Health Security Preparedness Index, as of 2016 |
| Public Health Accreditation | Have at least one accredited public health department |
| Climate Change Readiness | Receive a grade of A or B in States at Risk: America's Preparedness Report Card |
| Food Safety | Increase the speed of DNA fingerprinting using pulsed-field gel electrophoresis testing for all reported cases of E. coli |
| Emergency Healthcare Access | Have a formal access program or a program in progress for getting private sector health care staff and supplies into restricted areas during a disaster |

*Source: Trust for America*

The following problem statements were identified regarding thunderstorms:

- There is a significant lack of public health information available specifically for the Tribe. NCT Board of Health should evaluate and establish a procedure to begin tracking data and events.
- A lack of adequate health care facilities in the reservation significantly contributes to local vulnerability for health and safety of residents.
- Existing facilities lack storage space and supply stock of personal protective equipment (PPE) and/or emergency medical equipment.
- Climate change impacts to the local environment are likely to exacerbate water quality degradation, mental health concerns, and local public health.
- Loss of life from tribal elders significantly impacts tribal historical health and knowledge due to large oral history culture.
- Trained and educated tribal health care workers find employment outside the reservation due to lack of health care facilities and available housing for residents.

[68] Trust for America's Health. 2019. "Key Health Data About Montana - Public Health Preparedness." https://www.tfah.org/state-details/montana/.

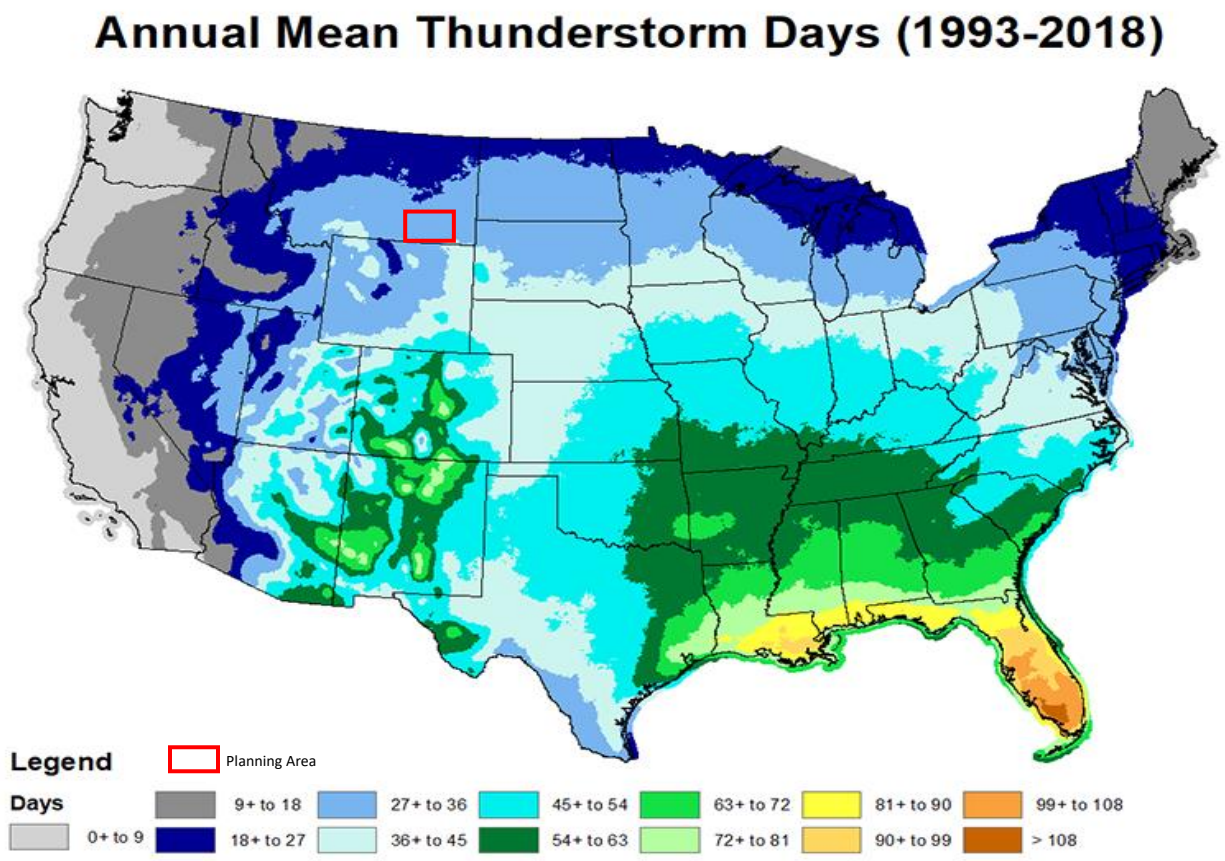
# Thunderstorms

***Hail, Lightning, Heavy Rain, and Thunderstorm Wind***

Severe thunderstorms are common and unpredictable seasonal events which typically occur between April and September. A severe thunderstorm is typically defined a storm that produces lightning, hail 0.75 inches or more in diameter, or winds of 50 knots (58 mph) or more. When cold upper air sinks and the warm, moist air rises, storm clouds or "thunderheads" develop, resulting in thunderstorms. This can occur singularly, in clusters, or in lines. Lightning, by definition, is present in all thunderstorms and can cause harm to humans and animals, fires to buildings and agricultural lands, and electrical outages in electrical systems. Lightning can strike up to 10 miles from the portion of the storm depositing precipitation.

While the majority of thunderstorms do not cause damage, they can escalate to severe storms and the potential for damages increases. Damages can include: crop losses from wind and hail; property losses due to building and automobile damages from hail; high wind; flash flooding; and death or injury to humans and animals from lightning, drowning, or getting struck by falling or flying debris. The figure below displays the average number of days with thunderstorms across the country each year. The planning area experiences an average of 27 to 36 thunderstorms over the course of one year.

***Figure 42: Average Annual Thunderstorms***




*Source: NWS, 2018*[69]

69 National Weather Service. 2020. "Global Weather: Introduction to Thunderstorms." https://www.weather.gov/jetstream/tstorms_intro#:~:text=It%20is%20estimated%20that%20there,its%20share%20of%20thunderstorm%20occurrences.

### *Location*

The entire area of the Northern Cheyenne Reservation is subject to severe thunderstorms including lightning, hail, wind, and heavy rain.

### *Historic Occurrences*

Severe thunderstorms in the planning area usually occur in the afternoon and evening during the summer months. The NCEI reports events as they occur in each community. A single severe thunderstorm event can affect multiple communities and counties at a time; the NCEI reports these large scale, multi-county events as separate events. The result is a single thunderstorm event covering the entire reservation could be reported by the NCEI as multiple events in both Rosebud and Big Horn Counties. The NCEI does not identify events as they occur specifically within the NCT reservation, thus all records for Big Horn County and Rosebud are included in this analysis.

The NCEI reports a total of 279 thunderstorm wind, eight heavy rain, three lightning, and 488 hail events in Big Horn and Rosebud Counties from January 1996 to December 2021. In total these events reported $164,000 in property damages. The USDA RMA data does not specify severe thunderstorms as a cause of loss, however heavy rains and hail which may be associated with severe thunderstorms caused $8,720,420 in crop damages in the two counties. There were four injuries and four fatalities reported in association with these storm events; however, none were reported within the reservation.

Specifically the local planning team noted a severe hail event in 2018 which caused extensive damage to homes and tribal buildings across the reservation. Hail damage required the tribal council building and majority of homes in Lame Deer to replace roofs.

### *Average Annual Losses*

The average damage per event estimate was determined based upon recorded damages from NCEI Storm Events Database since 1996 and number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Severe thunderstorms cause an average of $6,308 per year in property damages and over $1 million in crop damages annually.

***Table 53: Severe Thunderstorm Losses***

| Hazard Type | # of Events[1] | Average # events per year | Total Property Loss[1] | Average Annual Property Loss | Total Crop Loss[2] | Average Annual Crop Loss |
|---|---|---|---|---|---|---|
| Hail | 488 | 18.8 | $106,000 | $4,077 | $22,969,021 | $1,044,046 |
| Heavy Rain | 8 | 0.3 | $0 | $0 | $8,720,420 | $396,383 |
| Lightning | 3 | 0.1 | $10,000 | $385 | - | - |
| Thunderstorm Winds | 279 | 10.7 | $48,000 | $1,846 | - | - |
| **Totals** | **778** | **30.3** | **$164,000** | **$6,308** | **$31,689,441** | **$1,440,429** |

*Source: 1 NCEI (1996-2021), 2 USDA RMA (2000-2021)*

### *Extent*

The geographic extent of a severe thunderstorm event may be large enough to impact the entire planning area (such as in the case of a squall line, derecho, or long-lived supercell) or just a few square miles, in the

case of a single cell that marginally meets severe criteria. The NWS defines a thunderstorm as severe if it contains hail that is one inch in diameter or capable of winds gusts of 58 mph or higher. The Tornado and Storm Research Organization (TORRO) scale is used to classify hailstones and provides some detail related to the potential impacts from hail. Table 54 outlines the TORRO Hail Scale.

***Table 54: TORRO Hail Ranking***

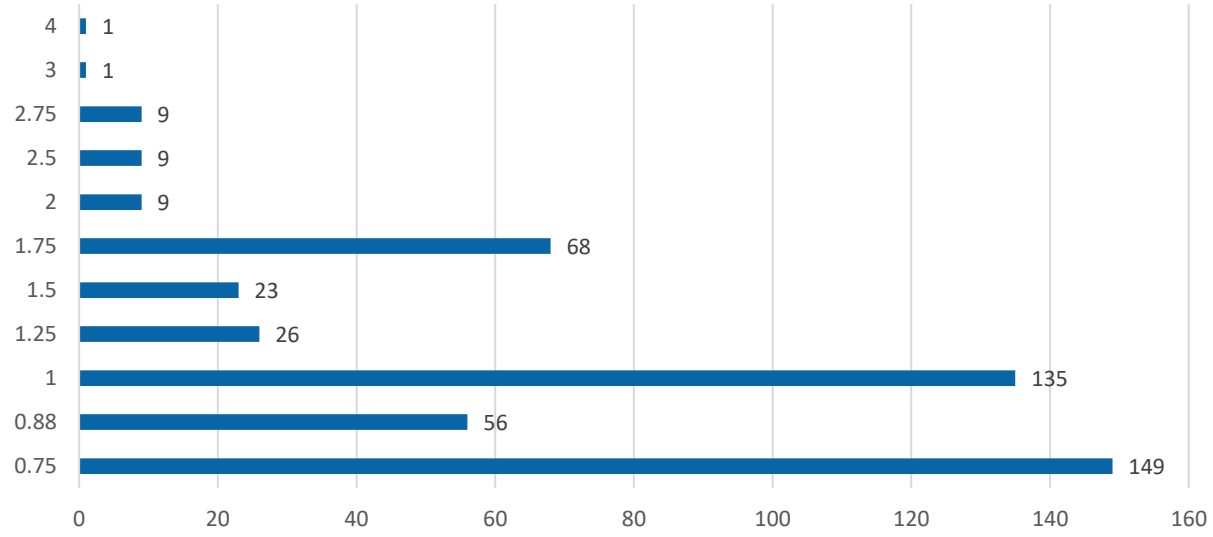
| Class | Type of Material | Divisions |
|---|---|---|
| H0: Hard Hail | 5 mm; 0.2 in (pea size) | No damage |
| H1: Potentially Damaging | 5-15 mm; 0.2-0.6in (marble) | Slight general damage to plants and crops |
| H2: Significant | 10-20 mm; 0.4-0.8 in (grape) | Significant damage to fruit, crops, and vegetation |
| H3: Severe | 20-30 mm; 0.8-1.2 in (walnut) | Severe damage to fruit and crops, damage to glass and plastic structures |
| H4: Severe | 30-40mm; 1.2-1.6 in (squash ball) | Widespread damage to glass, vehicle bodywork damaged |
| H5: Destructive | 40-50 mm; 1.6-2.0 in (golf ball) | Wholesale destruction of glass, damage to tiled roofs; significant risk of injury |
| H6: Destructive | 50-60 mm; 2.0-2.4 in (chicken egg) | Grounded aircrafts damaged, brick walls pitted; significant risk of injury |
| H7: Destructive | 60-75 mm; 2.4-3.0 in (tennis ball) | Severe roof damage; risk of serious injuries |
| H8: Destructive | 75-90 mm; 3.0-3.5 in (large orange) | Severe damage to structures, vehicles, airplanes, risk of serious injuries |
| H9: Super Hail | 90-100 mm; 3.5-4.0 in (grapefruit) | Extensive structural damage, risk of severe or even fatal injuries to persons outdoors |
| H10: Super Hail | >100 mm; >4 in (melon) | Extensive structural damage; risk of severe or even fatal injuries to persons outdoors. |

*Source: TORRO, 2017*[70]

The NCEI reported 488 individual hail events across the planning area. As the NCEI reports events per county, this value overestimates the total amount of thunderstorm events. The average hailstone size was 1.14 inches. Events of this magnitude correlate to an H3 Severe classification. It is reasonable to expect H3 classified events to occur several times in a year throughout the planning area. In addition, it is reasonable, based on the number of occurrences, to expect larger hailstones to occur in the planning area annually. The planning area has experienced one reported H10 hail events (>4.0 inches) in 2006. The following figure outlines average hail size by event.

[70] Tornado and Storm Research Organization. 2017. "Hail Scale." http://www.torro.org.uk/hscale.php.

***Figure 43: Hail Events by Magnitude***




*Source: NCEI, 1996-2021*

### *Probability*

Based on historical records and reported events, severe thunderstorm events are likely to occur on an annual basis. The NCEI reported a severe thunderstorm event (hail, lightning, heavy rain, or thunderstorm winds) in every year on record (1996-2021), resulting in 100 percent chance annually for thunderstorms.

Based on this historical record, the annual probability of thunderstorms occurring in the future is *Highly Likely*.

### *Regional Vulnerabilities & Problem Statements*

Vulnerable populations at greatest risk to severe thunderstorms include the elderly, those living in aged or damaged homes, and those caught outside during storm events. During severe thunderstorms, it is not uncommon for residents and towns to lose power for a temporary or prolonged period of time. These power outages may prove deadly for elders or disabled residents that are reliant upon powered medical devices. Tribal elders or residents with disabilities are generally less mobile than many other members of the community, making them more vulnerable to a wide range of threats. Unanchored or improperly anchored mobile homes are at high risk during thunderstorms because they can be turned over by winds of 60 to 70 mph.

Agriculture is at risk during severe thunderstorms when cattle or horses are caught outside. Heavy rain from thunderstorms may trigger flash flooding. Hail, lightning strikes, downed trees, or flash floods from heavy rain can cause injury or fatalities to livestock. Lightning generally causes little direct damage, but it is responsible for starting wildfires in the right conditions, which can result in significant damage.

The following problem statements were identified regarding thunderstorms:

- Loss of power for residents and tribal facilities is likely during severe storms.
- Health and safety of residents is a concern due to limited number of health care facilities in the reservation.
- Shelter locations and supply depots should be identified for residents to congregate at if homes are damaged or without necessary supplies.

- Communication systems at risk to damage or power outages will inhibit effective emergency response and communication.
- Heavy rainfall from thunderstorms is likely to overwhelm existing stormwater management system (undersized culverts, insufficient storage space).
- A limited number of emergency responders and staff are available to take damage reports, investigate power outages, or clear debris during severe storms.

## Terrorism

According to the Federal Bureau of Investigation (FBI), there is no single, universally accepted definition of terrorism. Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof in furtherance of political or social objectives" (28 C.F.R. Section 0.85).

The FBI further describes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. For the purpose of this report, the following definitions from the FBI will be used:

- **Domestic terrorism** is the unlawful use, or threatened use, of force or violence by a group or individual based and operating entirely within the United States or Puerto Rico without foreign direction committed against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof in furtherance of political or social objectives.
- **International terrorism** involves violent acts or acts dangerous to human life that are a violation of the criminal laws of the United States or any state, or that would be a criminal violation if committed within the jurisdiction of the United States or any state. These acts appear to be intended to intimidate or coerce a civilian population, influence the policy of a government by intimidation or coercion, or affect the conduct of a government by assassination or kidnapping. International terrorist acts occur outside the United States or transcend national boundaries in terms of the means by which they are accomplished, the persons they appear intended to coerce or intimidate, or the locale in which their perpetrators operate or seek asylum.

There are different types of terrorism depending on the target of attack which are:

- Political Terrorism, Bio-terrorism, Cyber-terrorism, Eco-terrorism, Nuclear-terrorism, Narco-terrorism, and Agro-terrorism.

Terrorist activities are also classified based on motivation behind the event (such as ideology: i.e. religious fundamentalism, national separatist movements, and social revolutionary movements). Terrorism can also be random with no ties to ideological reasoning. The FBI also provides clear definitions of a terrorist incident and prevention:

- A terrorist *incident* is a violent act or an act dangerous to human life, in violation of the criminal laws of the United States, or of any state, to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.
- Terrorism *prevention* is a documented instance in which a violent act by a known or suspected terrorist group or individual with the means and a proven propensity for violence is successfully interdicted through investigative activity.

*Note: the FBI investigates terrorism-related matters without regard to race, religion, national origin, or gender. Reference to individual members of any political, ethnic, or religious group in this report is not meant to imply that all members of that group are terrorists. Terrorists represent a small criminal minority in any larger social context.*

The Department of Homeland Security and its affiliated agencies are responsible for disseminating any information regarding terrorist activities in the country. The system in place is the National Terrorism Advisory System (NTAS). NTAS replaced the Homeland Security Advisory System (HSAS) which was the color coded system put in place after the September 11th attacks by Presidential Directive 5 and 8 in

March of 2002. NTAS replaced HSAS in 2011. NTAS is based on a system of analyzing threat levels and providing either an imminent threat alert or an elevated threat alert. An *Imminent Threat Alert* warns of a credible, specific and impending terrorist threat against the United States. An *Elevated Threat Alert* warns of a credible terrorist threat against the United States. The Department of Homeland Security, in conjunction with other federal agencies, will decide whether a threat alert of one kind or the other should be issued should credible information be available. Each alert provides a statement summarizing the potential threat and what, if anything, should be done to ensure public safety. The NTAS Alerts will be based on the nature of the threat: in some cases, alerts will be sent directly to law enforcement or affected areas of the private sector, while in others, alerts will be issued more broadly to the American people through both official and media channels.

A rising type of terrorism of concern is the increased prevalence of cyber-terrorism. The National Conference of State Legislatures defines cyberterrorism as: *the use of information technology by terrorist groups and individuals to further their agenda. This can include use of information technology to organize and execute attacks against networks, computer systems and telecommunications infrastructures, or for exchanging information or making threats electronically. Examples are hacking into computer systems, introducing viruses to vulnerable networks, web site defacing, denial of service attacks, or terroristic threats made via electronic communication."*

An additional concern that arose during the development of the 2022 NCT HMP was for nuclear war or nuclear strikes. The Russian invasion of Ukraine in 2022 and subsequent heightening global tensions reinvigorated concerns by the local planning team of Cold War era risks. The planning team noted a need to invest in a supply stock or resource for iodine tablets and to identify/build shelters or bunkers for resident safety.

### *Location*

Terrorist attacks could occur anywhere within the reservation. A large-scale power facility which provides power to a large portion of the west coast is located approximately 20 miles south of the reservation and may be a location of terrorist attack. In more rural areas, concerns are primarily related to impacts to agriculture, utility facilities, or the environment. Within tribal populated areas, concerns are related to political unrest, activist groups, and others that may be targeting businesses, culturally significant locations, or tribal buildings. The Southern Poverty Law Center tracks established hate groups across the country. There were six hate groups identified in the State of Montana as listed in the table below in 2020.

***Table 55: Hate Groups in Montana***

| GROUP NAME | FOCUS | LOCATION |
|---|---|---|
| Act for America | Anti-Muslim | Whitehall MT |
| American Freedom Party | White Nationalist | Statewide |
| American Front | Racist Skinhead | Statewide |
| International Conservative Community | White Nationalist | Statewide |
| Last Chance Patriots | Anti-Muslim | Dayton MT |
| Proud Boys | General Hate | Statewide. |

*Source: Southern Poverty Law Center, 2020*[71]

### *Historic Occurrences*

Previous accounts of terrorism in the planning area were gathered from the Global Terrorism Database,

71 Southern Poverty Law Center. 2022. "Hate Groups in Montana." https://www.splcenter.org/hate-map?state=MT.

maintained by the University of Maryland and the National Consortium for the Study of Terrorism and Responses to Terrorism (START), as well as a general literature review on the history of the Tribe. The START database contains information for over 140,000 terrorist attacks. According to the database, no terrorist events were reported in the planning area between 1970-2017.[72]

Tribal nations have experienced significant conflict since the 1800s in the Nation. A brief overview of major conflicts involving the Northern Cheyenne Tribal Nation is listed below.

- 1876 – Where the Girl Saved Her Brother – Battle of the Rosebud. Thirteen hundred soldiers under General Crook moved up the Bozeman Trail to Rosebud Creek, meeting about the same number of Cheyenne and Hunkpapa (a Lakota band). The Cheyenne warrior, Comes in Sight, had his horse shot out from under him and was about to be killed when his sister, Buffalo Calf Road Woman, rode to him, under fire, and saved him. Eleven Warriors were killed in the battle and five wounded. The cavalry suffered 57 killed and wounded.
- 1876 - Battle of the Little Big Horn. The famed battle that took place nine days after the Battle of the Rosebud. Custer made the ill-fated decision to divide his regiment of 600 men into four battalions. Custer and 264 of his men were killed. After the Battle of the Little Big Horn, the Northern Cheyenne were forced into a Southern Cheyenne Reservation. The Northern Cheyenne Exodus took place from 1878-1879, where the Northern Cheyenne left the reservation and returned to their land up North
- 1882 – Conflicts between Rosebud Creek tribal settlements and white homesteaders arose when white cattle owners accused Cheyenne members of killing cattle. Investigations from Commission of Indian Affairs sent and found no just cause or indication Cheyenne members committed any crime. Petitions to remove Cheyenne members from area submitted to commissioners in 1884 by white landowners. Cheyenne members resolved to stay in the region with the recommendation to form small reservation centered around Little Wolf's original settlement on Rosebud Creek and further from white ranching in the Tongue River valley. An executive order created the Northern Cheyenne Reservation in November 1884.
- 1890 – The last Northern Cheyenne engagement with the US Cavalry. After the deaths of a white man and a young boy, Cheyenne Indian police and federal troops faced off with Cheyenne members leading to several deaths of Cheyenne members. Congress created a committee to investigate incidents on the reservation. Conflicts arose due to poor reservation conditions and limited resources for tribal members. In 1900 a resolution to extend tribal boundary east to the Tongue River and removed remaining white ranchers was ordered by President McKinley.[73]

More recently Tribal agencies have experienced cyber-attack incidents which impacted local networks or capabilities. Due to the sensitive nature of this information, further details and discussion is not included in this plan. Local tribal departments should take additional steps to ensure adequate cybersecurity measures are in place for community websites or information technology networks. Threat assessment, mitigation, and response to terrorism are addressed at both the federal and tribal level with each entity focused on working in conjunction. Terroristic events are addressed at the federal level by the U.S. Department of Homeland Security and by the Tribe through its Department of Emergency Services. By and large, most acts of terrorism in the United States are committed by white nationalists, white

72 National Consortium for the Study of Terrorism and Responses to Terrorism (START). 2016. Global Terrorism Database [Data file]. Retrieved from https://www.start.umd.edu/gtd.

73 Allison III, J.R. 2012. "Beyond the Violence: Indian Agriculture, White Removal, and the Unlikely Construction of the Northern Cheyenne Reservation, 1876-1900." Great Plains Quarterly, Spring 2012, vol 32 no 2, pp. 91-111. https://www.jstor.org/stable/23534331.

supremacists, Neo-Nazis, and other far-rightwing organizations.[74]

### *Average Annual Losses*

The average damage per event estimate was determined based upon the START Global Terrorism Database information since 1970. This does not include losses from displacement, functional downtime, or economic loss. As no events were reported in the planning area, it is not possible to determine average annual losses from terrorist attacks. If a terrorist event were to occur in the planning area, damages can range from minimal (in rural areas, <$1 million) to significant (in metropolitan areas, >$10 million).

### *Extent*

Terrorist attacks can vary greatly in scale and magnitude, depending on the location, method, and target of the attack. Local concerns have been identified for computer systems, rural water supplies, and equipment. Since 2001, biased crimes against Middle Eastern/Muslim populations, Jewish populations, and African Americans have increased steadily.[75] Racial tensions also exist between Tribal populations and local, state, and federal governments.

### *Probability*

Given no reported incidents have occurred over the 48 years, the annual probability for terrorism in the planning area is stated as less than 1% annually. This does not indicate that a terrorist event will occur with that frequency within the planning area as terrorist events are typically clustered in timeframe due to extenuating circumstances. Based on this historical record, the annual probability of terrorism occurring in the future is *Unlikely*.

### *Regional Vulnerabilities & Problem Statements*

Terroristic events are most likely to occur at high visibility target locations. Special districts including school districts and public health districts identified specific concerns related to terrorism. School shootings or bomb threats have increased over the past decade prompting additional security measures and drills in the districts. Additionally, as climate change continues to impact the region, environmental issues may be leveraged as a motive for violence. This motive may apply to either "eco-warriors" or climate-change deniers. Vulnerable populations are most likely to feel the impacts of terrorist attacks as well as are more likely to be targeted. People at greatest risk can include first responders, tribal elders, or media reporters.

The local planning team and the Northern Cheyenne Tribe's Emergency Operation plan noted no reports of any suspicious activity that contribute to a credible threat of terrorism. Facilities which may host the greatest attraction to be a threat include the casino, schools, or IHS clinics. It should be noted that because of the Tribe's remoteness, terrorism background or planning activities could occur as a development of a major cell operation, leading to a potential attack in other areas of the state that have attractive targets.

The following problem statements were identified regarding terrorism:

- Concerns about cyber security and adequate protection of key tribal records stored electronically.
- Emergency response capabilities to terrorist events would be hindered by lack of adequate communication equipment and back-up power.

74 McGarrity, M.C. May 8, 2019. "Confronting the Rise of Domestic Terrorism in the Homeland, Statement Before the House Homeland Security Committee." https://www.fbi.gov/news/testimony/confronting-the-rise-of-domestic-terrorism-in-the-homeland.

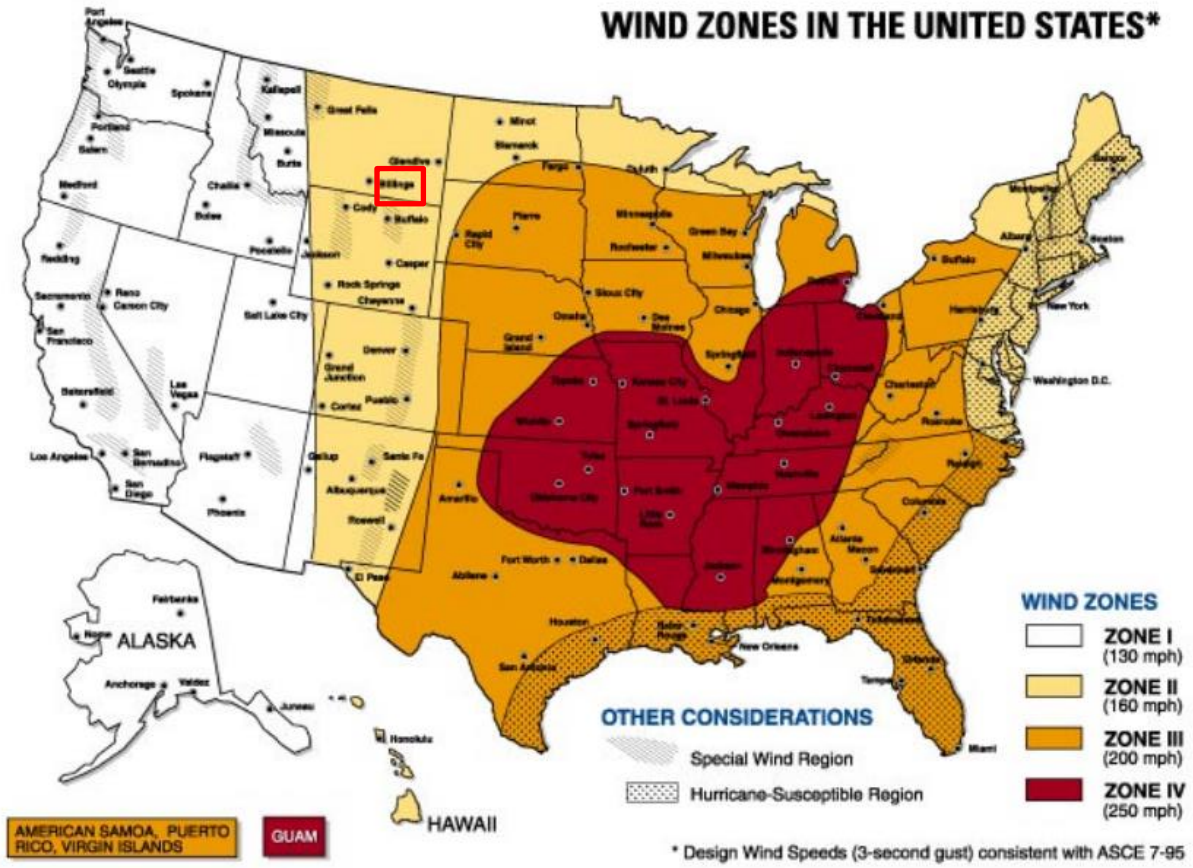
75 FBI. 2021. "Hate Crime Statistics." [1996-2019]. https://www.fbi.gov/services/cjis/ucr/hate-crime.

## Tornadoes and High Winds

High winds typically accompany severe thunderstorms, severe winter storms, tornadoes, and other large low-pressure systems, which can cause significant crop damage, downed power lines, loss of electricity, traffic flow obstructions, and significant property damage including to trees, overhead power lines, residents' homes, and other infrastructure.

The NWS defines high winds as sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration.[76] The NWS issues High Wind Advisories when there are sustained winds of 25 to 39 miles per hour and/or gusts to 57 mph. The figure below shows the wind zones in the United States. Wind zones are based on the maximum wind speeds that can occur from a tornado or hurricane event. The reservation is located primarily in Zone II which has maximum winds of 160 mph equivalent to an EF3 tornado.

***Figure 44: Wind Zones in the U.S.***




*Source: FEMA*

High winds are a critical component of tornado formation. A tornado is typically associated with a supercell thunderstorm. For a rotation to be classified as a tornado, three characteristics must be met:

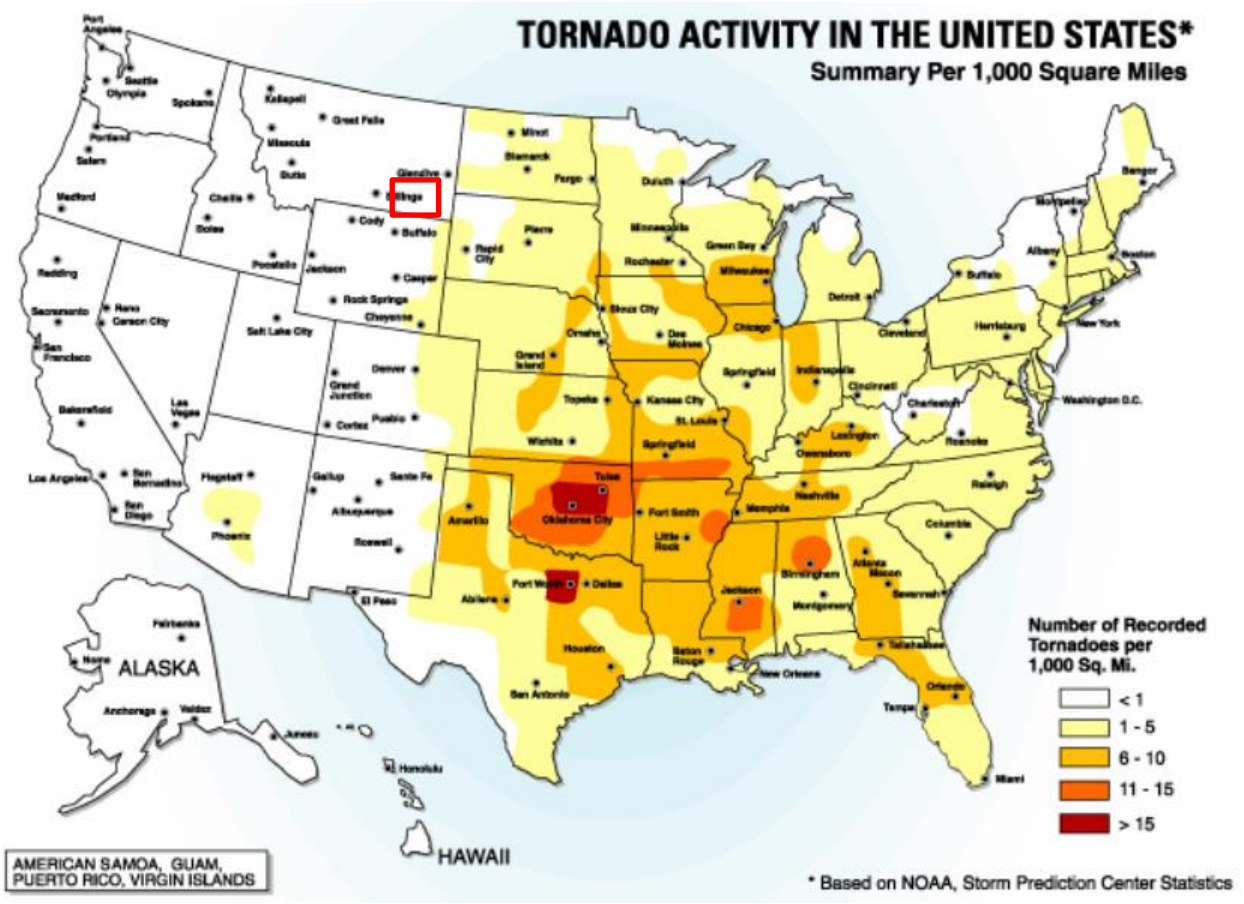
- There must be a microscale rotating area of wind, ranging in size from a few feet to a few miles wide;

76 National Weather Service. 2017. "Glossary." http://w1.weather.gov/glossary/index.php?letter=h.

- The rotating wind, or vortex, must be attached to a convective cloud base and must be in contact with the ground; and,
- The spinning vortex of air must have caused enough damage to be classified by the Fujita Scale as a tornado.

Once tornadoes are formed, they can be extremely violent and destructive. They have been recorded all over the world but are most prevalent in the American Midwest and South, in an area known as "Tornado Alley." Approximately 1,250 tornadoes are reported annually in the contiguous United States. Tornadoes can travel distances over 100 miles and reach over 11 miles above ground. Tornadoes usually stay on the ground no more than 20 minutes. Nationally, the tornado season typically occurs between April and July. On average, 80 percent of tornadoes occur between noon and midnight. For the planning area, tornadoes are a relatively rare occurrence but still have the potential to develop during the summer months.

***Figure 45: Average Tornado Activity in the U.S.***




*Source: FEMA*

### *Location*

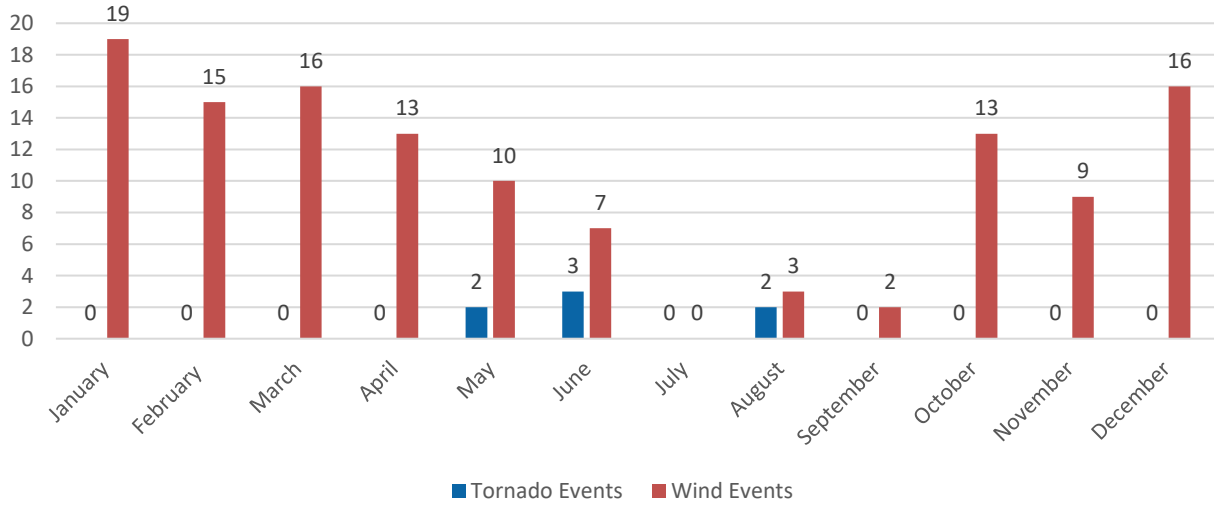
High winds and tornadoes can occur across the entire reservation. The impacts would be greater in more densely populated areas, such as Lame Deer. Few significant tornado events have directly impacted residential centers located in the planning area, but touchdowns and tornado events can occur anywhere in the planning area.

### *Historic Occurrences*

Due to the regional scale of high winds, the NCEI reports events as they occur in each county. While a single event can multiple counties at a time, the NCEI reports them as separate events. There were 124 high wind events that occurred between January 1996 and December 2021 and seven tornadic events ranging in magnitude from EF/F0 to EF1. No property damages were reported for these events; however the RMA reported over $2 million in crop damages from high winds.

As seen in the following figures, the majority of high wind events occur in the spring and winter months, while most tornado events occur in the late spring/early summer. No events reported injuries or fatalities in the planning area.

***Figure 46: Tornado and High Wind Events by Month***




*Source: NCEI, 1996-2021*

While not included in the period of record, a F0 tornado hit an area two miles south of Lame Deer on July 20, 1993. The tornado destroyed two mobile homes and resulted in three injuries.

### *Average Annual Losses*

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury or loss of life. No property damages were reported in the NCEI Storm Events Database from high winds or tornadoes. This does not indicate damages were not experienced in the planning area, only that they had not been reported. Damages from high winds and tornadoes can vary greatly depending on the severity or magnitude of each event.

***Table 56: High Winds and Tornado Losses***

| HAZARD TYPE | # OF EVENTS[1] | AVERAGE # EVENTS PER YEAR | TOTAL PROPERTY LOSS[1] | AVERAGE ANNUAL PROPERTY LOSS | TOTAL CROP LOSS[2] | AVERAGE ANNUAL CROP LOSS |
|---|---|---|---|---|---|---|
| **HIGH WINDS** | 124 | 4.8 | $0 | $0 | $2,175,396 | $98,882 |
| **TORNADOES** | 7 | 0.3 | $0 | $0 | $0 | $0 |

*Source: 1 NCEI (1996-2021), 2 USDA RMA (2000-2021)*

### *Extent*

The Beaufort Wind Scale can be used to classify wind strength while the magnitude of tornadoes is measured by the Enhanced Fujita Scale. The following table outlines the Beaufort scale including wind speed ranking, range of wind speeds per ranking, and a brief description of conditions for each.

***Table 57: Beaufort Wind Ranking***

| Beaufort Wind Force Ranking | Range of Wind | Conditions |
|---|---|---|
| 0 | <1 mph | Smoke rises vertically |
| 1 | 1-3 mph | Direction shown by smoke but not wind vanes |
| 2 | 4-7 mph | Wind felt on face; leaves rustle; wind vanes move |
| 3 | 8-12 mph | Leaves and small twigs in constant motion |
| 4 | 13-18 mph | Raises dust and loose paper; small branches move |
| 5 | 19-24 mph | Small trees in leaf begin to move |
| 6 | 25-31 mph | Large branches in motion; umbrellas used with difficulty |
| 7 | 32-38 mph | Whole trees in motion; inconvenience felt when walking against the wind |
| 8 | 39-46 mph | Breaks twigs off tree; generally, impedes progress |
| 9 | 47-54 mph | Slight structural damage; chimneypots and slates removed |
| 10 | 55-63 mph | Trees uprooted; considerable structural damages; improperly or mobiles homes with no anchors overturned |
| 11 | 64-72 mph | Widespread damages; very rarely experienced |
| 12 - 17 | 72 - > 200 mph | Hurricane; devastation |

*Source: Storm Prediction Center, 2017*[77]

The Enhanced Fujita Scale replaced the Fujita Scale in 2007. The Enhanced Fujita Scale does not measure tornadoes by their size or width, but rather the amount of damage caused to human-built structures and trees after the event. The official rating category provides a common benchmark that allows comparisons to be made between different tornadoes. The enhanced scale classifies EF0-EF5 damage as determined by engineers and meteorologists across 28 different types of damage indicators, including different types of building and tree damage. To establish a rating, engineers and meteorologists examine the damage, analyze the ground-swirl patterns, review damage imagery, collect media reports, and sometimes utilize photogrammetry and videogrammetry. Based on the most severe damage to any well-built frame house, or any comparable damage as determined by an engineer, an EF-Scale number is assigned to the tornado. The following tables summarize the Enhanced Fujita Scale and damage indicators. According to a recent report from the National Institute of Science and Technology on the Joplin Tornado, tornadoes rated EF3 or lower account for around 96 percent of all tornado damages.[78]

77 Storm Prediction Center: National Oceanic and Atmospheric Administration. 1805. "Beaufort Wind Scale." http://www.spc.noaa.gov/faq/tornado/beaufort.html.
78 Kuligowski, E.D., Lombardo, F.T., Phan, L.T., Levitan, M.L., & Jorgensen, D.P. March 2014. "Final Report National Institute of Standards and Technology(NIST) Technical Investigation of the May 22, 2011, Tornado in Joplin, Missouri."

***Table 58: Enhanced Fujita Scale***

| Storm Category | 3 Second Gust (mph) | Damage Level | Damage Description |
|---|---|---|---|
| EF0 | 65-85 | Gale | Some damages to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign board |
| EF1 | 86-110 | Weak | The lower limit is the beginning of hurricane wind speed; peels surface off rooms; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages might be destroyed |
| EF2 | 110-135 | Strong | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated. |
| EF3 | 136-165 | Severe | Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted. |
| EF4 | 166-200 | Devastating | Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown, and large missiles generated. |
| EF5 | 200+ | Incredible | Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged. |
| EF No Rating | -- | Inconceivable | Should a tornado with the maximum wind speed in excess of EF5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures. |

*Source: NOAA; FEMA*

***Table 59: Enhanced Fujita Scale Damage Indicator***

| Number | Damage Indicator | Number | Damage Indicator |
|---|---|---|---|
| 1 | Small barns, farm outbuildings | 15 | School – 1 story elementary (interior or exterior halls) |
| 2 | One- or two-family residences | 16 | School – Junior or Senior high school |
| 3 | Single-wide mobile homes | 17 | Low-rise (1-4 story) buildings |
| 4 | Double-wide mobile homes | 18 | Mid-rise (5-20 story) buildings |
| 5 | Apartment, condo, townhouse (3 stories or less) | 19 | High-rise (over 20 stories) |
| 6 | Motel | 20 | Institutional buildings (hospital, government, or university) |
| 7 | Masonry apartment or motel | 21 | Metal building systems |
| 8 | Small retail buildings (fast food) | 22 | Service station canopy |
| 9 | Small professional (doctor office, branch bank) | 23 | Warehouse (tilt-up walls or heavy timber) |
| 10 | Strip mall | 24 | Transmission line tower |
| 11 | Large shopping mall | 25 | Free-standing tower |
| 12 | Large, isolated (“big box”) retail building | 26 | Free standing pole (light, flag, luminary) |

| Number | Damage Indicator | Number | Damage Indicator |
|---|---|---|---|
| 13 | Automobile showroom | 27 | Tree- hardwood |
| 14 | Automotive service building | 28 | Tree -softwood |

*Source: NOAA; FEMA*

Using the NCEI reported events, the most common high wind event in the planning area is a level 9 on the Beaufort Wind Ranking scale. The reported high wind events ranged from 35 mph to 81 mph, with an average speed of 53 mph. Based on the historical record, it is most likely that tornadoes that occur within the planning area will be of EF0 strength. Of the seven reported tornado events, five were EF/F0 and two were EF/F1.

### *Probability*

Given the historic record of occurrence for tornado events (four out of 26 years with reported events), for the purposes of this plan, the annual probability of tornado occurrence is 15%. Given the historic record of occurrence for high wind events (22 out of 26 years with reported events), for the purposes of this plan, the annual probability of wind event occurrence is 85 percent. However, high wind events may be more common than presented here but have simply not been reported in past years.

Based on this historical record, the annual probability of tornadoes occurring in the future is *Possible*.
Based on this historical record, the annual probability of high winds occurring in the future is *Highly Likely*.

### *Regional Vulnerabilities & Problem Statements*

Tornadoes and high winds occur with irregularity and can affect the entire planning area. All building stock and above ground infrastructure, including critical facilities, are at risk of being damaged or affected by tornadoes and high winds. Tornadoes and high winds can cause structure loss, downed power lines, loss of electricity, obstruction to traffic flow, and significant damage to trees and the natural environment. A catastrophic event could lead to major economic loss for the jurisdiction. High wind speeds and flying debris can pose a significant threat to human life.

High winds and tornadoes can impact a wide range of people and properties, including people living in mobile homes. Mobile homes that are not anchored or are not anchored properly can be blown over by winds as fast as 60 to 70 mph. A 2007 study conducted by Dr. W. Ashley at Northern Illinois University found that between 1985 and 2005, 44-percent of all tornado-related fatalities occurred in mobile homes while between 20 and 30-percent occurred in permanent homes. Tornado related deaths in mobile homes have increased over the timeframe investigated from 37-percent of all fatalities between 1986 and 1990 to nearly 57-percent of all fatalities from 2001 to 2005. The timing of tornadoes also impacts the vulnerability of people living in mobile homes. The 2007 study found that while only 25.8-percent of tornadoes occur between sunset and sunrise, they account for 42.5-percent of tornado fatalities. This is a result of a number of factors including decreased ability to identify tornadoes in the dark, decreased ability to communicate tornado threats due to a high rate of people sleeping during the night, and a higher number of people in the housing units (i.e. mobile home) during the nighttime. Other factors that may increase vulnerability to the threat posed by high winds and tornadoes include age, poverty levels, and home rentals. The 2007 study found that the middle aged (those over 40 years of age) and elderly are more vulnerable which may be a result of decreased mobility, higher rate of auditory complications, or lack of resources need to mitigate potential tornado related impacts.

To reduce damages and potential risks, building codes for new structures can be strengthened, requiring increased rebar in foundations, enhanced nailing patterns for wall sheathing, the use of Simpson Strong

Ties and Straps, and require the use of anchors and tie-downs of mobile homes. Additionally, individuals can choose to build to an optional Code Plus Standard, such as Fortified for Safer Living. Safe rooms can be installed in new structures as well as made to adapt to existing structures. In-ground safe rooms can be installed in existing structures for as little as $4,000. The installation of public safe rooms in areas around vulnerable populations, such as mobile home parks, can increase safety of residents in those areas. Considerations for future development should include developing tornado safe rooms.

The following problem statements were identified regarding tornadoes and high winds:

- Loss of power for residents and tribal facilities is likely during high wind events which down power lines.
- Resident health and safety is at risk during severe weather events with limited health care facilities available within the reservation.
- There are few publicly available shelter locations for protection during high winds.
- The Tribe has limited capabilities to remove heavy debris (destroyed buildings, tree damage, utilities) after a tornado or high wind event.

## Volcanic Eruptions

The state of Montana is within a region with potential for volcanic activity. The two volcanic centers affecting Montana in recent geologic time are: 1) the Cascade Range of Washington, Oregon and California; and 2) the Yellowstone Caldera in Wyoming and eastern Idaho. Volcanic eruptions in the Cascade Mountains are more likely to impact Montana than Yellowstone eruptions, based on the historic trends of past eruptions. Primary concerns or impacts from volcanoes pertain to ash-fall within the planning area.

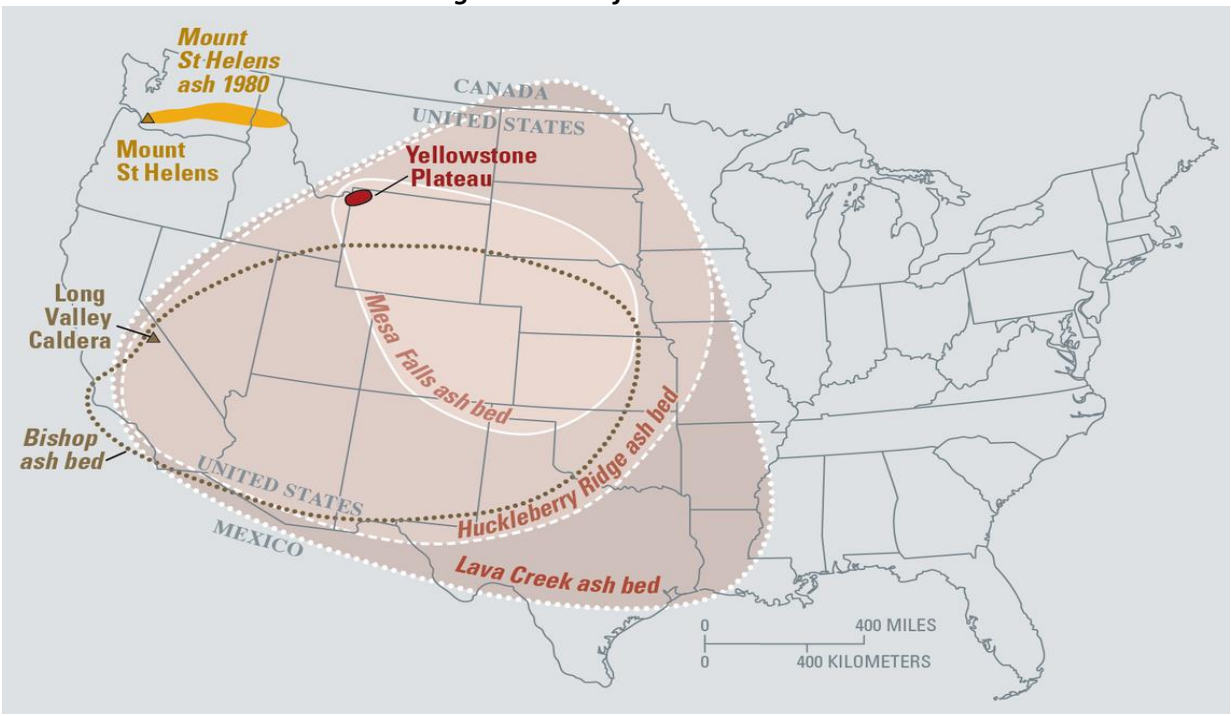
Ash distribution is a product of local weather conditions including wind speed, direction, precipitation, as well as the duration of the volcanic eruption. Ashfall can create significant damage including:

- Short-circuiting and causing failure of electronic components, especially high- voltage circuits and transformers
- Interrupting or preventing radio and telephone and radio communication
- Damage to air filters and affecting internal combustion engines
- Making roads, highways, and airport runways slippery and treacherous
- Reducing visibility to near zero
- Causing crop damage depending on the thickness of ash, type and maturity of plants, and timing of subsequent rainfall.
- Posing health risks, especially to children, the elderly, and people with cardiac or respiratory conditions

### *Location*

Due to the proximity of the Cascade Range and the Yellowstone National Park volcano, the Northern Cheyenne Tribe reservation is at risk of ash-fall deposits or impacts from an eruption.

***Figure 47: Ash-fall Boundaries***




*Source: USGS, 2005*

### *Historic Occurrences*

According to the USGS no historic volcanic eruptions have been reported directly within the reservation.

The Mount St. Helen eruption in the state of Washington is the most recent volcanic event that has significantly affected Montana. After the eruption of Mount St. Helen in May 1980, a coating of up to 5.0 mm (0.2 inches) of ash fell on Western Montana. Ash deposits were thickest in the western portions of the state, tapering to near zero on the eastern part of the state.

Historically, eruptions of the Yellowstone volcanic system have included the two largest volcanic eruptions in North America in the past few million years; the third largest was at Long Valley in California and produced the Bishop ash bed. The biggest of the Yellowstone eruptions occurred 2.1 million years ago, depositing the Huckleberry Ridge ash bed. These eruptions left behind huge volcanic depressions called "calderas" and spread volcanic ash over large parts of North America. If another large caldera-forming eruption were to occur at Yellowstone, its effects would be worldwide. Thick ash deposits would bury vast areas of the United States, and injection of huge volumes of volcanic gases into the atmosphere could drastically affect global climate. Fortunately, the Yellowstone volcanic system shows no signs that it is headed toward such an eruption in the near future. In fact, the probability of any such event occurring at Yellowstone within the next few thousand years is exceedingly low.[79]

### *Average Annual Losses*

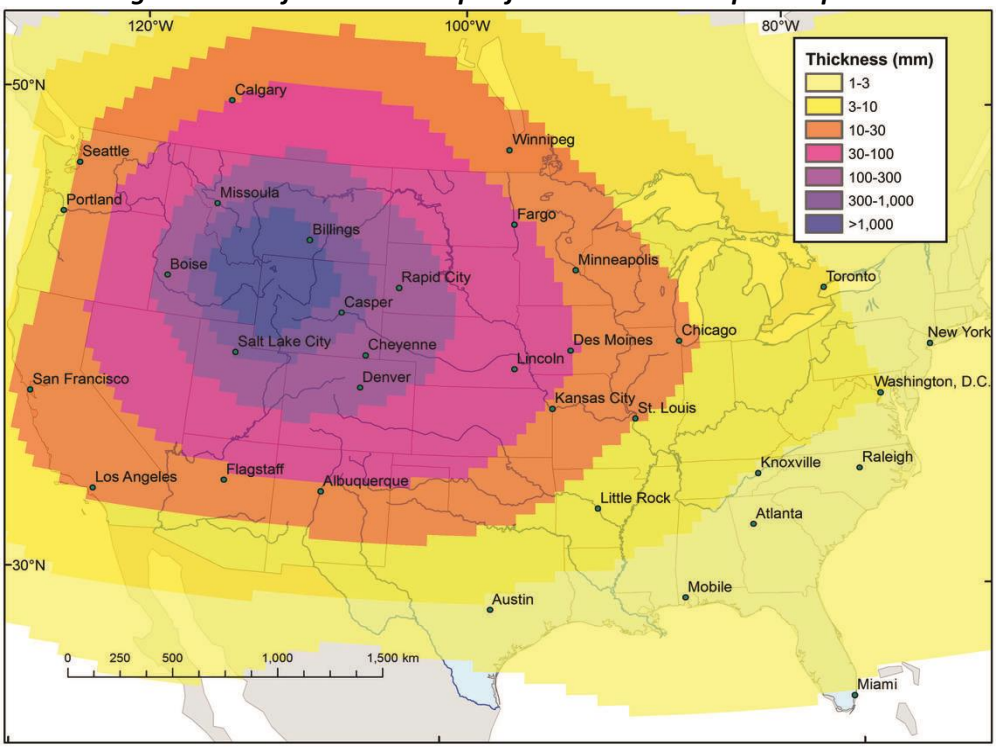
Due to a lack of reported volcanic eruption events, it is not possible to calculate average annual loss for volcanos in the planning area. However, if an event were to occur in the planning area, the anticipated losses would be catastrophic.

### *Extent*

Given a lack of reported volcanic impacts, no reported economic damages, and the exceedingly low probability of event in this region, the extent of a volcanic eruption event is difficult to quantify. Eruptions in the Cascade Range would likely impact western Montana, but geographic features of the state may provide some protection to the Northern Cheyenne Tribe's reservation. Eruption from the Yellowstone Plateau would likely lead to moderate to significant ashfall across the reservation (300-1,000mm).

[79] USGS. Accessed February 2022. "Map of the known ash-fall boundaries for several U.S. eruptions." https://www.usgs.gov/media/images/map-known-ash-fall-boundaries-several-us-eruptions.

***Figure 48: Ashfall Model Output for Yellowstone Super-eruption***




*Source: USGS, 2014*

### *Probability*

Due to a lack of reported volcanic events, it is not possible to calculate volcanic eruption probability for the Northern Cheyenne Tribe reservation. The USGS notes the likelihood of the Yellowstone super volcano erupting as incredibly low.

Based on this historical record, the annual probability of extreme heat occurring in the future is *Unknown*.

### *Regional Vulnerabilities & Problem Statements*

Residents of the Northern Cheyenne Tribe, transportation corridors, and local utilities are the most vulnerable to volcanic eruptions. However, the science of forecasting a volcanic eruption has significantly advanced over the past 25 years. Regional experts note the traditional build-up preceding a catastrophic eruption would be detectable for weeks, and perhaps months to years, prior to eruption. Indirect impacts from volcanic eruptions are also of significant concern. Ashfall on agricultural land can cause crop and livestock mortality, long term food scarcity, and long-term health impacts for residents. As populations grow in the reservation, additional people and future development are at risk from ashfall associated with volcanic activity.

The following problem statements were identified regarding tornadoes and high winds:

- Limited evacuation and transportation corridors may limit resident evacuation efforts if needed.
- Lack of existing and redundant communication infrastructure puts residents at risk.

# Wildfire

Wildfire, also known as grass fires, brush fires, forest fires, or wildland fires, is defined as any fire occurring on wildlands that requires suppression response. Wildfires range in size from less than an acre, to thousands of acres in some cases. Fire events can rapidly spread from their original source, change direction quickly, and jump gaps (such as roads, rivers, and fire breaks). Wildfire events are particularly dependent on the local conditions including temperature, humidity, wind speed, wind direction, topography or slope, and available fuel load. While some wildfires burn in remote or inaccessible regions, others can cause extensive destruction of homes and other property located in the wildland-urban interface (WUI), the zone of transition between developed areas and undeveloped wilderness.

Certain conditions exacerbate significant fire events including hot, dry, and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, other conditions influence its behavior, including fuel, topography, weather, drought, and development. Although fire is a natural and beneficial naturally occurring process, long-term fire suppression can also lead to more severe fires due to the buildup of vegetation, which creates more fuel and increases the intensity and devastation of future fires.

NCT experiences an increased fire risk seasonally, usually from April through October. Lightning is the primary source of ignition; secondary causes include agricultural burns and other human caused ignitions. Reservation-wide, fuel sources are trees, ladder brush, underbrush, cheat grass, and dead or dying trees. Fuel and structure durability are the primary factors people can control and are the target of most mitigation efforts. The NWS monitors the risk factors including high temperature, high wind speed, fuel moisture (greenness of vegetation), low humidity, and cloud cover in the state on a daily basis.

Another concern for the Tribe is coal seam fires. Coal seams are an underground coal deposit that is close enough to the surface to be ignited by a lightning strike or even extreme temperatures. These fires challenge traditional firefighting techniques by continuing to smolder underground for extended periods of time and traveling along the coal deposit to ignite brush or dry ground cover nearby.

### *Location*

The Northern Cheyenne Reservation is served by two main fire departments – the wildland fire department of the BIA, and the Northern Cheyenne Tribal Fire Department who is the primary responder for structural fires on the Reservation. Wildland fire can occur throughout the Northern Cheyenne Reservation. There are three categories of interface fire:

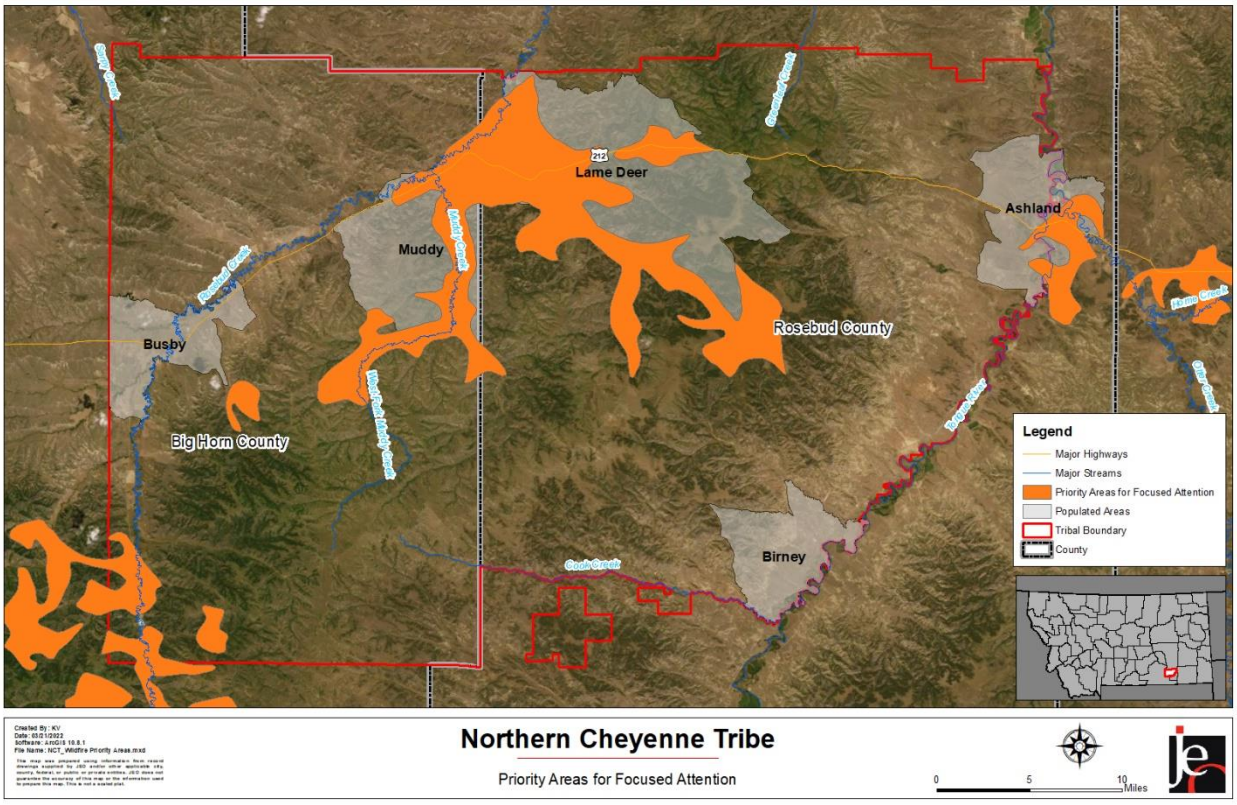
- The classic wildland-urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas;
- The mixed wildland-urban interface is characterized by isolated homes, subdivisions, and small communities situated predominantly in wildland settings; and
- The occluded wildland-urban interface exists where islands of wildland vegetation occur inside a largely urbanized area.

In the planning area, the primary type of interface fire is mixed wildland-urban interface.

The Montana Department of Natural Resources and Conservation identifies priority areas for focused attention on forested land in the state that has significant forest health issues or wildfire risk. Priority areas are determined through GIS Analysis of multiple datasets for fire risk (wildfire potential, distance to

WUI, and recent fires) and forest health (insect risk, insect mortality, and spruce budworm) as well as road density and vegetation type. The planning area resides in Rosebud and Big Horn Counties. According to DNRC, there are 58,220 priority acres in Rosebud County with 10,719 of those acres located in the WUI. Of those priority acres in Rosebud County, approximately 54,800 (69.4%) acres are on tribal land. Big Horn County has 113,654 priority acres with 9,689 acres in the WUI. Of the priority acres, 83,400 (74.7%) acres are on tribal land. On the Northern Cheyenne Tribe reservation, there are approximately 40,439 acres in the priority area, with 8,902 of those acres located in the WUI (Figure 49)[80]

***Figure 49: Priority Areas for Focused Attention in the Planning Area***




*Source: DNRC, 2020*

Coal seam fires are a concern for the Northern Cheyenne Tribe; however, coal seams have not been mapped within the reservation. There is one Spring Creek Coal Company located directly south of the reservation in Big Horn County. [81] The mine is a Surface mine with a total production of over 9 million short tons in 2020. Additionally, there are several Coalbed Methane Fields south of the reservation in Montana and in northern Wyoming. These include the Coal Creek Field, Dietz Field, and Cx Field.[82] As of spring 2022, the Tribe is working with FEMA on a pilot coal seam mitigation project. Further details and a summary of the project should be included here in the 2027 HMP.

Both Rosebud County and Big Horn County have Community Wildfire Protection Plans (CWPPs) which address localized wildfire risk in their respective county. While these plans do not include the Northern

[80] Montana Department of Natural Resources and Conservation. 2020. "Priority Areas for Focused Attention." Accessed March 2022. https://www.montanaforestactionplan.org/pages/priority-areas

[81] U.S. Energy Information Administration – ArcGIS. "Surface and Underground Coal Mines in the U.S." Accessed March 2022. https://www.arcgis.com/apps/mapviewer/index.html

[82] U.S. Energy Information Administration – ArcGIS. 2007. "Coalbed Methane Fields." Accessed March 2022. https://www.arcgis.com/apps/mapviewer/index.html

Cheyenne reservation, wildfire concerns do extend across jurisdictional boundaries. The Rosebud County CWPP identifies areas around Ashland as a priority for fire management while the Big Horn County CWPP identified both Muddy and Busby as at-risk areas. Further discussion of these plans is included in Chapter Six: Plan Integration and Capabilities.

### *Historic Occurrences*

The NCT reservation is a fire-prone area with many fire events occurring annually; however, it is important to note that there is no comprehensive fire event database. Fire events, magnitude, and local responses were reported voluntarily by local agencies and local reporting standards can vary annually. Actual fire events and their impacts are likely underreported in the available data. The Bureau of Indian Affairs (BIA) is responsible for wildland fire response in the reservation while the NCT Fire Department/Department of Emergency Services is responsible for structural fire events. Historical occurrences for this plan were collected from the State of Montana Department of Natural Resources and Conservation's Wildland Fire Information database.

The Montana Department of Natural Resources and Conservation maintains an *Interactive Wildland Fire Map* which lists several fire events between 2006 and 2019 which reported 34 events since 2006 which burned 419,675 acres in total. Total damage estimates were not available for reported fire events. Fire events from the database which occurred within or crossed reservation boundaries are listed in the table below.

| FIRE YEAR | NEAREST LOCATION | ACRES BURNED | INCIDENT NAME | SOURCE AGENCY |
|---|---|---|---|---|
| **2006** | Ashland | 1,070 | Sage | BLM |
| **2012** | Ashland | 249,714 | Ash Creek | USFS |
| **2012** | Busby | 528 | Coal Seam | BLM |
| **2012** | Lame Deer | 132,876 | Chalky | USFS |
| **2017** | Ashland | 18 | Fork | BIA |
| **2017** | Ashland | 80 | Tie Creek | BIA |
| **2017** | Ashland | 246 | River | BIA |
| **2017** | Ashland | 1,494 | Turtle | BIA |
| **2017** | Birney | 10 | Kelty | BIA |
| **2017** | Birney | 11 | Broken Jaw | BIA |
| **2017** | Birney | 32 | Eagle Top | BIA |
| **2017** | Birney | 37 | Black Eagle | BIA |
| **2017** | Birney | 760 | Coyote | BIA |
| **2017** | Birney | 28,950 | Witten | BIA |
| **2017** | Busby | 10 | Fisher | BIA |
| **2017** | Busby | 190 | Trail Creek | BIA |
| **2017** | Busby | 403 | Hawk Ridge | BIA |
| **2017** | Lame Deer | 43 | Spring | BIA |
| **2017** | Muddy | 37 | Wisconsin | BIA |
| **2017** | Muddy | 74 | Indian Coulee | BIA |
| **2017** | Muddy | 2,496 | Painted Hill | BIA |
| **2018** | Ashland | 28 | Stebbins | BIA |
| **2018** | Birney | 20 | White Buffalo | BIA |
| **2018** | Birney | 39 | Clubfoot | BIA |

| FIRE YEAR | NEAREST LOCATION | ACRES BURNED | INCIDENT NAME | SOURCE AGENCY |
|---|---|---|---|---|
| **2018** | Birney | 67 | Buffalo Springs | BIA |
| **2018** | Busby | 48 | Gold Creek | BIA |
| **2018** | Busby | 75 | Wolf Creek | BIA |
| **2018** | Lame Deer | 10 | Soldier Gulch | BIA |
| **2018** | Lame Deer | 31 | Coulee | BIA |
| **2018** | Muddy | 8 | 4th Coulee | BIA |
| **2018** | Muddy | 11 | Hamilton Creek | BIA |
| **2018** | Muddy | 20 | Upper Indian Coulee | BIA |
| **2018** | Muddy | 62 | Upper Lynch | BIA |
| **2018** | Muddy | 177 | Wood Gulch | BIA |

*Source: Montana Wildland Fire Information – Interactive Wildland Fire Map*[83]

Fire events shared anecdotally during the planning process are described below:

- "Baby Dean" fire near Busby in 1994 which burned over 60,300 acres
- The Windmill Complex fire, which burned nearly 25,000 acres in 2003, was actually four different fires in an area near Busby. Total cost to suppress exceeded $3.5 million. Total area burned was 24,895 acres. The volunteer fire department's efforts in suppression prevented the Town of Busby from being burned.
- April 7, 2019 – a mobile home fire spread into Lame Deer forcing evacuations of homes on the west side of town. Busses were made available at the Tribal Office to transport residents to a shelter in Ashland.

***Figure 50: April 2019 Fire Event (Rosebud County Sheriff's Office)***

### *Average Annual Losses*

Wildfire damages were not available during this planning process, thus it is not feasible to utilize the 'event damage estimate formula' to estimate potential losses for the reservation. Damages caused by wildfires extend past the loss of building stock, recreation areas, timber, forage, wildlife habitat, and scenic views. Secondary effects of wildfires, including erosion, landslides, introduction of invasive species, and changes in water quality, all increase due to the exposure of bare ground and loss of vegetative cover following a wildfire, and can often be more disastrous than the fire itself in long-term recovery efforts.

### *Extent*

Wildfire events can range from less than one acre to thousands of acres at a time. The DNRC's Interactive Wildland Fire Map reported 34 wildfire events which burned 419,675 acres in total. Average fire size was approximately 12,343 acres with the majority of fires burning less than 100 acres (22 of 34 events).

The United States Department of Agriculture and U.S. Forest Service created the interactive web resource *Wildfire Risk to Communities* to help jurisdictions understand, explore, and reduce wildfire risk. While the

[83] Montana Department of Natural Resources & Conservation. "DNRC Interactive Wildland Fire Map." Accessed March 2022. https://www.mtfireinfo.org/apps/MTDNRC::dnrc-interactive-wildland-fire-map/explore.

Northern Cheyenne Tribe's entire reservation is not available for comparison, each populated area is available (Busby, Muddy, and Lame Deer) for more in-depth analysis. Compared to the State of Montana, the overall average for populated areas in the reservation have, greater risk than 93% of all other communities.

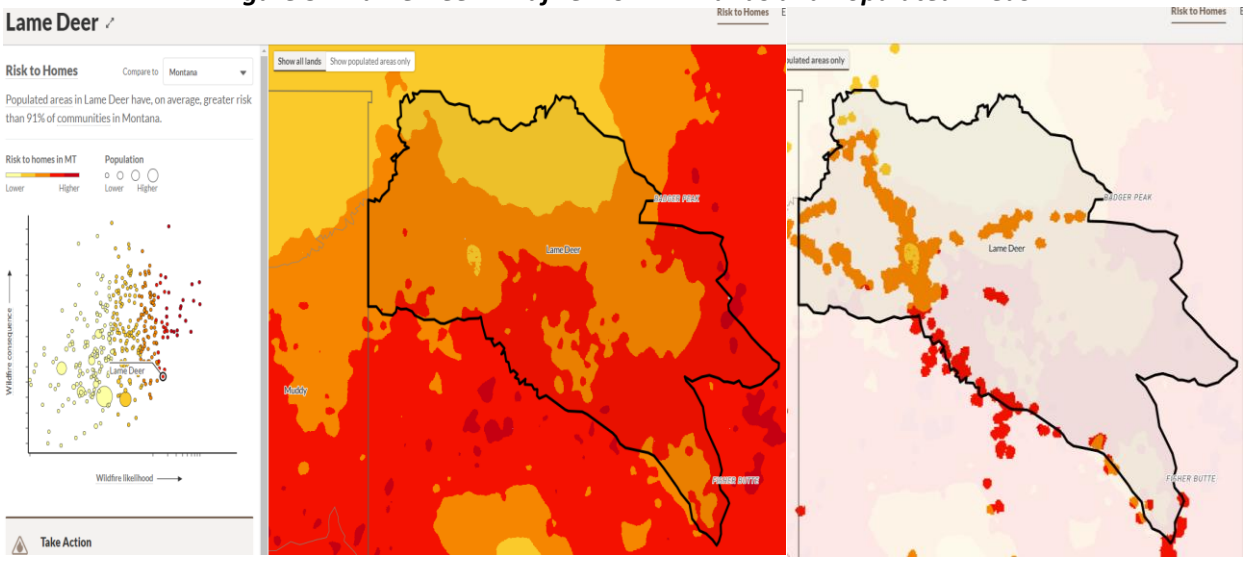
***Table 60: Wildfire Risk Factors for Northern Cheyenne***

| RISK FACTOR | BUSBY | LAME DEER | MUDDY | STATE OF MONTANA |
|---|---|---|---|---|
| FAMILIES IN POVERTY | 27 (21.8%) | 133 (33.3%) | 53 (43.8%) | 22,029 (8.5%) |
| PEOPLE WITH DISABILITIES | 63 (9.1%) | 322 (15.1%) | 36 (5.8%) | 139,635 (13.6%) |
| POPULATION OVER 65 | 01 (3.4%) | 154 (7.1%) | 17 (2.7%) | 183,823 (17.6%) |
| DIFFICULTY WITH ENGLISH | 0 (0%) | 0 (0%) | 0 (0%) | 3,023 (0.3%) |
| HOUSEHOLDS WITH NO VEHICLE | 12 (8.4%) | 53 (10.4%) | 0 (0%) | 21,492 (5.1%) |
| MOBILE HOMES | 4 (2.8%) | 60 (11.8%) | 28 (19%) | 45,396 (10.7%) |

*Source: USDA/USFS, Wildfire Risk to Communities, 2021*
*Note data from 2019 US Census American Community Survey 5-yr survey*

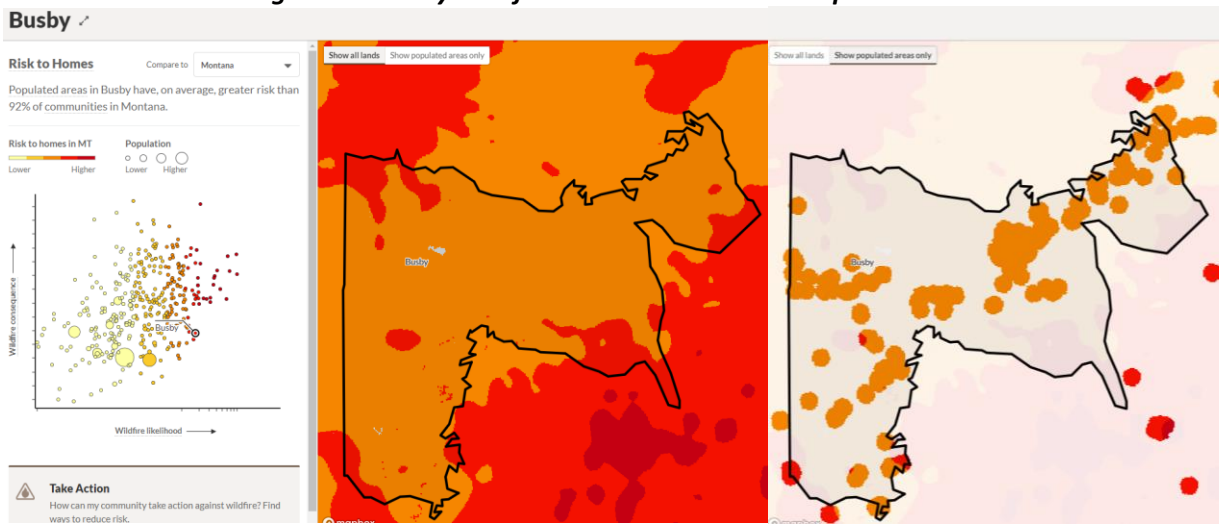
The following figures show wildfire risk to homes in the populated areas of the Northern Cheyenne Tribe.

***Figure 51: Lame Deer Wildfire Risk - All Lands and Populated Areas***



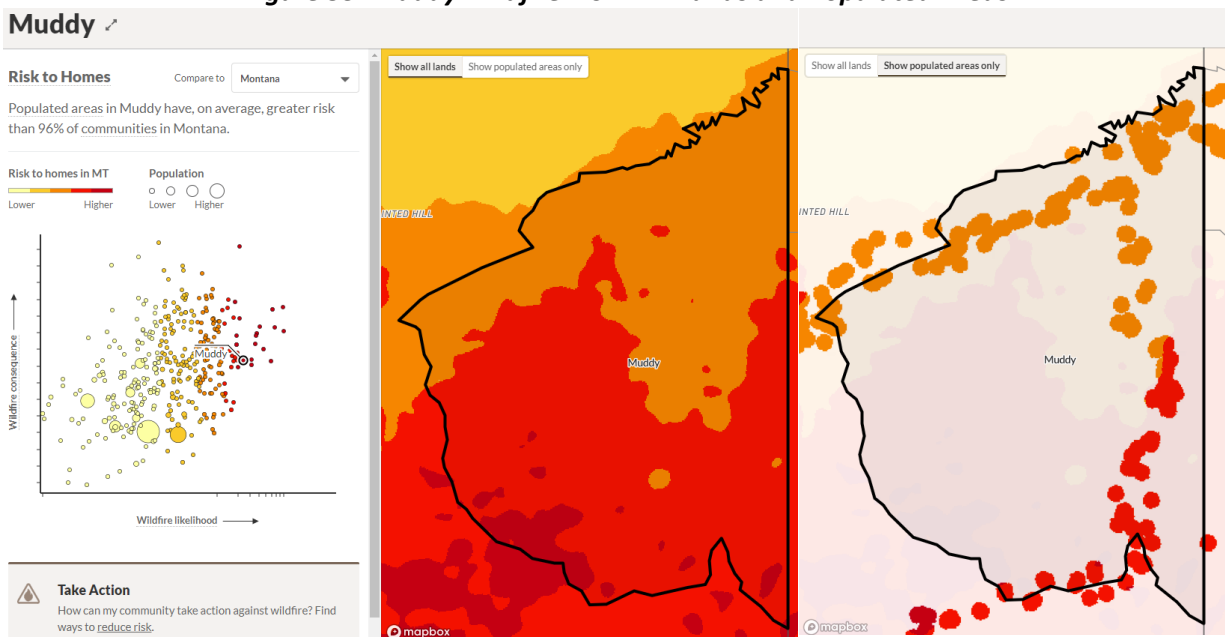

*Source: USDA/USFS, Wildfire Risk to Communities, 2022*

***Figure 52: Busby Wildfire Risk - All Lands and Populated Areas***




*Source: USDA/USFS, Wildfire Risk to Communities, 2022*

***Figure 53: Muddy Wildfire Risk - All Lands and Populated Areas***




*Source: USDA/USFS, Wildfire Risk to Communities, 2022*

The DNRC conducted a Montana Wildfire Risk Assessment (MWRA) across the state in May 2020 which analyzed wildfire risk to homes, commercial buildings, and other structures across the state. The assessment identified counties and communities with structures most at risk from wildfire on average and in total. The following table identifies communities in the planning area that were identified in the *Mean Risk to Structures* assessment. The assessment is particularly useful to identify the communities most at risk to wildfire, regardless of how many structures there are in the community. The mean burn probability represents the average likelihood that structures will experience a wildfire in one year.

***Table 61: Mean Risk to Structures in 50 most at-risk Montana Communities***

| COMMUNITY | RANK BY MEAN RISK TO STRUCTURES | TOTAL STRUCTURE IMPORTANCE | MEAN BURN PROBABILITY |
|---|---|---|---|
| BIRNEY | 13 | 1,878 | 1.02% |
| BUSBY | 16 | 5,184 | 0.75% |
| ASHLAND | 19 | 10,992 | 0.79% |
| LAME DEER | 21 | 9,157 | 0.67% |
| MUDDY | 28 | 2,924 | 0.62% |

*Source: DNRC, 2020*[84]

### *Probability*

The probability of wildfire occurrence is based on the historic record provided by the DNRC's Interactive Wildland Fire Map. Based on the historic record of reported incidents, there is a 29 percent probability (4 out of 14 years with an occurrence) that a wildfire event will occur annually in the planning area. However, the local planning team noted wildfire events do occur annually across the planning area; thus, it is reasonable to assume wildfire events will continue to occur into the future. Based on this historical record, the annual probability of wildfire occurring in the future is *Likely*.

### *Regional Vulnerabilities & Problem Statements*

Wildfire poses a threat to a range of demographic groups. Wildfire, wildfire within the WUI, and urban fire could result in major evacuations of residents in impacted and threatened areas. Groups and individuals lacking reliable transportation could be trapped in dangerous locations. Lack of transportation is common among the elderly, low-income individuals, and racial minorities, including on tribal reservation lands. Wildfires can cause extensive damage to both urban and rural building stock and properties including critical facilities and infrastructure, as well as agricultural producers which support the local industry and economy. Damaged homes can reduce available housing stock for residents, causing them to leave the area. Additionally, fire events threaten the health and safety of residents and emergency response personnel. Recreation areas, timber and grazing land, wildlife habitat, and scenic views can also be threatened by wildfires. In the Northern Cheyenne Tribe Forest Management Plan (2009) noted the Tribe's timber base had been reduced by as much as one half, from 10 million board feet of timber (mmbf) to 6.9 mmbf annual allowable harvest from fires in 2009. Several oil and gas companies also have drilling operations in wildfire interface areas.

***Figure 54: Inoperable Fire Hydrant in Lame Deer***

Factors increasing local vulnerability include areas of wildland urban interface (Lame Deer, Muddy Cluster and scattered developments), availability of water for suppression, and fuels conditions. The locations served with public water systems have fire hydrants, however, the local planning team noted many hydrants across the reservation are inoperable. The Fire Departments have painted the tops of the fire hydrants as an aid to quickly determine which are usable (**Error! Reference source not found.**).

A major concern for the local planning area is the overall lack of access to remote areas. In more developed

[84] Montana Department of Natural Resources and Conservation. May 2020. "Montana Wildfire Risk Assessment: Methods and Results." https://mwra-mtdnrc.hub.arcgis.com/documents/MTDNRC::montana-wildfire-risk-assessment-report/about

areas such as Lame Deer or Muddy Creek, access to structures can be obstructed because of abandoned vehicles and other materials. In unpopulated areas, topography, slope, and vegetation can prevent fire suppression equipment from accessing fires. Existing roads in the country may have steep grades or other conditions that make them impassable for heavy fire-fighting equipment. Fire response equipment is stored at a BIA storage area in Lame Deer. While Lame Deer is the most centralized community in the reservation, emergency services are working on providing training for individuals to assist with response so people in different districts can respond to disaster events. There is a home near Busby that is on the other side of Rosebud Creek that does not have a bridge. Outside of the public water systems, water is available directly from creeks, rivers, and reservoirs. Drought has affected many of the reservoirs, reducing or in some cases totally eliminating potential water sources for fire suppression. Drought can also affect the flow in the streams and rivers. Where water is available, it may be difficult to access because of brushy or boggy conditions. When water is not accessible locally, pumper trucks have to travel to where water is available, obtain water, and then return to the fire.

The following problem statements were identified regarding wildfire:

- Limited evacuation and transportation corridors may limit resident evacuation efforts during wildfire events.
- Lack of existing and redundant communication infrastructure puts residents at risk if warnings are not received.
- Limited firefighting equipment and water supplies hinder response ability, including adequate hydrants in town to fill pumpers

# Winter Storms

***Blizzards, Extreme Cold, Heavy Snow, Ice Storm, Winter Storms, Winter Weather***

Winter storms and winter conditions can bring extreme cold, freezing rain, heavy or drifting snow, and blizzards. Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions which greatly inhibit all travel. Generally, winter storms occur between October and May in the planning area.

- **Blizzards -** Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions, which greatly inhibits vehicular traffic. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple the entire reservation for several days by hindering transportation, knocking down tree limbs and utility lines, structurally damaging buildings, and injuring or killing crops and livestock.
- **Extreme Cold -** Along with snow and ice storm events, extreme cold is dangerous to the well-being of people and animals. What constitutes as extreme cold varies from region to region, but is generally accepted as temperatures that are significantly lower than the average low temperature. For the planning area, the coldest months of the year are January, February, and December. The average low temperature for these months are all below freezing (average low for the three months in the planning area is 12.6°F). The average high temperatures for the months of January, February, and December are near 39.3°F in the planning area.[85]
- **Ice Accumulation -** Along with snow events winter storms also have the potential to deposit significant amounts of ice. Ice buildup on tree limbs and power lines can cause them to collapse. This is most likely to occur when either rain falls and freezes upon contact, especially in the presence of wind, or snowfall warms to thaw and re-freezes. Ice accumulation can also lead to many problems on the roads, as it makes them slick, causing automobile accidents, and making vehicle travel difficult.

### *Location*

The entire planning area is at risk of severe winter storms.

### *Historic Occurrences*

Due to the regional scale of severe winter storms, the NCEI reports events as they occur in each county. For the purposes of this plan, records were collected from both Rosebud and Big Horn counties as NCEI does not collect reservation specific records. According to the NCEI, there were a combined 256 severe winter storm events for the planning area from January 1996 to December 2021. These recorded events caused a total of $1,200,000 in property damages and $15,259,026 in crop damages.

The most damaging event occurred on April 9, 2001 as the NCEI stated: “An early spring snowstorm blasted parts of South Central and Southeast Montana on April 8th and April 9th. Southern Big Horn County was the hardest hit. An estimated 600 power poles were knocked down from heavy, wet snow, ice, and wind. Thousands of people were without power for up to 7 days. The hardest hit area was along Route 314 in the Kirby/Decker area as well as in the western end of the Northern Cheyenne Indian Reservation.” Heavy snow drifts reached up to five feet and total damages exceeded $1 million. This winter storm caused significant power outages for several days and a need for water supplies, lanterns, and heat for residents. Responders during the event noted that supply distribution for residents was

[85] High Plains Regional Climate Center. 2020. “Monthly Climate Normals 1981-2010.” http://climod.unl.edu/.

delayed and overall response was insufficient to meet local needs. Repair costs for downed power lines from this event were approximately $750,000-$850,000.

An additional key event with significant damages occurred on February 14, 2018. During this event the Tribe experienced near record snow falls, with extreme cold and blizzard conditions. Schools, local government, and roads across the reservation were closed. Damage estimates noted many buildings and private residences were damaged due to heavy snow on roofs. An estimated 547 private roads were impassable due to snow and blowing snow accumulation. Numerous homes were without heat for several days as propane trucks were unable to access residential homes or supply depots. Total estimated damages were $22,500 from this event.

### *Average Annual Losses*

The average damages per event estimate was determined based upon NCEI Storm Events Database since 1996 and includes aggregated calculations for each of the six types of winter weather as provided in the database. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Severe winter storms have caused an average of $46,154 per year in property damage for the planning area.

***Table 62: Severe Winter Storms Losses***

| Hazard Type | # of Events[1] | Average # events per year | Total Property Loss[1] | Average Annual Property Loss | Total Crop Loss[2] | Average Annual Crop Loss |
|---|---|---|---|---|---|---|
| Blizzard | 32 | 1.2 | $0 | $0 | $15,259,026 | $693,592 |
| Extreme Cold | 4 | 0.2 | $0 | $0 | | |
| Heavy Snow | 80 | 3.1 | $1,200,000 | $46,154 | | |
| Ice Storm | 4 | 0.2 | $0 | $0 | | |
| Winter Storms | 131 | 5.0 | $0 | $0 | | |
| Winter Weather | 5 | 0.2 | $0 | $0 | | |
| **Totals** | **256** | **9.8** | **$1,200,000** | **$46,154** | **$15,259,026** | **$693,592** |

*Source: 1 NCEI (1996-2021), 2 USDA RMA (2000-2021)*

### *Extent*

The Sperry-Piltz Ice Accumulation Index (SPIA) was developed by the NWS to predict the accumulation of ice and resulting damages. The SPIA assesses total precipitation, wind, and temperatures to predict the intensity of ice storms. Ice Storm Warnings are issued when accumulation of at least 0.25 inches is expected from a storm. The following figure shows the SPIA index.

***Figure 55: SPIA Index***

**The Sperry-Piltz Ice Accumulation Index, or "SPIA Index"**

*Copyright, February, 2009*

| ICE DAMAGE INDEX | *AVERAGE ICE AMOUNT (in inches) Revised: Oct. 2011 | WIND (mph) | DAMAGE AND IMPACT DESCRIPTIONS |
|---|---|---|---|
| 0 | <0.25 | <15 | Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages. |
| 1 | 0.10 – 0.25 | 15 – 25 | Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous. |
| | 0.25 – 0.50 | >15 | |
| 2 | 0.10 – 0.25 | 25 – 35 | Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation. |
| | 0.25 – 0.50 | 15 – 25 | |
| | 0.50 – 0.75 | >15 | |
| 3 | 0.10 – 0.25 | > – 35 | Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days. |
| | 0.25 – 0.50 | 25 – 35 | |
| | 0.50 – 0.75 | 15 – 25 | |
| | 0.75 –1.00 | >15 | |
| 4 | 0.25 – 0.50 | > – 35 | Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 – 10 days. |
| | 0.50 – 0.75 | 25 – 35 | |
| | 0.75 –1.00 | 15 – 25 | |
| | 1.00 –1.50 | >15 | |
| 5 | 0.50 – 0.75 | > – 35 | Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeeks in some areas. Shelters needed. |
| | 0.75 –1.00 | > – 25 | |
| | 1.00 –1.50 | > – 15 | |
| | > 1.50 | Any | |

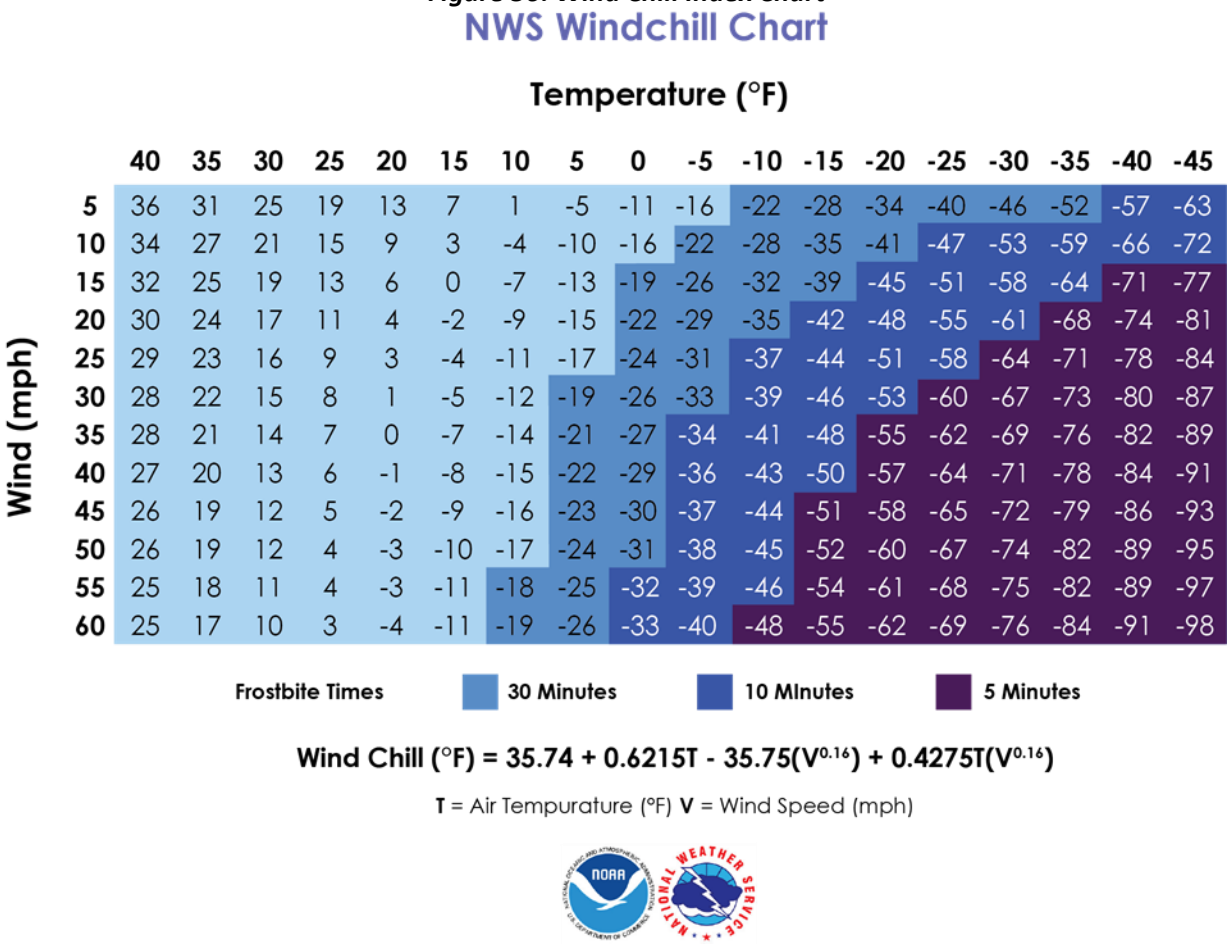
*(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)*

*Source: SPIA-Index*[86]

The wind chill index was developed by the NWS to determine the decrease in air temperature felt by the body on exposed skin due to wind. The wind chill is always lower than the air temperature and can quicken the effects of hypothermia or frost bite as it gets lower. The following figure shows the Wind Chill Index used by the NWS.

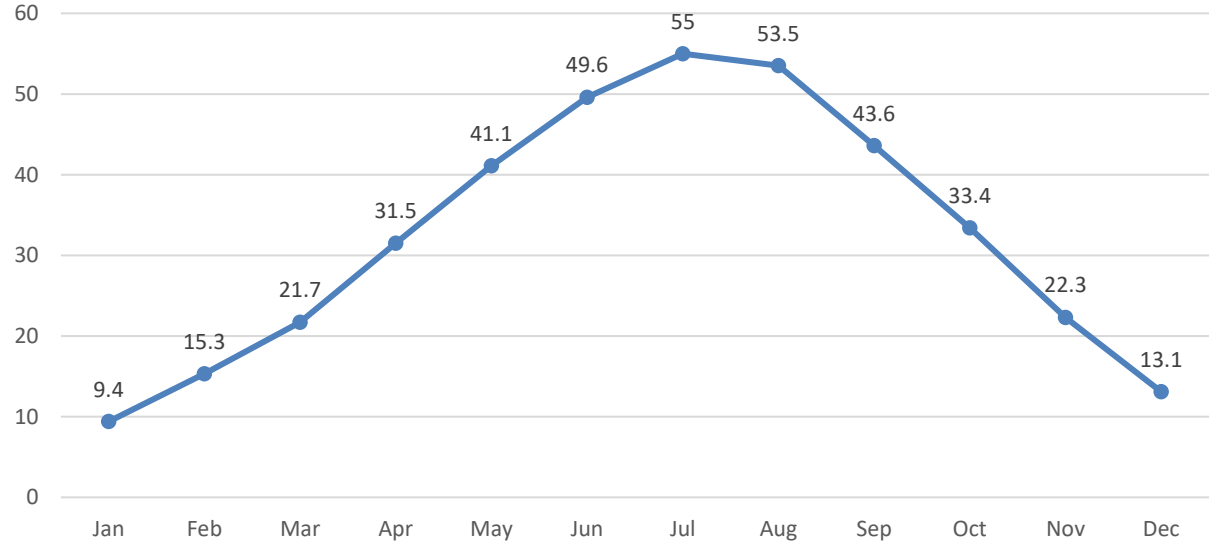
86 SPIA-Index. 2009. "Sperry-Piltz Ice Accumulation Index." https://www.spia-index.com/.

***Figure 56: Wind Chill Index Chart***




*Source: NWS*

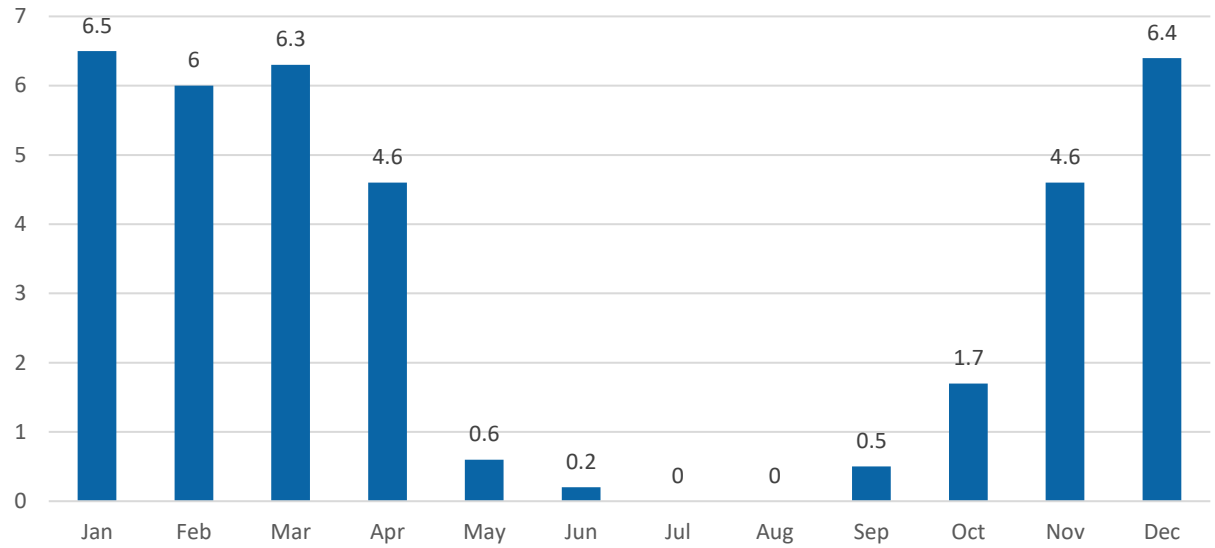
***Figure 57: Average Monthly Minimum Temperatures***




*Source: WRCC, 2022*

Average monthly snowfall for the planning area is shown below, which shows the snowiest months are between December and February. The annual average total snowfall for the region is approximately 38 inches according to the WRCC. A common snow event (likely to occur annually) will result in accumulation totals between one and seven inches. Often these snow events are accompanied by high winds. It is reasonable to expect wind speeds of 45 to 45 mph with gusts reaching 60 mph or higher. Strong winds and low temperatures can combine to produce extreme wind chills of 20°F to 40°F below zero. It should be noted that, while recent climate trends indicate the frequency and intensity of severe winter storms is increasing, it is anticipated that the extent of snow cover will decrease in future years.

***Figure 58: Average Total Snowfall (in)***




*Source: WRCC*

### *Probability*

Based on historical records and reported events, severe winter storm events are likely to occur on an annual basis. The NCEI reported a severe winter storm event (blizzard, extreme cold, heavy snow, ice storms, winter storms, or winter weather) in every year within the period of record (1996-2021), resulting in 100 percent chance annually for severe winter storms.

Based on this historical record, the annual probability of winter storms occurring in the future is *Highly Likely*.

### *Regional Vulnerabilities & Problem Statements*

Critical facilities and infrastructure including emergency response and recovery operations, warning and communication systems, wells and water treatment, and many other services vital for returning the jurisdiction's functions to normal, are at risk during winter storm events due to potential power outages, lack of access, and structural damages.

All building stock and infrastructure are at risk of being damaged or affected by a severe winter storm. Many homes and buildings across the reservation are aged and need upgraded roofs to withstand significant snow loads. Several major businesses have flat roofs which the Tribe is currently working to replace to assist with snow management. While current codes and ordinances do not prohibit flat roofs, future code updates and energy efficiency priorities are being discussed. Power outages, which occur

almost on an annual basis with severe weather, in combination with cold temperatures and below zero wind-chill, can pose a significant threat to human life. The Northern Cheyenne Indian Reservation has a history of power outages, the most severe of which are typically associated with ice storms. Power outages can last up to several days or more. In April 2001, for example, hundreds of homes in Busby and the western part of the Reservation were without power for up to seven days. The local planning team also noted significant problems with black ice forming on major transportation avenues, particularly in Lame Deer and on Highway 212. Semi-trucks which use Highway 212 have jack-knifed and caused significant traffic blockages and accidents. Due to the limited number of transportation corridors in the reservation, accidents can prevent emergency responders from responding to calls.

The collection of snow and ice on power lines and electrical equipment can cause equipment damage, downed power lines, and a loss of electricity. Snow and ice accumulations on transportation corridors can lead to obstruction of traffic flow and hinder emergency response. The local planning team noted that snowfall events can produce over a foot of snow at a time and trap residents in their homes until streets or homes are cleared. Weather patterns also vary drastically across the reservation which some areas receiving several feet of snow compared to several inches in other areas. Severe winter storms can also cause significant damage to the natural environment and trees, with branches downing electrical lines, blocking roadways, or causing building and property damage. Cottonwood trees across the reservation habe experienced damage and tree mortality due to heavy snow and ice accumulation.

An additional local concern regarding heavy snowfall and persistent ground temperatures above freezing includes a phenomenon called Snow Mold. Snow molds are a variety of cold resistant soil-borne fungi that can impact winter crops and turfgrasses when snow cover persists for extended periods of time. The deep snow cover acts as insulation for the ground, allowing soil temperatures to remain just above freezing underneath the snow and providing relative humidity near saturation, conditions which are perfect for fungus growth. In the Montana area, the two most commonly occurring snow mold species include specked snow mold (*Typhula spp.*) and pink snow mold (*Microdochium nivale*) and most commonly occur on Montana's winter wheat crops but may also impact grass fields with heavy thatch layer buildup. Wheat is Montana's top crop with hay being the second most harvested crop in the state. Of the varieties of wheat, only winter wheat is at risk of snow mold. In 2017, the state of Montana had 1.61 million acres of winter wheat planted and 2.68 million acres of land used for forages such as hay and haylage[87].

There is no guaranteed method of prevention for snow mold, but a few practices can help reduce the impacts. Early seeding that occurs in early to late August can produce larger, well-tillered plants that will have a higher chance of recovery from snow mold infections come spring[88]. Late seeding that occurs in late October can also be beneficial as the small plants may escape the disease entirely, but if infected are more likely to die completely. Yield potentials of late seeded plants may also be negatively impacted. Some fungicides are labeled for snow molds but are only suggested for areas where snow mold has been severe for several years in a row and the cost is justified[89]. Fungicides must also be applied before snow cover occurs. Some additional practices that may help reduce snow mold impacts beyond seeding time are to avoid heavy nitrogen applications in late fall and promote rapid drying and warming in the spring through improving field drainage[90].
On average, the reservation receives an average snowfall between 30 to 51 inches per year[91]. Changing

[87] United Stated Department of Agriculture.2019. "2017 Census of Agriculture – Montana State and County Data".
[88] Department of Plant Pathology and Crop and Soil Sciences of Washington State University. 1999. "Snow Mold Diseases of Winter Wheat in Washington." Accessed April 2022. https://s3-us-west-2.amazonaws.com/smallgrains.wsu.edu/uploads/2013/12/EB1880_Snowmold.pdf
[89] Crop Protection Network. "Snow Molds of Wheat". Published January 2022. https://cropprotectionnetwork.org/encyclopedia/snow-molds-of-wheat
[90] UMass Extension Turf Program. "The Snow Molds". Accessed April 2022. https://ag.umass.edu/turf/fact-sheets/snow-molds
[91] Western Regional Climate Center. "Cooperative Climatological Data summaries". Accessed February 2022. https://wrcc.dri.edu/summary/Climsmemt.html

extremes in precipitation are anticipated in the coming decades with more significant snowfall events. With a slight increase in precipitation over the last decade, the potential for deep snow cover also increases. However, with the overall average temperature of the planning area holding an increasing trend, rising temperatures may result in shorter snow coverage periods, allowing sunlight to enter the plant material and kill off growing mold.

Severe winter storms regularly result in damages to power lines and telephone lines, as well as other infrastructure related to threat communication (i.e. radio and television antennas). This potential for decreased message dissemination combined with potential power outages results in higher levels of vulnerability for the elderly, individuals and families living below the poverty line, those isolated from social interactions, groups with limited mobility, and residents that are new to the area/region. Elders are at higher risk of being isolated during severe winter storms as a result of decreased mobility, as well as a diminished ability to remove accumulations of snow and ice from vehicles and driveways. The most common injuries and deaths during extreme cold events are hypothermia and frostbite. Hypothermia affects a person's brain, making the victim unable to think clearly while frostbite is an injury caused by human cells freezing. Frostbite can permanently damage body tissues, and severe cases can lead to amputation. The most common areas on the body for frostbite include the nose, ears, cheeks, chin, fingers, or toes.

Highly vulnerable populations include elders, children, those living in sub-standard housing, or those living in rural areas without adequate access to assistance. Individuals and families below the poverty line and those isolated from social interactions may lack resources or access to resources that could mitigate the impacts of severe winter storms. Needed resources include sufficient food supplies when snowed in, and alternative heating sources during prolonged power outages. Severe winter storms often result in closed or impassable roadways. This increases the vulnerability among segments of the population that already have decreased mobility, making it important that they have a social network that can check on them and ensure they have access to heat and food.

***Figure 59: October 2005 Snow Accumulation (photo courtesy of Ernestine Spang)***

The following problem statements were identified regarding winter storms:

- Health and safety of residents is a concern due to limited number of health care facilities in the reservation.
- Loss of power for residents and tribal facilities is likely during winter storm events with ice accumulation.
- Shelter locations and supply depots should be identified for residents if homes are damaged or lack heat.
- Communication systems at risk of damage or power outages will inhibit effective emergency response and communication.
- Heavy snowfall is likely to damage roofs on aged homes and buildings across the reservation.

- Insufficient staff and equipment limit the Tribe's ability to clear snow or debris from key transportation corridors or remote resident homes.

# CHAPTER 5: MITIGATION STRATEGY

The primary focus of the mitigation strategy is to identify specific and actionable strategies and projects that will reduce the effects and impacts from the identified hazards of concern described in this Hazard Mitigation Plan. These action items should help reduce impacts on both existing and future infrastructure and property in a cost effective and technically feasible manner.

**C4 Element and Requirements §201.7(c)(3)(ii):** Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

a. The plan shall include a mitigation strategy that 1) analyzes actions and/or projects that the tribal government considered to reduce the impacts of hazards identified in the risk assessment, and 2) identifies the actions and/or projects that the tribal government intends to implement.
b. The plan shall include actions and/or projects that reduce risk to existing buildings and infrastructure as well as to new buildings and infrastructure.

These projects are the core of a hazard mitigation plan. Planning team members were instructed that each alternative must be directly related to the goals of the plan and identified hazards of top concern. Alternatives must be specific activities that are concise and can be implemented individually. Mitigation alternatives were evaluated based on referencing the risk assessment and capability assessment, as well as the various problem statements. The Tribe was encouraged to choose mitigation actions that were realistic and relevant to the concerns identified.

## Integration of Goals

**C3 Element and Requirements §201.7(c)(3)(i):** Does the Mitigation Strategy include goals to reduce or avoid long-term vulnerabilities to the identified hazards?

a. The plan shall include hazard mitigation goals that represent what the tribal government seeks to accomplish to reduce or avoid the vulnerabilities identified in the risk assessment.
b. The goals shall be consistent with the risk assessment.

Mitigation strategy development is based upon the identified problems from each of the hazard types and the established Goals determined by the Planning Team at the Kick-off meeting. The intent of each goal is to develop strategies to account for risks associated with hazards and identify ways to reduce or eliminate those risks.

The goals identified for this HMP are listed below. These goals provide specific direction to guide the Tribe in reducing future hazard related losses and in their selection of mitigation actions.

Goal 1: Protect Residents from Hazard Events
Goal 2: Protect Critical Infrastructure and Development in Hazard Areas
Goal 3: Protect and Preserve the Natural Environment and Cultural Resources
Goal 4: Increase Public Awareness and Education about Hazard Events
Goal 5: Support and Improve Tribal Mitigation Capabilities and Relationships
Goal 6: Build Upon and Increase Local Capacity to Respond to Hazard Events
Goal 7: Review, update, and integrate Hazard Mitigation principles into other planning mechanisms, as applicable, to streamline future planning efforts

## Methodology

Mitigation alternatives were reviewed, identified, and prioritized at the Round 2 meeting through

roundtable discussion. The alternatives considered included: the mitigation actions identified by NCT in the previous 2006 plan; additional mitigation actions discussed during the planning process (such as during the risk assessment); and recommendations from either tribal department leaders, the public, or JEO for additional mitigation actions based on identified needs and the risk related problem statements. JEO reviewed identified mitigation actions and provided suggestions to address identified gaps or vulnerabilities.

A final list of alternatives was established including the following information: action title and description of the action; which hazard(s) the action mitigated; responsible party; priority; cost estimate; priority level, potential funding sources; and estimated timeline. The listed priority does not indicate which actions will be implemented first but will serve as a guide in determining the order in which each action should be implemented.

It is important to note that not all of the mitigation actions identified by NCT may ultimately be implemented due to limited capabilities, prohibitive costs, low benefit-cost ratio, or other concerns. These factors may not be identified during the planning process. The Tribe has not committed to undertaking all of the identified mitigation actions in this plan. The cost estimates, priority ranking, potential funding, and identified agencies are used to provide an overall framework of which actions may be the most feasible to implement over the next five years. This information will serve as a guide for the Tribe to assist in further mitigating the hazards for the future. Additionally, NCT may identify and pursue additional mitigation actions not yet identified in this HMP. Such actions should be discussed and added into the HMP during the annual plan maintenance process.

Finally, not all mitigation actions may be eligible for funding through the Hazard Mitigation Assistance programs (HMGP, BRIC, or FMA). Ineligibility for these grant programs should not preclude the Tribe from identifying or pursuing a mitigation action. Numerous funding sources have been identified across Tribal nations, the State of Montana, and the federal government to assist tribes in funding projects. FEMA's funding is but one source and is not always the best fit for certain mitigation actions.

## *Mitigation Action Descriptions*

Mitigation actions identified by the Northern Cheyenne Tribe are found in the Mitigation Alternative Project Matrix below. Each action addresses the following:

- Mitigation Action – general title of the action item.
- Description – brief summary of what the action item(s) will accomplish or what the project means.
- Hazard(s) Addressed – which hazard the mitigation action aims to address .
- Estimated Cost – a general cost estimate for implementing the mitigation action for the appropriate jurisdiction. Cost was broken down into three categories – Low (less than $10,000), Medium ($10,000 to $50,000), and High (more than $50,000). Specific costs affiliated to each project should be identified during project scoping or during the grant application process.
- Potential funding – a list of any potential funding mechanisms to fund the action.
- Timeline – a general timeline as established by planning team members noting when the project will begin.
- Priority –a general description of the importance and workability in which an action may be implemented (high/medium/low); priority may vary between respective lead agencies or departments with multiple actions identified – implementation may be dependent on funding

capabilities and staffing. Priority level may vary due to other applicable factors. For example political will, community support, or ability to accomplish a project quickly may make projects a high priority.

- Lead agency – listing of agencies or tribal departments which may lead or oversee the implementation of the action item.
- Status – for continued mitigation actions from previous HMP a description of what has been done, if anything, to implement the action item is included. For new mitigation actions any additional key information to aid in implementation is also listed.

Implementation of the actions will vary between individual departments based upon the availability of existing information; funding opportunities and limitations; and administrative capabilities of the Tribe. Establishment of a cost-benefit analysis is beyond the scope of this plan and could potentially be completed prior to submittal of a project grant application or as part of a five-year update. Completed, removed, and continued mitigation actions from the previously approved 2006 NCT HMP are also identified and included in the matrices below.

**C5 Element and Requirements §201.7(c)(3)(iii):** Does the plan contain an action plan that describes how the actions identified will be prioritized, implemented, and administered by the tribal government?

a. The plan shall describe the criteria used for prioritizing implementation of the actions.
b. The plan shall identify the position, office, department, or agency responsible for implementing and administering each action.

**D2 Element and Requirements §201.7(d)(3) and 201.7(c)(4)(iii):** Was the plan revised to reflect progress in tribal mitigation efforts?

a. The plan shall describe the status of each mitigation action and/or project identified in the previous plan. For those actions not completed, the plan shall provide a narrative describing the status (for example, a description of why the action is no longer relevant).
b. The plan shall describe how the tribal government incorporated the previous mitigation plan into other planning mechanisms, as applicable.

**D3 Element and Requirements §201.7(d)(3):** Was the plan revised to reflect changes in priorities?

a. The plan shall describe if and how any priorities changed (for example, due to disaster events or changes in leadership) since the plan was previously approved. If no changes in priorities are necessary, plan updates shall validate the information in the previously approved plan.

***Completed Mitigation Actions:***

| MITIGATION ACTION 1.1 | HIRE A DES COORDINATOR FOR THE NORTHERN CHEYENNE TRIBE |
|---|---|
| **DESCRIPTION** | Ensure the DES Coordinator has direct line of communication with the Tribal President and Council (similar to the way county DES Coordinators have direct line of communication with County Commissioners). DES Coordinator should be active coordinator of various disaster-related activities among the various tribal departments |
| **HAZARD(S) ADDRESSED** | All hazards |
| **STATUS** | Angel Becker has been hired as the Tribal DES Coordinator as of December 2021. |

***Continued Mitigation Actions from 2006 Plan***

| MITIGATION ACTION | HOME ACCESS |
|---|---|
| **DESCRIPTION** | Build a bridge to access homes on the other side of Rosebud Creek (near Busby) |
| **HAZARD(S) ADDRESSED** | All hazards |
| **ESTIMATED COST** | Medium to high (more than $50,000) |
| **POTENTIAL FUNDING** | Roads Fund, MDOT |
| **TIMELINE** | 1-3 years |
| **PRIORITY** | Medium |
| **LEAD AGENCY** | Tribal Roads Department |
| **STATUS** | Previously Objective 6.2<br>Bridge has been constructed however additional improvements are needed to accommodate additional traffic. Bridge is currently only used for emergency access. |

| MITIGATION ACTION | SPEED ENFORCEMENT |
|---|---|
| **DESCRIPTION** | Obtain more active enforcement of speed limits on state highways<br>Get more law enforcement on the highways |
| **HAZARD(S) ADDRESSED** | Hazardous Materials (Transportation) |
| **ESTIMATED COST** | Low |
| **POTENTIAL FUNDING** | Tribal Roads Department, MDOT, Montana State Patrol |
| **TIMELINE** | 3-5 years |
| **PRIORITY** | Low |
| **LEAD AGENCY** | Tribal Roads Department, MDOT, Montana State Patrol |
| **STATUS** | Previously Objective 4.1<br>This project has not yet been started. |

| MITIGATION ACTION | TRAFFIC REGULATIONS |
|---|---|
| DESCRIPTION | Establish comprehensive tribal traffic regulations for the Reservation |
| HAZARD(S) ADDRESSED | Hazardous Materials (Transportation) |
| ESTIMATED COST | Low |
| POTENTIAL FUNDING | General Funds – Tribal Council, Roads Department, MSP |
| TIMELINE | 1-2 years |
| PRIORITY | Low |
| LEAD AGENCY | Tribal Transportation, Tribal Council must adopt regulations |
| STATUS | Previously Objective 4.3<br>This project has not yet been started. |

***Reworked Mitigation Actions from 2006 Plan for 2022 Plan***

| MITIGATION ACTION | ANCHOR AND HARDEN HAZARDOUS STORAGE TANKS |
|---|---|
| DESCRIPTION | Remediate leaking underground fuel storage tanks. Anchor all existing storage tanks to reduce damages during floods and high winds |
| HAZARD(S) ADDRESSED | Hazardous Materials, Flooding, Public Health Concerns |
| ESTIMATED COST | Medium (per tank) |
| POTENTIAL FUNDING | Tribal Environmental Dept, EPA, BRIC |
| TIMELINE | 2-5 years |
| PRIORITY | Medium |
| LEAD AGENCY | Tribal Environmental |
| STATUS | This action expanded to include anchoring storage tanks. Modified from 2006 Objective 5.2.<br>Tanks in Lame Deer have been replaced. Tanks in Ashland and at the Busby gas station have not been replaced. Concurrent with "Update and Improve Existing Codes and Ordinances" mitigation action, all hazardous material tanks should be required to be anchored upon installation. |

| MITIGATION ACTION | BACKUP POWER GENERATORS |
|---|---|
| DESCRIPTION | Identify critical facilities and shelters in need of backup power redundancies and generators. Purchase and install backup generators in facilities. Identify regular maintenance to ensure back-up power functions when needed. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Medium |
| POTENTIAL FUNDING | BRIC |
| TIMELINE | 1-3 years |
| PRIORITY | High |
| LEAD AGENCY | Tribal Council, Department of Emergency Services |
| STATUS | Modified from 2006 Objective 2.1.<br>Facilities identified as needing generators include Indian Health Services, the Tribal council building, and utilities infrastructure such as pump houses and wells. |

| MITIGATION ACTION | IMPROVE ELECTRICAL SERVICE |
|---|---|
| DESCRIPTION | Reduce power outages throughout the reservation by upgrading and reinforcing existing power lines. Require all new development or replacement power lines to be buried.<br>Evaluate local ability (including location and infrastructure) to install tribal solar microgrid. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | NC Utilities Commission, local electrical companies, Tribal Council |
| TIMELINE | 2-5 years |
| PRIORITY | High |
| LEAD AGENCY | Tribal Council, Indigenized Energy Initiative |
| STATUS | Modified from 2006 Objective 2.3.<br>This action has not yet been started. Ground surveys may be needed before powerlines can be buried.<br>IEI may look into possibility of tribal energy microgrid to provide resilient and sustainable power. |

| MITIGATION ACTION | IMPROVE EMERGENCY RESPONSE CAPABILITIES |
|---|---|
| DESCRIPTION | Identify an Emergency Operations Center; conduct training exercises, identify evacuation routes, develop plan for emergency supply distribution |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Medium to High |
| POTENTIAL FUNDING | DES, BRIC |
| TIMELINE | 2-5 years |
| PRIORITY | High |
| LEAD AGENCY | Department of Emergency Services, Tribal Council |
| STATUS | Modified from 2006 Objective 1.3.<br>Improvements are specifically needed for communication equipment and channel access across departments, agencies, and other authorities. |

| MITIGATION ACTION | IMPROVE FIRE SUPPRESSION RESOURCES |
|---|---|
| DESCRIPTION | Ensure water systems are adequate for fire suppression needs<br>Bring all fire hydrants into working order. Identify needs for dry hydrants and install as needed. |
| HAZARD(S) ADDRESSED | Wildfire, Drought |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | Tribal Council, BIA, HMGP/BRIC |
| TIMELINE | 1-3 years |
| PRIORITY | High |
| LEAD AGENCY | NCT Fire Department, Tribal Forestry, BIA |
| STATUS | Modified from 2006 Objective 3.1<br>Water tanks across the reservation need to be improved for storage capacity and access, specifically in Lame Deer. Repairs are needed on fire hydrants throughout community centers. This action supports mitigation activities listed in the Drought Contingency Plan to address wildland fire. |

| MITIGATION ACTION | IMPROVE HAZARDOUS MATERIALS RESPONSE |
|---|---|
| DESCRIPTION | Update Tribal Hazardous Materials Plan (Tribal Fire Dept.), train emergency responders for hazardous materials spills, and establish agreement with advanced hazardous materials team from Billings. |
| HAZARD(S) ADDRESSED | Hazardous Materials |
| ESTIMATED COST | Medium |
| POTENTIAL FUNDING | DES, Fire Department |
| TIMELINE | 1-3 years |
| PRIORITY | Medium |
| LEAD AGENCY | Environmental Dept, Department of Emergency Services |
| STATUS | Modified from 2006 Objective 4.2<br>Resources are currently adequate however all emergency responders should take additional response training. Adequate staffing is the limiting factor for response. |

| MITIGATION ACTION | IMPROVE ROAD ACCESS DURING HAZARD EVENTS |
|---|---|
| DESCRIPTION | Improve access from snow and debris for emergency response and firefighting equipment. Identify critical roads and bridges in need of improvements for access. Identify streets in town to be cleared of abandoned vehicles and other items that can restrict access. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Medium to High (varies by road) |
| POTENTIAL FUNDING | Transportation Dept, MDOT |
| TIMELINE | 2-3 years |
| PRIORITY | Medium |
| LEAD AGENCY | Tribal Transportation |
| STATUS | Modified from 2006 Objective 7.1 and Objective 3.3<br>Improvements to roadways are needed on Rosebud Cut-off Road. |

| MITIGATION ACTION | PUBLIC EDUCATION AND OUTREACH |
|---|---|
| DESCRIPTION | Provide education and training to the public regarding household mitigation and through schools for families. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Low |
| POTENTIAL FUNDING | Tribal Council |
| TIMELINE | 1-2 years |
| PRIORITY | High |
| LEAD AGENCY | Varies – Tribal Council to delegate type of education per department |
| STATUS | Modified from 2006 Objective 1.5, Objective 2.2, and Objective 8.1<br>This project has not yet been started. Information shared should include household mitigation, maintenance measures, and available resources for tribal members during hazard events. Education and outreach should be integrated on the tribal website and through local community events. Other additional information should be shared with residents regarding water conservation practices (Drought Contingency Plan). The Drought Contingency Plan's survey noted tribal members want information regarding drought and fire condition information available on the tribal website. |

| MITIGATION ACTION | WATER SYSTEM IMPROVEMENTS |
|---|---|
| DESCRIPTION | Evaluate and upgrade existing water infrastructure including sewer lines, water pipe upsizing, and culverts. Install water monitoring devices to track water levels in storage facilities. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | Utilities Commission, BRIC/HMGP |
| TIMELINE | 1-2 years |
| PRIORITY | High |
| LEAD AGENCY | Utilities Commission |
| STATUS | Modified from 2006 Objective 5.1 and Objective 2.2<br>An additional water tank is needed in Lame Deer and the current water tank in Lame Deer needs repaired to address pressure issues. New wells are needed in Busby and Birney. This mitigation action supports actions identified in the Drought Contingency Plan for Domestic Water. |

| MITIGATION ACTION | WILDLAND FIRES FUELS REDUCTION |
|---|---|
| DESCRIPTION | As identified in the Rosebud County CWPP, coordinate fuels reduction opportunities between private landowners, Custer National Forest, the Miles City Field Office of the Bureau of Land Management, and the Northern Cheyenne Tribe. |
| HAZARD(S) ADDRESSED | Wildfire |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | Tribal Forestry, BIA, BLM |
| TIMELINE | 1-2 years |
| PRIORITY | High |
| LEAD AGENCY | Tribal Forestry |
| STATUS | Modified from 2006 Objective 3.4<br>Tribal forestry currently working on some fuels reduction projects. Areas of concern identified after the Richard Springs fire. This mitigation action also supports actions identified in the Drought Contingency Plan for Wildland Fire. |

***New Mitigation Actions for 2022 Plan***

| MITIGATION ACTION | BUILD HEALTH CARE FACILITY |
|---|---|
| DESCRIPTION | Construct a new or expand on existing health care facility within the reservation to provide health care clinic, assisted living, and hospice care. An ancillary clinic/hospice center is needed. |
| HAZARD(S) ADDRESSED | Public Health Concerns |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | IHS, Tribal Council |
| TIMELINE | 5+ years |
| PRIORITY | Medium |
| LEAD AGENCY | Indian Health Services |
| STATUS | This is a new mitigation action. Limiting factors to implementation include recruiting staff, finding housing for staff, and finding a new location for building. |

| MITIGATION ACTION | BUILD TRANSPORTATION TRAVEL CENTER |
|---|---|
| DESCRIPTION | Construct a new transportation travel center (Depot #3). |
| HAZARD(S) ADDRESSED | Hazardous Materials<br>*General Transportation Concerns* |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | Tribal Roads Department |
| TIMELINE | 5+ years |
| PRIORITY | Medium |
| LEAD AGENCY | Transportation Department |
| STATUS | This is a new mitigation action. This is currently in the early planning stages. |

| MITIGATION ACTION | LAGOON UPGRADES |
|---|---|
| DESCRIPTION | Repair and improve existing lagoon in Lame Deer. Construct new lagoon in Ashland. |
| HAZARD(S) ADDRESSED | Flooding, Severe Thunderstorms |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | Utilities Commission |
| TIMELINE | 2-3 years |
| PRIORITY | Medium |
| LEAD AGENCY | Utilities Commission |
| STATUS | This is a new mitigation action. Lame Deer's lagoon should be dredged, built-up, and needs an aeration system. A new lagoon is currently under construction in Ashland by Highway 12. |

| MITIGATION ACTION | EMERGENCY SHELTER LOCATIONS |
|---|---|
| DESCRIPTION | Identify existing storm shelters in the reservation. Construct additional safe rooms, storm shelters, or bunkers in the reservation for tribal members. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Staff time, $250+ per sq ft for new construction |
| POTENTIAL FUNDING | DES, HMA |
| TIMELINE | 1-2 years |
| PRIORITY | Low |
| LEAD AGENCY | DES, Tribal Council |
| STATUS | This is a new mitigation action. Community centers are used for supply depots or short-term sheltering. A new community center is needed in Lame Deer. |

| MITIGATION ACTION | IMPROVE EMERGENCY ALERT NOTIFICATIONS |
|---|---|
| DESCRIPTION | Evaluate existing warning systems and resources. Develop and implement an emergency text alert system, hire a Town Crier position to manage emergency alerts, and improve existing siren and NOAA radio equipment across all populated areas of the reservation. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Medium to High |
| POTENTIAL FUNDING | Tribal Council, DES, HMGP/BRIC |
| TIMELINE | 1-2 years |
| PRIORITY | Medium |
| LEAD AGENCY | Tribal Council, DES |
| STATUS | New mitigation action to address local priorities and concerns. Integrates previous 2006 Objective 1.6 and Objective 1.4.<br>This is a new mitigation action. Currently there is only one existing siren in Lame Deer. Additional sirens are needed in other community centers. Social media is primary form of notification for many residents; however, cell coverage is poor in some areas of the reservation. |

| MITIGATION ACTION | PARCEL AND ADDRESS DOCUMENTATION |
|---|---|
| DESCRIPTION | Perform a parcel-level evaluation of tribal properties to improve addresses and ability to give directions for emergency responders. Document existing structures and condition for future development or improvement needs. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Moderate |
| POTENTIAL FUNDING | Housing Authority, HUD |
| TIMELINE | 3-5 years |
| PRIORITY | Low |
| LEAD AGENCY | Housing Authority, Tribal Council |
| STATUS | This is a new mitigation action. |

| MITIGATION ACTION | RESERVATION-WIDE SOIL ANALYSIS |
|---|---|
| DESCRIPTION | Utilize drones and/or ground penetrating radar to evaluate soil suitability for burying utilities and powerlines. Identify and map coal seam locations in the reservation. |
| HAZARD(S) ADDRESSED | Landslides, Wildfire (for coal seams) |
| ESTIMATED COST | Unknown |
| POTENTIAL FUNDING | FEMA, Tribal Council cost-share |
| TIMELINE | 1-5 years |
| PRIORITY | Low |
| LEAD AGENCY | Tribal Council |
| STATUS | This is a new mitigation action. NCT is currently working with FEMA on coal-seam mapping and mitigation. |

| MITIGATION ACTION | RESERVATION WI-FI AND COMMUNICATIONS |
|---|---|
| DESCRIPTION | Improve existing cell coverage and Wi-Fi access across the reservation for residents and emergency responders. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | High |
| POTENTIAL FUNDING | General Funds, NOAA, FEMA, local cell companies cost share |
| TIMELINE | 5+ years |
| PRIORITY | Medium |
| LEAD AGENCY | Tribal Council |
| STATUS | This is a new mitigation action. The Tribe is currently working to install additional cell towers in the reservation for cell coverage. |

| MITIGATION ACTION | UPDATE AND IMPROVE EXISTING CODES AND ORDINANCES |
|---|---|
| DESCRIPTION | Update building codes and zoning ordinances for all new developments. Required updates include preventing flat roofs for snow management and ensuring homes are "Fire Wise".<br>Ensure all new developments are constructed out of the floodplain once new FIRMs are available. |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Staff time, Low |
| POTENTIAL FUNDING | Staff Time, Low |
| TIMELINE | 1-2 years |
| PRIORITY | High |
| LEAD AGENCY | Tribal Council |
| STATUS | This is a new mitigation action to update all existing codes. Considerations should be included for new developments relative to gravity-fed water tanks and for wildfire prone areas.<br>Integrates previous 2006 Objective 3.5. |

| MITIGATION ACTION | UPDATE EMERGENCY OPERATIONS PLAN |
|---|---|
| DESCRIPTION | Update the Tribal Emergency Operations Plan |
| HAZARD(S) ADDRESSED | All hazards |
| ESTIMATED COST | Low |
| POTENTIAL FUNDING | Department of Emergency Services |
| TIMELINE | 1 year |
| PRIORITY | High Priority |
| LEAD AGENCY | DES |
| STATUS | Currently in the works. Anticipated to be completed by end of 2023. |

| MITIGATION ACTION | WALKABILITY IMPROVEMENTS |
|---|---|
| DESCRIPTION | Construct and/or improve walkways for pedestrians, specifically between Lame Deer and Muddy, and around Ashland. |
| HAZARD(S) ADDRESSED | Public Health |
| ESTIMATED COST | Medium to High |
| POTENTIAL FUNDING | Roads Department, Parks and Recreation |
| TIMELINE | 5+ years |
| PRIORITY | Medium |
| LEAD AGENCY | Roads Department, Parks and Recreation |
| STATUS | This is a new mitigation action. |

### *Removed Mitigation Actions*

The following table lists mitigation actions identified in the 2006 Hazard Mitigation Plan which have been removed. Many of these actions have been reevaluated and have been either integrated with other actions which better serve current priorities and goals of the Tribe or are no longer needed.

***Table 63: Removed Mitigation Actions***

| 2006 MITIGATION NUMBER | ACTION NAME | DESCRIPTION | REASON FOR REMOVAL |
|---|---|---|---|
| **1.2** | Develop and maintain an active Tribal Emergency Response Committee | DES Coordinator is leader and motivator for the TREC DES Coordinator leads TERC in annual review of progress on PDM goals and objectives, assessment of next tasks necessary to accomplish goals | Due to changes in the planning process while updating the 2022 NCT HMP, this action was identified as no longer a need. Plan review and updates will be coordinated by the DES Coordinator and by the Tribal Council. |
| **1.3** | Develop systems and infrastructure to respond to emergencies. | Identify an Emergency Operations Center; conduct training exercises, including table-top and field test exercises for various disaster scenarios and evacuations; Identify evacuation routes for various types of disasters, including hazardous materials; and develop systems for distributing emergency supplies and for their collection after the disaster | This action originally from 2006 has been restructured and addressed under the "Improve Emergency Response Capabilities" action. |
| **1.4** | Improve capabilities to forecast weather events and provide warning notifications to the public | Obtain NOAA weather radio reception in Lame Deer; Work with critical facilities and public building occupants to ensure each has working NOAA weather radios. | This action originally from 2006 has been restructured and addressed under the "Improve Emergency Alert Notifications" action. |
| **1.5** | Improve public preparedness for disasters | Provide education and training for the public regarding how to prepare for serious weather and other disaster types | This action originally from 2006 has been restructured and addressed under the "Public Education and Outreach" action. |
| **1.6** | Improve Disaster-Related Communications | Identify existing warning systems (such as sirens in Birney and Magic city) and resources (such as the telephones in the water pump houses; identify inefficiencies and needed improvements and implement) | This action originally from 2006 has been restructured and addressed under the "Improve Emergency Alert Notifications" action. |

| 2006 MITIGATION NUMBER | ACTION NAME | DESCRIPTION | REASON FOR REMOVAL |
|---|---|---|---|
| | | Northern Cheyenne continue to participate in the Big Sky 11 Interoperability project (communications among various emergency service providers/systems and jurisdictions in the area)<br>Improve cell phone coverage on the Reservation<br>Improve communication with Birney | |
| **2.1** | Backup-Power | Put back-up Power in place for critical buildings that do not have back-up power sources.<br>Identify critical buildings/facilities according to standard criteria (e.g., need of facility during emergencies, shelter for special needs, children, elderly, etc., and get back-up power in place<br>Identify regular maintenance to ensure back-up power functions when needed. | This action originally from 2006 has been restructured and addressed under the "Backup Power Generators" action. |
| **2.2** | Ensure adequate water supplies during power outages | Install monitors to track water quantities in storage facilities<br>Public education on how to prepare for adequate water supplies during power outages" | This action originally from 2006 has been restructured and addressed under the "Public Education and Outreach" action and the "Water System Improvements" action. |
| **2.3** | Reduce Power Outages | Identify causes of power outages. (e.g., downed lines, system under-designed, other?) and implement needed changes; Install air flow spoilers where needed to keep lines from coming down due to winds/weather events | This action originally from 2006 has been restructured and addressed under the "Improve Electrical Services" action. |
| **3.1** | Fire Suppression Needs | Ensure water systems are adequate for fire suppression needs; Bring all fire hydrants into working order. Ensure adequate water supplies and pressure for concurrent fire suppression and basic public needs. Build additional storage as needed. Install water supply | This action originally from 2006 has been restructured and addressed under the "Improve Fire Suppression Resources" action. |

| 2006 MITIGATION NUMBER | ACTION NAME | DESCRIPTION | REASON FOR REMOVAL |
|---|---|---|---|
| | | monitors at storage facilities. Identify needs for dry hydrants and install as needed | |
| **3.2** | Continue to implement existing fire plans | Continue to implement existing fire plans: Bia Wildland Fire Plans, Tribal Fire Plan/Community Fire Plans, applicable portions of the Big Horn County/Rosebud County CWPP | Ongoing implementation of plans is not a specific mitigation action. Other fire risk reduction activities have been identified to address local risks. |
| **3.3** | Ensure clear access for firefighting equipment | Identify critical roads and bridges in need of improvements (grade, slope, other) for access by firefighting equipment and implement needed changes<br>Keep streets in town clear of abandoned vehicles and other item that can restrict access by firefighting equipment | This action originally from 2006 has been restructured and addressed under the "Improve Road Access During Hazard Events" action. |
| **3.4** | Continue fuel reduction in the Wildland Urban Interface | Continue fuel reduction in the Wildland Urban Interface | This action originally from 2006 has been restructured and addressed under the "Wildland Fire Fuels Reduction" action. |
| **3.5** | New development will be "Fire-wise" | Construction will be of "fire-wise" materials (less subject to fires)<br>New development will be designed and built to ensure access by fire suppression equipment<br>Enforce existing Housing Authority ordinances related to fire reduction and suppression | This action originally from 2006 has been restructured and addressed under the "Update and Improve Existing Codes and Ordinances" action. |
| **4.2** | Ensure timely response to hazardous materials events | Conduct field training and exercises<br>Update Tribal Hazardous Materials Plan (Tribal Fire Dept.)<br>Continue to secure training and necessary equipment for hazardous materials responders<br>Improve coordination with advanced hazardous materials teams (e.g., from Billings) that need to be called in for hazardous materials events that are beyond the certified capabilities of the local tribal team | This action originally from 2006 has been restructured and addressed under the "Improve Hazardous Materials Response" action. |

| 2006 MITIGATION NUMBER | ACTION NAME | DESCRIPTION | REASON FOR REMOVAL |
|---|---|---|---|
| **5.1** | EPA Sanitary Surveys | Implement recommendations made by the IPA in Sanitary Surveys of public water supplies | This action originally from 2006 has been restructured and addressed under the "Water System Improvements" action. |
| **5.2** | Underground Fuel Storage Tank Leaks | Continue to address remediation of underground fuel storage tank leaks | This action originally from 2006 has been restructured and addressed under the "Anchor and Harden Hazardous Storage Tanks" action. |
| **6.1** | Use of Floodplain Maps | Continue to use flood plain maps in siting new development. | Floodplain mapping efforts currently underway for Big Horn and Rosebud Counties. This action has been integrated into the "Update and Improve Existing Codes and Ordinances" action. |
| **7.1** | Road Clearing | Roads should be cleared of snow (with priority for evacuation routes, main travel routes) | This action originally from 2006 has been restructured and addressed under the "Improve Road Access During Hazard Events" action. |
| **8.1** | Water Conservation Measures | Continue public awareness and water conservation measures | This action originally from 2006 has been restructured and addressed under the "Public Education and Outreach" action. |
| **8.2** | Grasshopper Control Program | Institute a grasshopper control program like Big Horn County | This action was identified as no longer a priority for the Northern Cheyenne Tribe during this plan update. |
| **9.1** | Submit Plan | Submit plan to the State of Montana and FEMA for approval. | This action is part of the plan update process rather than a specific action to address local risks or vulnerabilities. |
| **9.2** | PDM Plan | Ensure coordination with other planning efforts Incorporate elements of the PDM plan as appropriate into other plans. When updating or revising the PDM plan, incorporate elements of other plans as appropriate | This action is part of the plan update process rather than a specific action to address local risks or vulnerabilities. |

### *Mitigation Actions from Drought Contingency Plan*

The following mitigation actions were identified in the tribe's Drought Contingency Plan but were not identified as specific mitigation actions by the local planning team during this HMP planning process. However, it is a valuable opportunity to identify cohesive planning documents and the objectives or projects therein which further mitigation efforts across the reservation. (Note that * indicates connection to the Northern Cheyenne Agriculture Resource Management Plan while ** indicates response is from 2007 Drought Plan)

ALL SECTORS

- Update Tribal Water Code
- Develop and Maintain Drought Contingency Plan
- Improve administration and enforcement of water code
- Drill new wells (e.g., drinking, livestock water, etc.), as appropriate
- Identify outside assistance providers (such as for emergency water, feed, personal financial assistance, etc.)

DOMESTIC WATER

- Identify emergency/back-up water supply for each public drinking water system and the IHS clinic **
- Develop and maintain a list of individuals/companies able to haul water**
- Develop additional storage capacity for public water supplies**
- Develop wellhead protection plans for public water supplies**
- Develop program to identify and repair plumbing leaks**
- Develop public drinking water source west of Busby**
- Establish a fund for assisting individuals in replacing wells that go dry**
- Improving plumbing for domestic water in the communities to reduce leakage**

AG-RANGELANDS

- Develop a comprehensive water budget*
- Develop a plan to protect sensitive areas, including the construction of additional water sources to encourage better distribution of livestock and less reliance on riparian areas and springs*
- Develop and implement a Rosebud Creek Watershed Plan*
- Repair existing wells, pumps, and watering facilities (tanks, pipelines, drinkers)
- Reduce herds
- Increase frequency and extent of range surveys and monitoring
- Control grazing in sensitive/impacted areas
- Develop policies for rotating/rest pastures
- Locate additional grazing areas (e.g., identify unallocated land, unused range units, acquisition of additional land, etc.)
- Develop and implement a buffalo management plan in designated area*
- Conduct a systematic review of the health of range units and consider the feasibility of implementing timing, grazing intensity changes, and stocking rate changes*
- Develop and implement a plan to monitor the health, productivity, and utilization of native plant communities in the range units*
- Prioritize and construct additional fencing, such as cross fencing for rotational grazing is feasible *
- Provide drought education effort included water conservation (e.g., drip irrigation, rainwater harvesting

- Educate producers, implement, and enforce the tribal grazing ordinance**
- Assist individual operators in grazing management practices in cooperation with the BIA and NRCS** Inventory stock water sources and monitor yields**
- Encourage water conservation practices**
- Working with elected officials, consider additional water projects that would utilize water from Rosebud Creek and the Tongue River for agricultural and other purposes**

AG-FARM-PASTURELAND

- Inspect current irrigation infrastructure for leaks/inefficiencies; Repair or replace irrigation systems, as needed*
- Reuse irrigation tail water (return flow)
- Measure and regulate diversions to ensure diverting only amount necessary
- Schedule irrigation rotation for equal shares • Select appropriate crops, such as traditional Northern Cheyenne varieties and other drought resistant crops
- Return to more traditional farming techniques, including smaller fields, traditional soil and water conservation practices, and reducing or eliminating use of tractors.
- Use traditional runoff fields
- Use field conservation measures (e.g., level fields, line ditches, efficient irrigation/tillage, mulch)
- Change farming practices, such as cultivating smaller fields, planting later, foregoing the use of tractors to help retain soil, using cover crops to hold down soil, limiting planting to specific types of soil where soil moisture remains higher in dry times (e.g., higher clay content), and shifting to only planting corn in a household vegetable garden, where it can be easily watered.
- Encourage water conservation practices**
- Working with elected officials, consider additional water projects that would utilize water from Rosebud Creek and the Tongue River for agricultural and other purposes **
- Provide ongoing education to lessees on sustainable crop production; Identify farm/pasture leases with areas of/or with the potential for high soil erosion and/or declining soil health**
- Evaluate the feasibility of the Tribe reestablishing hay on abandoned croplands for eventual re-lease by a lessee**

WILDLAND FIRE

- Develop a georeferenced list of fire hydrants across the Reservation that need to be replaced. Make a bulk purchase and install new hydrants**
- Work with IHS facility and new Lame Deer school to install adequate hydrants**
- Identify best locations and develop additional water storage in Lame Deer for firefighting**
- Identify best locations and develop water sources for wildland fire fighting in remote areas**
- Investigate the feasibility of obtaining the unused water tank at the sawmill in Ashland and relocating it for structural and wildland fire fighting water storage
- Continue to utilize burning permits to reduce the number of escaped fires**
- Continue fire prevention education** • Continue with fuel reduction and prescribed burning**
- Use fire suppressants that reduce or eliminate water requirements
- Reduce forest fuels
- Increase field personnel

LAND AND WILDLIFE-WETLANDS

- Identify range units and farm/pasture leases with or adjacent to sensitive areas (e.g., surface waters and springs) *
- Develop and implement a plan or lease language that requires lessees to maintain buffers to

protect sensitive areas*

LAND AND WILDLIFE-VEGETATION

- Increase frequency and extent of range surveys and monitoring
- Control grazing in sensitive/impacted areas
- Rotate/rest pastures
- Locate additional grazing areas
- Develop and implement a buffalo management plan in designated area *

LAND AND WILDLIFEFISH/WILDLIFE

- Establish enforcement of existing fish and game regulations**
- Evaluate proposed irrigation uses of Rosebud Creek to determine impacts to fisheries**
- Work with U.S. Fish and Wildlife Service to remove diversion dam on the Tongue River north of Ashland to accommodate fish passage**
- Develop springs for wildlife use**
- Prepare for decreased revenue from permits

CULTURAL RESOURCES

- Identify range units and farm/pasture leases with or adjacent to sensitive areas (e.g., cultural resources)*

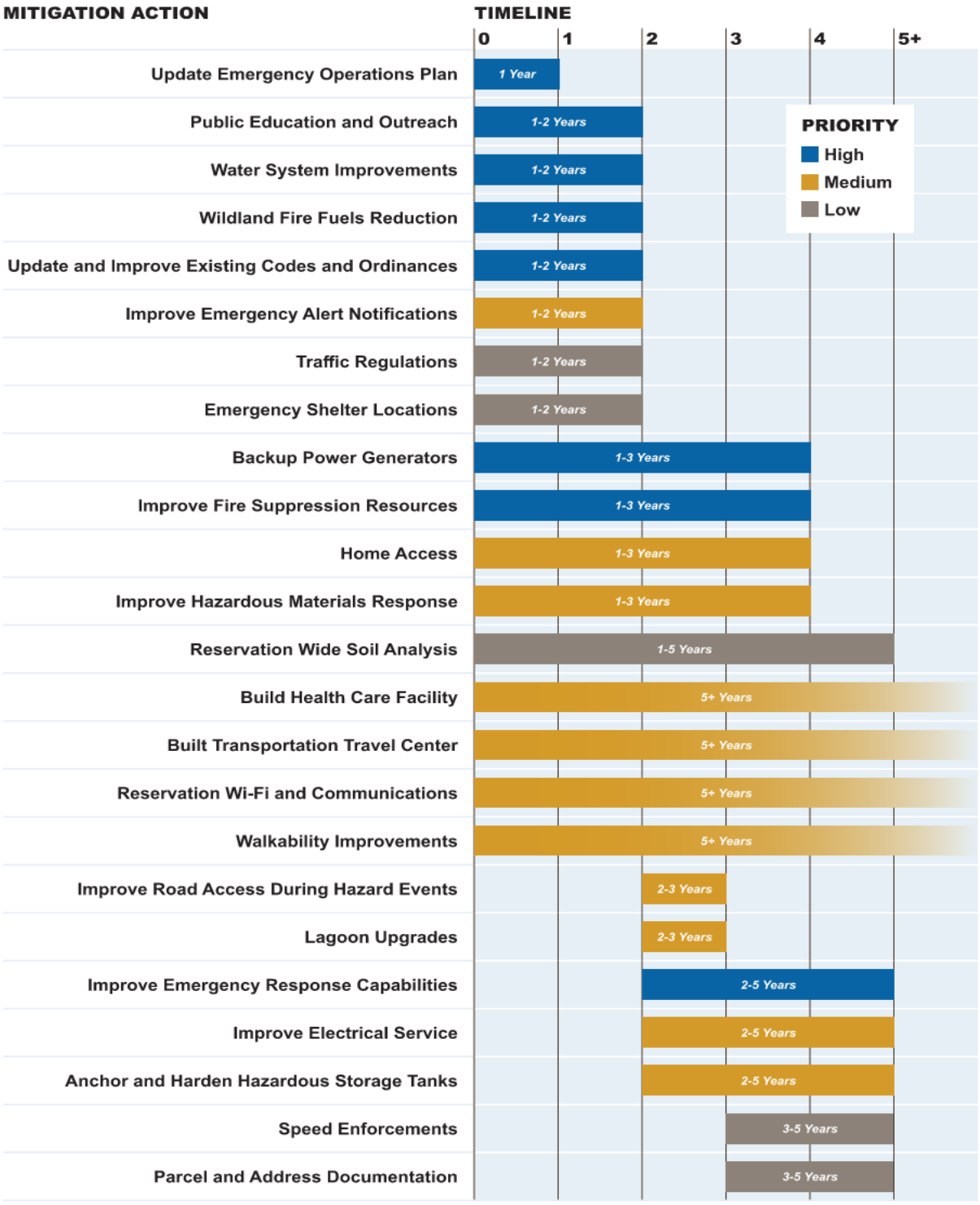
RECREATION

- Prepare for decreased revenue from permits

## Prioritization and Timeline Table

The following figure shows the overall priority level and timeline anticipated for each mitigation action identified in this HMP as determined by the local planning team.

***Figure 60: Prioritization and Timeline Table***



## Mitigation Action Implementation

The identified mitigation strategies are the means by which the Northern Cheyenne Tribe intends to become more disaster resistant. Accomplishing the projects will be dependent on funding, staffing, and technical resources from a variety of sources including the Tribe, state and federal government, non-profit organization, and the business community. Some projects can be undertaken by the Tribe within existing resources, such as to develop comprehensive tribal traffic or building regulations or develop education programs to provide information on how to prepare for various types of disasters.

However, many of the projects will need additional funding or support from agencies outside of the Tribe to be fully implemented. The amount of funding or support needed depends on the project. Public-private-tribal partnerships are required to build large scale redundancies or tools such as hazardous fuels mapping or floodplain mapping efforts. Projects will be accomplished as resources become available. Those projects with a higher priority ranking will be considered first. Project implementation also depends on the willingness of tribal departments (e.g., public health, housing), public entities (e.g., the schools), private business (such as the electric companies), and non-profit organizations (such as the American Red Cross) to participate in specific mitigation actions and projects.

# CHAPTER 6: PLAN INTEGRATION AND CAPABILITIES

A variety of existing planning mechanisms were reviewed to determine to what extent hazard mitigation principles were utilized as well to identify areas of improvement of all future plan updates. Tools utilized during this plan integration process included FEMA's *Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan*[92] guidance, as well as FEMA's *2015 Plan Integration*[93] guide, each jurisdiction engaged in a plan integration discussion.

**C1 Element and Requirements §201.7(c)(3) and 201.7(c)(3)(iv):** Does the plan include a discussion of the tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of tribal laws and regulations related to hazard mitigation as well as to development in hazard-prone areas?

a. The plan shall describe the tribal government's existing capabilities to mitigate hazards in the tribal planning area, including pre-disaster and post-disaster hazard management policies and programs.
b. The plan shall include an evaluation of the tribal laws, regulations, policies, programs, and resources related to hazard mitigation and development in hazard-prone areas. The evaluation shall address the opportunities, as well as the challenges, of existing capabilities.

The Northern Cheyenne Tribe is regulated by Tribal ordinances, codes, and policies that address the Tribe's capacity to implement pre- and post-disaster mitigation activities. It should be noted that as a sovereign nation, NCT is not required to adhere to any local or state planning regulations; however, in an effort to be a good steward and neighbor, the Nation does strive to plan in consideration of state and local requirements. NCT must comply with applicable federal regulations for construction and maintenance of facilities, such as those administered by HUD, EPA and/or BIA, as well as other federal agencies. NCT has a long history of grant management as the recipient of several grants to implement projects in the past, disaster recovery funds, or to make improvements across the reservation. Tribal procurement regulations are well defined and adhered to in order to ensure that the grant requirements are fulfilled.

The planning team and consultant reviewed existing codes, ordinances, resolutions, and policies to ensure that mitigation projects are in compliance and meet benefit-cost criteria for HMA funding. The Tribe understands that many federal grants, including HMA grants, require matching funds to support the projects. While NCT has limited financing available to accommodate these matching requirements, there are several options to fulfill local cost-share requirements including in-kind labor match or other non-federal funding resources which may be used.

The Tribe has a strong historical, cultural, and spiritual relationship between the Northern Cheyenne people and the natural environment. As such, it is the Tribe's policy to protect and preserve the Northern Cheyenne Indian Reservation environment and to provide a safe and habitable place for its people and existing plans emphasis this relationship.

[92] Federal Emergency Management Agency. November 2013. "FEMA Region X Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan." https://www.fema.gov/media-library-data/1388432170894-6f744a8afa8929171dc62d96da067b9a/FEMA-X-IntegratingLocalMitigation.pdf.

[93] Federal Emergency Management Agency. July 2015. "Plan Integration: Linking Local Planning Efforts." https://www.fema.gov/media-library-data/1440522008134-ddb097cc285bf741986b48fdcef31c6e/R3_Plan_Integration_0812_508.pdf.

## Local Capabilities

A local capability assessment provides a review of existing policies, programs, and fiscal capabilities to mitigate identified hazards. When specific planning mechanisms are lacking or do not exist, the HMP may be used as a guide for future activity and development in the community.

| SURVEY COMPONENTS/SUBCOMPONENTS | | NORTHERN CHEYENNE TRIBE |
|---|---|---|
| PLANNING AND REGULATORY CAPABILITY | Comprehensive Plan | No |
| | Capital Improvements Plan | No |
| | Economic Development Plan | No |
| | Tribal Emergency Operations Plan | **Yes** |
| | Drought Contingency Plan | **Yes** |
| | Watershed Management Plan | **Yes** |
| | Storm Water Management Plan | No |
| | Zoning Ordinance | No |
| | Subdivision Regulation/Ordinance | No |
| | Floodplain Ordinance | No |
| | National Flood Insurance Program | No |
| | Building Codes | No |
| | Community Rating System | No |
| | Storm Water Ordinance | No |
| | Historical Preservation Ordinance | **Yes** |
| | Debris Management Plan | No |
| | Pandemic Influenza Response Plan | **Yes** |
| | Evacuation Plan | **Yes** |
| | Community Wildfire Protection Plan | No (Rosebud and Big Horn Counties have County specific CWPPs) |
| ADMINISTRATIVE & TECHNICAL CAPABILITY | Planning Commission | No |
| | Floodplain Administration | No |
| | GIS Capabilities | **Yes** |
| | Chief Building Official | No |
| | Civil Engineering | No |
| | Emergency Management | **Yes** |
| | Finance Department | **Yes** |
| | Grant Manager | No |
| | Mutual Aid Agreement/Memorandum of Understanding | **Yes – With BIA and Red Cross** |
| | Capital Improvement Plan/ 1 & 6 Year plan | No |

| SURVEY COMPONENTS/SUBCOMPONENTS | | NORTHERN CHEYENNE TRIBE |
|---|---|---|
| FISCAL CAPABILITY | Applied for grants in the past | **Yes** |
| | Awarded a grant in the past | **Yes** |
| | Authority to Levy Taxes for Specific Purposes such as Mitigation Projects | **Yes** |
| | Gas/Electric Service Fees | No |
| | Storm Water Service Fees | No |
| | Water/Sewer Service Fees | **Yes** |
| | Development Impact Fees | No |
| | General Obligation Revenue or Special Tax Bonds | No |
| EDUCATION AND OUTREACH CAPABILITY | Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. | **Yes** |
| | Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education) | **Yes** |
| | StormReady Certification | No |
| | Firewise Communities Certification | No |
| | Tree City USA | No |
| | Language Revitalization Educational Program | **Yes – at Chief Dull Knife College** |

| OVERALL CAPABILITY (LIMITED/MODERATE/HIGH) | NORTHERN CHEYENNE TRIBE |
|---|---|
| DOES YOUR JURISDICTION HAVE THE FINANCIAL RESOURCES NEED TO IMPLEMENT MITIGATION PROJECTS? | Limited |
| DOES YOUR JURISDICTION HAVE THE STAFF/EXPERTISE TO IMPLEMENT PROJECTS? | Moderate |
| DOES YOUR JURISDICTION HAVE THE COMMUNITY SUPPORT TO IMPLEMENT PROJECTS? | Moderate |
| DOES YOUR JURISDICTION STAFF HAVE THE TIME TO DEVOTE TO HAZARD MITIGATION? | Limited |

**A5 Element and Requirements §201.7(c)(1)(iv):** Does the plan include a discussion on how the planning process was integrated, to the extent possible, with other ongoing tribal planning efforts as well as other FEMA programs and initiatives?

a. The plan shall describe how the tribal government integrated the current planning process and/or findings with other ongoing tribal planning efforts.
b. The plan shall describe how the tribal government integrated the current planning process with other FEMA programs and initiatives.

## Summary of Existing Plans

**A4 Element and Requirements §201.7(c)(1)(iii):** Does the plan describe the review and incorporation of existing plans, studies, and reports?

a. The plan shall describe what existing plans, studies, and reports were reviewed.
b. The plan shall document how relevant information was incorporated into the mitigation plan.

Other planning mechanisms within which the Northern Cheyenne Tribe may integrate Hazard Mitigation principles or mitigation actions and strategies may include tribal codes, stormwater management guidelines, wildfire protection plans, transportation studies, climate adaptation plans, education and outreach campaigns, or capital improvement programs. As planning mechanisms and activities are reviewed or implemented across the reservation, the Emergency Services Director is responsible for ensuring the HMP goals and actions are evaluated or included as applicable. At the time of this plan update no other plans were being updated in which to include the Hazard Mitigation Plan goals, risk area assessments, or mitigation activities, but it will be a priority for future plan updates.

A brief summary of existing NCT or other applicable plans and their relationship to the HMP are provided below.

### *Northern Cheyenne Reservation Emergency Operations and Action Plan (EOP) (2005)*

The Northern Cheyenne Tribe has an Emergency Operations Plan (EOP) which was last updated in February 2005. The EOP uses an "all-hazards" approach that provides generalized directions in response to disaster events. The EOP is activated when the Tribal President declares an emergency and the Disaster and Emergency Services building is the designated Emergency Operations Center (EOC).

The plan discusses hazards of concern including aircraft accidents, bomb/explosion threats, civil unrest, drought/blights/infestations, earthquake, major fire, flood/dam failure, hazardous material spills, illegal drug sites, mass casualty, pipeline rupture, radiological event, severe weather, terrorism, utility interruption, volcanic ash, and wildfire. Specifically, the plan notes the following overall concerns regarding hazard events in the reservation: power and transportation sectors remain the greatest potential victims due to winter and ice storms. Transmission lines and related support structures can and will fail during periods where build-up of radial ice increases the weight and internal stresses on steel structures and high voltage cables especially if combed with wind loading. Interruption of power to other sectors within the region remains a considerable risk potential. Highways and bridges are heavily impacted by heavy winter storms forcing costly removal and de-icing operations. Most highways are scenes of numerous vehicle accidents during the initial stages of storms and may result in injuries and deaths not to mention costly insurance claims and potential disruption of traffic patterns. Due to the history and severity of past storms within this region, critical infrastructure should be prepared in case power and transportation is disrupted during a storm. **Emergency power generation should be available and if not, must be prioritized for future installation of critical facilities such that are operated by the Fire Department. Alternative transportation routes should also be evaluated."**

The EOP also includes a brief summary of hazardous material spills and notes that a Commodity Flow Study was not available for this area that may identify types of trucks and the hauling of hazardous materials. It is presumed that trucks moving through the reservation area in Montana do haul some types

of hazardous materials.

The EOP assigns specific leadership roles and an established line of command in responding to disasters. Additionally, the plan outlines specific roles and responsibilities of the tribal president, fire department, law enforcement, public health/medical services, Northern Cheyenne Utilities Commission, Emergency Manager, Communications, Resource Management (Bureau of Indian Affairs), Mass Care/Sheltering, Environmental Management, and Financial Administration. The plan identifies communication methods to the public to include news releases for new paper, radio, and television as directed by the Tribal President.

The local planning team noted as a high priority to update the Emergency Operations and Action Plan during this plan update.

## *Integrated Solid Waste Management Plan (2011)*

The Northern Cheyenne Integrated Solid Waste Management Plan was developed in 2011. The plan outlines the Tribe's waste management goals, objectives, and strategies to continue to provide key utility services to tribal residents while protecting the natural environment and infrastructure. The goals of the plan generally align with the goals of this HMP and are listed below:

1. Protection of human health and the environment
2. Compliance with Federal requirements
3. Reduction of the overall costs of solid waste management
4. Utilizing solid waste management for economic development purposes
5. Improving solid waste collection service to the residents of the Northern Cheyenne Reservation

Specifically, the Integrated Solid Waste Management Plan identifies key sources of hazardous waste across the reservation, outlines actions to take to manage that waste, and seeks methods to improve utility accessibility and services to all tribal members. Future updates to the Integrated Solid Waste Management Plan should consider potential mitigation actions which align with other natural hazard types for inclusion in the HMP. These may include implementing ordinances which restrict waste facilities from identified wildfire or flood hazard areas, anchoring tanks or other equipment, or providing redundant power and utilities to waste management facilities.

## *Drought Contingency Plan (2022)*

The tribe's Drought Contingency Plan outlines specific drought categories and proposed actions as outlined below:

- **Normal** - Normal conditions are considered to occur when the SPEI is greater than or equal to -0.49. Under a *Normal* drought category, the NRD Administrator will produce a Drought Status and Outlook Report on April 1st of each year. The report will be sent to the NCT President, Tribal Council, and NCT program managers. A template of the Drought Status and Outlook Report is included in the Drought Plan Operation Decision Tree and Templates.
    - RECOVERY: As conditions improve, recovery to Normal conditions occurs when the SPEI is greater than -0.49 for at least two consecutive months.
- **Abnormally Dry** - Abnormally Dry conditions are considered to occur when the SPEI is between -0.5 and -0.7. This category is meant to serve as an early warning for drought. While it is not considered a drought category, it is an opportunity to begin building awareness among the NCT

leadership and the NCT community that a drought could occur in the coming months.

- ONSET: Month at which Abnormally Dry status is reached
  - During Abnormally Dry conditions, an automated notification (via the NCT Weather and Climate Dashboard or otherwise) will be sent to the NCT President and NCT Drought Committee that Abnormally Dry conditions have been reached.
  - Consider possible mitigation actions to discuss with NCT leadership and the NCT Drought Committee (further discussed in next section, Mitigation and Response Actions).
- RECOVERY: During recovery, Abnormally Dry status is not considered until the SPEI is between -0.5 and -0.7 for two consecutive months.

- **Stage I-Moderate Drought** - Moderate Drought is the first drought category and is considered to occur when the SPEI is between -0.8 and -1.2. At this drought level, impacts can range from minor damage to pastures, streams, reservoirs, or wells could be low, and some water shortages could be developing.
  - ONSET: Month at which SPEI level reaches -0.8 to -1.2.
    - Begin communication with NCT program managers regarding drought related impacts that are being observed. Send memo notifying the Tribal President the first drought stage has been reached (see Appendix D).
    - Begin monthly communication with NCT President and the Drought Committee/BIA Superintendent regarding the status of drought (i.e., trending direction), impact trends 31 (i.e., water supply, pasture conditions, streamflow, wildfire) and what if any response actions are being implemented.
    - Begin monthly email communication with the Montana Drought Monitoring SubCommittee (MT DMSC) and USDA NRCS on the Tribe's drought status, what impacts, if any, are being observed, and possible response actions (further discussed in next section, Mitigation and Response Actions).
  - RECOVERY: As conditions begin improving, recovery to Moderate Drought status is not considered until the SPEI reaches -0.8 to -1.2 for at least two consecutive months.
- **Stage II-Severe Drought** - Severe Drought is considered when SPEI is between -1.3 to -1.49 and should occur approximately 6-10% at any given time. Impacts often associated with Severe Drought include crop and pasture losses and water shortages.
  - ONSET: Month at which the SPEI reaches -1.3 to -1.49
    - Increase frequency of communication to bi-weekly with the Drought Committee regarding drought related impacts that are being observed, the status of drought (i.e., trending direction), impact trends (i.e., water supply, pasture conditions, streamflow, wildfire) and what if any response actions are being implemented.
    - Increase discussions to bi-weekly with MT DMSC and USDA NRCS, to consider the ongoing status of drought, the likelihood it could intensify, how to communicate the Tribe's drought status to the U.S. Drought Monitor, what impacts are being observed, and possible response actions (further discussed in next section, Mitigation and Response Actions).
  - RECOVERY: During recovery, Severe Drought status is not considered until the SPEI is between -1.3 and -1.49 for two consecutive months.
- **Stage III-Extreme Drought** - Extreme Drought is considered when the SPEI reaches -1.5 or less. This is the highest drought category for the NCT Drought Plan. It has a probability of occurring approximately 5% or less at any given time of the year.
  - ONSET: Month at which the SPEI reaches -1.5 or less.
    - Send request for drought emergency declaration to Tribal President for

consideration of Tribal Resolution.

- Increase frequency of communication with the Drought Committee to weekly discussions regarding drought related impacts that are being observed, the status of drought (i.e., trending direction), impact trends (i.e., water supply, pasture conditions, streamflow, wildfire) and what if any response actions are being implemented.
- Increase discussions with MT DMSC and USDA NRCS to weekly calls to consider the ongoing status of drought, the likelihood it could intensify, how to communicate the Tribe's drought status to the U.S. Drought Monitor, what impacts are being observed, and possible response actions (further discussed in next section, Mitigation and Response Actions).

- RECOVERY: As conditions improve, the Extreme Drought classification can be downgraded to Severe Drought when the SPEI is greater than -1.5 for at least two consecutive months.

The plan also identified several mitigation measures to pursue to address local drought concerns as shown in the following figure. Several of these mitigation actions are also reflected here in this Hazard Mitigation Plan to address existing concerns.

***Figure 61: Drought Mitigation Actions from Drought Contingency Plan***

| *NORTHERN CHEYENNE SECTOR* | POSSIBLE MITIGATION ACTIONS |
|---|---|
| DOMESTIC WATER | • Develop program to identify and repair plumbing leaks**<br>• Develop additional storage capacity for public water supplies** |
| AGRICULTURE (Rangelands) | • Develop a plan to protect sensitive areas, including the construction of additional water sources to encourage better distribution of livestock and less reliance on riparian areas and springs* |
| AGRICULTURE (Farmlands & Pasturelands) | • Encourage water conservation practices**<br>• Working with elected officials, consider additional water projects that would utilize water from Rosebud Creek and the Tongue River for agricultural and other purposes |
| WILDLAND FIRE | • Continue fire prevention education**<br>• Continue with fuel reduction and prescribed burning**<br>• Reduce forest fuels |
| LAND AND WILDLIFE (Wetlands & Riparian Areas; Vegetation; Fish and Wildlife) | • Develop and implement a buffalo management plan in designated area*<br>• Control grazing in sensitive/impacted areas<br>• Develop and implement a plan or lease language that requires lessees to maintain buffers to protect sensitive areas* |

* Indicates connection to the Northern Cheyenne ARMP
** Indicates response is from 2007 Drought Mitigation Plan

## *Pandemic Influenza Response Plan (2019)*

Due to the outbreak of the novel Coronavirus-19 (COVID-19), the Indian Health Services and Tribal Council developed and implemented a Pandemic Influenza Response Plan. The NCT Health Officer is responsible

for implementation of this plan and the actions identified within it. Information collected and utilized in the plan included *passive surveillance* for information received from medical care facilities and lab staff and *active surveillance* through physician and providers specifically monitoring for a disease.

The plan specifically identifies actions local health care facilities are to take during the following phases: **Novel Virus Alert Phase, Pandemic Alert Phase, Pandemic Imminent, Pandemic Phase, Second Wave, and Pandemic Over.** The actions outlined include applicable notification channels, vaccine distribution site set up/tear down, and monitoring protocols. The plan also documents the need for effective Vaccine Management. Storage options include the NC Service Unit Pharmacy, NC Public Health department building, or NC Service Unit Emergency Department.

Additional annexes to the Pandemic Influenza Response Plan include the Communicable Disease Surveillance/Response Protocol and the Mass Fatality Management Plan (described below).

### *Communicable Disease Surveillance/Response Protocol (3/10/2020)*

A Communicable Disease Emergency is determined if: a single case of unusual disease (any condition that requires immediate reporting as listed on the list of reportable diseases or any condition listed as a threat for biological attack), an unusual number of usual diseases, number of cases exceeds the ability of assigned staff to respond in a timely manner, unusual incident of unexplained death in humans or animals, unusual pharmaceutical sales, or report from the state that pharmaceutical sales indicate unusual number of OTC pharmaceuticals for home treatment of illness. Cases must be for a resident of the NCT jurisdiction. If the case is not a resident contact must be made to DPHHS for referral to the appropriate jurisdiction.

### *Mass Fatality Management Plan*

During mass fatality events the Tribe must consult with the Montana Department of Public Health and Human Services and provide disease management information for coroner, health care providers, EMS, morticians, and the general public. All funerals for individuals that died of the reported disease outbreak must be conducted with instruction from the local health officer. Any death from a disease that requires quarantine of contacts must be conducted with a closed casket and/or require segregation.

Public Information and updates can be shared via several avenues depending on severity of local outbreaks and available local staff members. Information outreach may include methods such as phone response or call lines; broadcast fax along Health Alert Network which includes health care providers and coroner, first responders, laboratories, veterinarians, or other special populations; issuing press releases; through a designated department spokesperson; establishing a joint information center; teleconferences; or through issuing emergency alerts through the EOC.

Future updates to the Pandemic Influenza Response Plan and to the Hazard Mitigation Plan should evaluate local health care capacities and capabilities for potential mitigation actions. The mitigation action identified in this plan “Build Health Care Facility” should be strongly considered to help address these local vulnerabilities.

## *Chempack Plan (August 2018)*

The Tribal Chempack Plan outlines use, ownership, and activation of chemical spill response resources in the circumstance that all other local resources are depleted. CHEMPACK Programs place chemical and nerve agent antidotes at specific predetermined locations to provide state and local governments, including Tribes, a rapid, accessible, and sustainable resource to improve their ability to quickly respond

to a chemical event. NCT Public Health is the lead entity responsible for implementation of the CHEMpack Plan with support from DES, Law Enforcement, EMS, Fire and Rescue, Northern Cheyenne Service Unit, and local hospitals.

## *Floodplain Ordinance & Watershed Management Plan*

There is no current floodplain ordinance established for the Northern Cheyenne Tribe's reservation. At the time of this plan development the Watershed Management Plan was not available for review. Future updates to the HMP should include a synopsis of the Watershed Management Plan and floodplain ordinances as established.

## *Northern Cheyenne Evacuation/Sheltering in Place Manual (2021)*

The Northern Cheyenne's Evacuation and Sheltering in Place plan was last updated in July 2021. The plan includes key information for emergency response activities such as identifying the Incident Commander, evacuation shelter locations, the public information officer, and transportation methods and resources. Specific procedures have been outlined for activation of the evacuation shelters, notification processes, and specific actions/responsibilities of department leaders.

Future updates to the Evacuation/Shelter in Place Manual should include a risk assessment of identified shelter locations (i.e. located in flood risk or fire risk hazard areas) and include a list of actions needed to increase local capabilities. These may include hardening or improving shelter locations, purchasing additional evacuation resources, or developing formal mutual aid agreements.

## *Comprehensive Economic Development Strategy*

While not available for review during this planning process, the Northern Cheyenne Comprehensive Economic Development Strategy was under revision alongside the HMP. The local planning team specifically noted the HMP was to be included in the plan's development with key items to include as mitigation actions aimed at increasing local capacity and growth for the Nation as a whole. The Tribe was also working on developing a *Pandemic Economic Recovery Addendum* for this plan in 2021-2022.

## *Rosebud County Community Wildfire Protection Plan (2007)*

The eastern side of the Northern Cheyenne Tribal reservation is located partially within Rosebud County. The county developed its Community Wildfire Protection Plan in 2007. While this plan does not specifically address wildfire concerns within the reservation, as the Tribe is a sovereign Nation, wildfire events and areas of concern can extend across jurisdictional boundaries and the Tribe was invited to participate in the CWPP update process.

The Rosebud County CWPP identified Ashland as a priority for fire protection which neighbors the reservation and houses many tribal members. The plan also identified a key mitigation goal of "…coordinate fuels reduction opportunities between private landowners and the Custer National Forest, the Miles City Field Office of the Bureau of Land management, and **the Northern Cheyenne Tribe."** This action has been included in this Hazard Mitigation Plan. Future updates to the Rosebud County CWPP should integrate and emphasis the importance of identifying hazardous fuels reduction projects which may be eligible for HMA assistance.

## *Rosebud County Flood Insurance Study (2019)*

Rosebud County has a Flood Insurance Study as completed by FEMA from 2019. The Rosebud County FIS

did not include specific information for the Northern Cheyenne Tribal reservation and the area was not included in the FIS.

### *Big Horn County Community Wildfire Protection Plan (2008)*

The western side of the Northern Cheyenne Tribal reservation is located partially within Big Horn County. The county developed its Community Wildfire Protection Plan in 2006. While this plan does not specifically address wildfire concerns within the reservation, as the Tribe is a sovereign Nation, wildfire events and areas of concern can extend across jurisdictional boundaries and the Tribe was invited to participate in the CWPP update process. Members of the Northern Cheyenne Tribe's Fire and Aviation Department provided key insight to the development of the CWPP.

The CWPP identified the community of Busby as having Medium risk to wildfire events, as well as Muddy Cluster as having High risk. The plan provided the following description of concerns for Busby: "*Busby has a community water system from groundwater wells that serves residents, the Northern Cheyenne Tribal School, and a youth detention facility, constructed in 2004… Issues for fire protection for this community include lack of continuous, adequate water supply (limited by availability in storage towers), and lack of volunteers for the fire department."* The plan provided the following description of concerns for Muddy Cluster: "*Muddy Cluster is a residential area with housing for tribal members… Issues for Muddy Cluster include the proximity of woody vegetation to residences, lack of reliable and adequate water supply (water storage capabilities), and distance from structural fire responders."*

Future updates to the Big Horn County CWPP should integrate specific mitigation actions to reduce vulnerabilities identified for Muddy Cluster and Busby.

### *Big Horn County Flood Insurance Study (1981)*

Big Horn County has a Flood Insurance Study completed by FEMA in 1981. This plan noted that "*the Northern Cheyenne and Crow Indian Reservations are not within the jurisdictional limits of Big Horn County and, therefore, are not included in this study."* The FIS discusses the Tongue River Dam, which if a major failure were to occur would impact the reservation, but noted dam provided sufficient flood risk reduction to the county. No other flood factors were identified which would impact the NCT reservation.

The Northern Cheyenne Tribe will continue to update and integrate hazard mitigation planning into additional plans and updates as opportunities are identified, however plan development and updates may be contingent on future available funds.

**C6 Element and Requirements §201.7(c)(4)(iii):** Does the plan describe a process by which the tribal government will incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate?

a. The plan shall describe the process the tribal government will use to incorporate the data, information, and hazard mitigation goals and/or actions from the mitigation plan into other planning mechanisms.

## Budget and Funding Resources

By participating and producing this FEMA-approved Tribal Hazard Mitigation Plan, the Northern Cheyenne Tribe will be eligible for mitigation and disaster funding through the Hazard Mitigation Assistance Program. These FEMA grant programs provide various funding opportunities to support mitigation

planning and projects to reduce potential disaster damages. The Tribe's current annual budget is generally limited in its capacity to pursue additional mitigation strategies or projects without the assistance of outside funding resources. It is the intent of the Northern Cheyenne Tribe to pursue grant opportunities in the future to assist in mitigating the Nation's top hazards of concern. The Tribe received a Pre-Disaster Mitigation (PDM) grant from FEMA to pay for the update of this HMP. No other FEMA HMA grants have been received or utilized by the Tribe to implement projects in the past. The Tribe has utilized local funds primarily to support salaries and department essential functions. NCT hopes to pursue future mitigation funding opportunities as able and supported by the Tribal Council.

Various funding opportunities are available which support mitigation efforts are laid out in Table 64 as described in FEMA's *Mitigation Assistance Resource Guide.*[94]

***Table 64: Funding Resources***

| SECTOR | FUNDING RESOURCE OR OPPORTUNITY | |
|---|---|---|
| COMMUNITY PLANNING AND CAPACITY BUILDING | FEMA Hazard Mitigation Assistance - Building Resilient Infrastructure and Communities https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities | Forest Stewardship Program https://www.fs.usda.gov/managing-land/private-land/forest-stewardship |
| | Emergency Management Performance Grants https://www.fema.gov/grants/preparedness/emergency-management-performance | USACE Floodplain Management Services Program https://www.nae.usace.army.mil/missions/public-services/flood-plain-management-services/ |
| | HUD Community Challenge Planning Grants https://www.hud.gov/program_offices/economic_development/HUD-DOT_Community_Challenge_Grants | Community Development Block Grant (Disaster Recovery, State Program, or Mitigation Program) https://www.hudexchange.info/programs/cdbg/ |
| | Federal Excess Personal Property Program https://www.fs.usda.gov/managing-land/fire/fepp | |
| ECONOMIC RECOVERY | EDA and Disaster Recovery https://eda.gov/ | Tree Assistance Program https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/tree-assistance-program/index |
| | Section 108 Loan Guarantee Program https://www.hudexchange.info/programs/section-108/ | Disaster Supplemental Funding https://eda.gov/disaster-recovery/supplemental/ |
| | Disaster Assistance and Emergency Relief for Individuals and Businesses https://www.irs.gov/businesses/small-businesses-self-employed/disaster- | Small Business Association Disaster Loan Program https://www.sba.gov/funding-programs/disaster-assistance |

[94] FEMA. 2021. "Mitigation Assistance Resource Guide: Resources for Federal, State, and Non-Governmental Hazard Mitigation Support." https://www.fema.gov/sites/default/files/documents/fema_mitigation-assistance-resource-guide-tribal-nations_2021.pdf.

| SECTOR | FUNDING RESOURCE OR OPPORTUNITY | |
|---|---|---|
| | assistance-and-emergency-relief-for-individuals-and-businesses | |
| HOUSING | Housing Preservation Grants https://www.rd.usda.gov/programs-services/single-family-housing-programs/housing-preservation-grants | BIA Housing Improvement Program https://www.bia.gov/bia/ois/dhs/housing-improvement-program |
| | 203 (K) Rehabilitation Program https://www.hud.gov/program_offices/housing/sfh/203k | |
| INFRASTRUCTURE SYSTEMS | Greening America's Communities https://www.epa.gov/smartgrowth/greening-americas-communities | Flood Mitigation Assistance Program https://www.fema.gov/grants/mitigation/floods |
| | Water and Waste Disposal Loan and Grant Program https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-loan-grant-program | Hazard Mitigation Grant Program https://www.fema.gov/grants/mitigation |
| | Rehabilitation and Inspection Program https://www.mvp.usace.army.mil/Missions/Emergency-Management/Rehabilitation-Inspection/ | Federal Highway Administration Emergency Relief Program https://www.fhwa.dot.gov/specialfunding/index.cfm#fa |
| | Continuing Authorities Program https://www.nae.usace.army.mil/Missions/Public-Services/Continuing-Authorities-Program/ | |
| NATURAL AND CULTURAL RESOURCES | Sustainable Communities Regional Planning Grants https://www.hud.gov/program_offices/economic_development/sustainable_communities_regional_planning_grants | Office of Protected Resources Endangered Species Act https://www.fisheries.noaa.gov/funding-opportunities |
| | Environmental Planning and Historic Preservation https://www.fema.gov/emergency-managers/practitioners/environmental-historic | Drinking Water State Revolving Fund https://www.epa.gov/dwsrf |
| | Air Grants and Funding https://www.epa.gov/grants/air-grants-and-funding | Indian Environmental General Assistance Program https://www.epa.gov/tribal/indian-environmental-general-assistance-program-gap |

| SECTOR | FUNDING RESOURCE OR OPPORTUNITY | |
|---|---|---|
| | Nature Based and Green Infrastructure Solutions Grants https://www.epa.gov/green-infrastructure/green-infrastructure-funding-opportunities | Ecosystem Investment Partners https://ecosystempartners.com/ |
| | Environment Grantmaking: Climate Solutions and Great Lakes https://www.joycefdn.org/grants/environment-guidelines | Five Star and Urban Waters Restoration Grant Program https://www.nfwf.org/programs/five-star-and-urban-waters-restoration-grant-program |
| | Climate Adaptation Fund https://www.wcsclimateadaptationfund.org/ | Climate Solutions University https://www.mfpp.org/climate-solutions-university-2/ |
| | Resilient Landscapes Funds https://landscaperesiliencefund.org/ | Emergency Conservation Program https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/index |
| | Wetland Mitigation Banking Program https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/?cid=nrcseprd362686 | Conservation Reserve Program https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/ |
| | Tribal Climate Resilience Program https://www.bia.gov/bia/ots/tribal-climate-resilience-program | Emergency Watershed Protection Program https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/ |
| | Rivers, Trails, and Conservation Assistance Program https://www.nps.gov/orgs/rtca/index.htm | Environmental Quality Incentives Program https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/ |
| | Section 404 of Clean Water Act https://www.epa.gov/cwa-404 | Forest Legacy Program https://www.fs.usda.gov/managing-land/private-land/forest-legacy |
| | Clean Water State Revolving Fund https://www.epa.gov/cwsrf | Tribal Wetland Program Development https://www.epa.gov/wetlands/tribal-wetland-program-development-grant-request-applications |
| | Drought Assistance Program https://www.farmers.gov/protection-recovery/drought | Waste and Waste Disposal Loan and Grant Program https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-loan-grant-program |

In addition to federal funding resources, private funds may be used by the Tribe to implement projects. The Tribe may seek out and receive funding through local non-profit organizations and State of Montana programs or agencies such as:

- Montana Community Foundation - https://mtcf.org/grants/apply-for-a-grant
- Community Development Funding through Main Street Montana - https://mainstreetmontanaproject.com/
- Rural Health Information - https://www.ruralhealthinfo.org/states/montana/funding
- Montana Watershed Coordination Council - https://www.mtwatersheds.org/funding-opportunity/
- Montana Water Pollution Control State Revolving Fund - https://mtconservationmenu.org/program/water-pollution-control-state-revolving-fund-wpcsrf/

The largest challenge to the Northern Cheyenne Tribe regarding funding resources for project implementation is adequate staffing and expertise by tribal members to apply for, manage, and oversee grant funding and resources, as the Tribe does not currently have a tribal grant manager.

**C2 Element and Requirements §201.7(c)(3)(iv) and 201.7(c)(3)(v):** Does the plan include a discussion of tribal funding sources for hazard mitigation projects and identify current and potential sources of Federal, tribal or private funding to implement mitigation activities?

a. The plan shall describe the tribal government's existing funding sources for hazard mitigation actions and/or projects, including:
    1. A general discussion of how the tribal government has used non-FEMA (tribal, private or other federal) funds for hazard mitigation projects; and
    2. A general discussion of how the tribal government has used FEMA mitigation funding, including HMGP, PDM, FMA, PA (C-G), and FMAG.
b. The plan shall identify potential sources of funding to implement mitigation actions and/or projects. These shall include federal, tribal, and private sources.

# CHAPTER 7: ACTION PLAN AND MAINTENANCE

The Northern Cheyenne Tribal Council is responsible for ensuring that the HMP is kept current, accurate, and effective. With the adoption of this plan, the Tribal President designates the Northern Cheyenne Disaster and Emergency Services Coordinator as the primary point of contact in accomplishing this ongoing responsibility on the President's behalf.

The Planning Team established goals and prioritized mitigation actions that will be implemented through existing plans, policies, and programs. Implementation of the long-term and short-term objectives/goals will be dependent on securing funding for each of the strategies identified in the plan. The Tribe will actively pursue a variety of funding opportunities identified in the various plans and prioritized by the various departments and programs under the direction of Tribal Council.

**A6 Element and Requirements §201.7(c)(4)(i):** Does the plan include a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within the plan update cycle)?

a. The plan shall identify how, when, and by whom the plan will be monitored. Monitoring means tracking the relevance and implementation of the plan over time and includes all elements of the plan.
b. The plan shall identify how, when, and by whom the plan will be evaluated. Evaluating means assessing the effectiveness of the plan at achieving its stated purpose and goals.
c. The plan shall identify how, when, and by whom the plan will be updated. Updating means reviewing and revising the plan at least once every 5 years.
d. The plan shall include the title of the individual or name of the department/agency responsible for leading these efforts.

## Monitoring, Evaluating, and Updating the Plan

The Northern Cheyenne Tribe will be responsible for implementing, monitoring, and maintaining this Hazard Mitigation Plan. Unless otherwise specified, the identified lead agency or tribal department will be responsible for implementation of the identified mitigation actions in this plan. The lead agency or department is responsible for reporting on the status of all projects, including which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies could be revised. Processes for developing and updating the plan vary according to branch of government (e.g., BIA or Northern Cheyenne Tribal Administration) and can also vary depending on direction from the Tribal President and Tribal Council. The DES Coordinator will be responsible for staying informed of other relevant plans and working to incorporate pertinent elements into the HMP as appropriate.

## Maintenance

Hazard Mitigation Plans should be living documents and updated regularly to reflect changes in hazard events, priorities, and mitigation actions. These updates are encouraged to occur after every major disaster event, alongside other planning documents, each fall before the HMA grant cycle begins, and/or prior to other funding opportunity cycles begin. Quarterly or semi-annual performance reports should be utilized by the tribal council or department heads to identify accomplishments or progress made on identified mitigation actions. Additionally, as each recommended project is completed, a timeline and

summary of how that project was completed may be written and attached to the plan in a format selected by the tribal council. Information to be included:

- Summary of major events and their impacts,
- a discussion of the work performed for all work plan components,
- project timelines,
- agencies or individuals to be involved in the project,
- discussion of any existing or potential problems and benefits,
- a detailed discussion of budget or funding opportunities,
- closeout details and paperwork for grant funded projects

**C7 Element and Requirements §201.7(c)(4)(ii) and 201.7(c)(4)(v):** Does the plan describe a system for reviewing progress on achieving goals as well as activities and projects identified in the mitigation strategy, including monitoring implementation of mitigation measures and project closeouts?

a. The plan shall describe the system for tracking the implementation of the mitigation activities and projects identified in the mitigation strategy. This includes all mitigation activities, not just those funded by FEMA.
b. The system shall include the following:
    1. A schedule;
    2. Tribal department or tribal office responsible for coordination (or non-tribal entity or agency, if the tribe allows);
    3. Role of the agencies/offices identified in the mitigation strategy as responsible for implementation of actions; and
    4. Project closeout procedures.

At the discretion of the tribal council, a local task force led by the DES Coordinator can be used to review the original draft of the mitigation plan and to recommend changes. The DES Coordinator is responsible for ensuring approved revisions are made to this plan as changes occur or after a major hazard event. The DES Coordinator will coordinate with applicable agencies to gather After Action Reports from events. Revisions and comment periods on the HMP will be posted in local newspapers and shared with the public and individuals who participated in the development of this HMP. The DES Coordinator will maintain a file into which comments or input on changes to the plan can be kept.

Engaging the public in the review and maintenance procedures of the HMP is a key strategy to address local concerns and garner public support on subsequent mitigation strategies. The Tribe will engage the public in the review process by collecting local comments or testimony on local hazard impacts on social media and at tribal council meetings and by posting the approved Hazard Mitigation Plan on the tribal website for public access and comment.

Finally, should federal regulations with which the Reservation must comply be significantly changed, the DES Coordinator will notify and hold a meeting with department heads who participated in this plan update and the Tribal Council. A revised copy of the HMP will then be provided to the Tribal Council and FEMA.

**A7 Element and Requirements §201.7(c)(4)(iv):** Does the plan include a discussion of how the tribal government will continue public participation in the plan maintenance process?

a. The plan shall describe how the tribal government will continue to seek public participation after the plan has been approved and during the plan's maintenance process.

## Regulatory Plan Update

Reviews and updates of this plan will occur at a minimum every five years, as part of FEMA regulations for approved Hazard Mitigation Plans. At the discretion of the tribal council, updates may be incorporated more frequently, especially in the event of a major hazard. The DES Coordinator will oversee the evaluation process and will review the goals and identified mitigation strategies of this previous plan and evaluate them to determine whether they are still pertinent and current.

Agencies to be included in the 5-year update include all those involved in this 2022 plan update and any newly formed departments, committees, or stakeholder groups which contribute or guide to the overall governance and services provided to residents by the Tribe. Various improvements or changes may be considered during the five-year update of the HMP, such as:

- Whether any potential natural hazards have developed that were not addressed in the plan,
- Whether any disasters have occurred which were not addressed in the plan,
- Whether any unanticipated development has occurred that could be vulnerable to any natural disasters, and
- Whether any additional project ideas have been developed.

As identified throughout the 2022 planning process, several changes and improvements should be incorporated into the future five-year update. These future revisions were either outside of the scope of the 2022 plan update or were identified as areas of potential improvement. The list below is not a comprehensive list of potential changes for the 2027 plan, but rather provide a starting point for pre-project scoping and grant management.

- Identify and include specific objectives under goals to assist in tying risk assessment to mitigation actions and to help track progress on mitigation strategies.
- Identifying specific vulnerable populations impacted by each individual hazard type in HMP (example available in the earthquake section).

## Unforeseen Opportunities

If new, innovative mitigation strategies arise that could impact the planning area or elements of this plan, which are determined to be of importance, a plan amendment may be proposed and considered separate from the annual review and other proposed plan amendments. NCT will compile a list of proposed amendments received annually and prepare a report for FEMA, by providing applicable information for each proposal, and recommend action on the proposed amendments. In addition, the tribal council will be responsible for ensuring that the HMP's goals are incorporated into applicable revisions of other planning mechanisms and any new planning projects undertaken by the Nation.