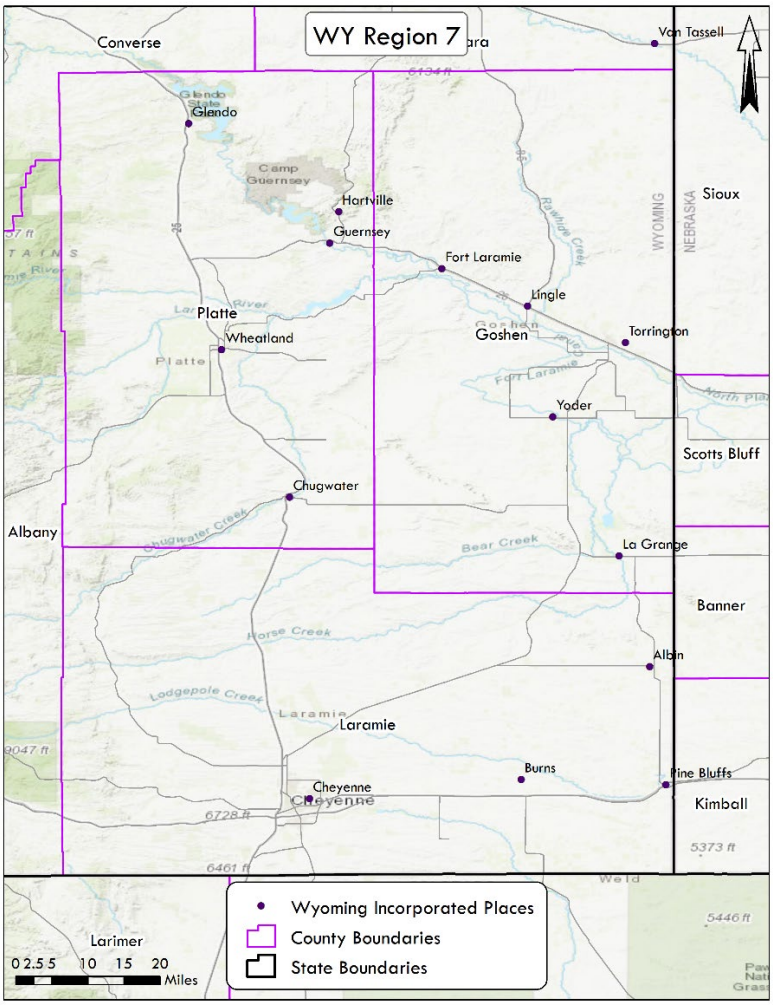
Wyoming Region 7 Hazard Mitigation Plan

2023 Update



GOSHEN COUNTY EM PUBLIC SAFETY, PUBLIC TRUST

THE GREAT SEAL OF LARAMIE COUNTY 1867 WYOMING

PLATTE COUNTY GOVERNMENT

Contents

Professional planning services for this plan update provided by:

1 Mitigation Strategy

1.1 Hazard Mitigation Strategy Overview

The intent of the Mitigation Strategy is to provide the participating jurisdictions with goals and implementable actions that will guide future mitigation policy and project administration. The Mitigation Strategy includes a list of proposed actions deemed necessary to meet those goals and reduce the impact of natural hazards.

1.2 Mitigation Goals

The goals and objectives identified by the Hazard Mitigation Planning Committee (HMPC) for the 2023 Wyoming Region 7 Hazard Mitigation Plan (HMP) update are:

Goal 1: Improve protection of the general population, including the citizens and guests of Region 7, including Goshen, Laramie, and Platte County, from hazards.

- Continue to improve emergency preparedness.
- Continue to improve each County's disaster response and recovery capabilities.
- Educate residents, business/industry representatives, and government officials on the hazards and risks in their area to allow them to make informed decisions as to what level of feasible and realistic disaster resistance they desire for themselves and their communities.

Goal 2: Reduce the potential impact of hazards on critical support services, critical facilities, infrastructure, private property, and economy in Region 7 counties, Goshen, Laramie, and Platte.

- Reduce impacts to existing and future development.
- Strengthen and improve disaster resistance of facilities owned and operated by Goshen, Laramie, or Platte Counties to prevent injury and loss of life, and to reduce potential property damage.
- Strengthen infrastructure and lifelines, including gas and electrical transmission and distribution lines, communication lines, water distribution systems, roads, and bridges as a means of preventing loss of life, reducing damages, and reducing loss of revenue.
- Strengthen infrastructure and reduce damages to road crossings, reduce potential for loss of life, and increase public safety in Region 7's special flood hazard areas (SFHA).
- Minimize disruption of critical services.

Goal 3: Enhance cooperation and coordination between governmental authorities at all levels and private sector partners in regard to hazard mitigation.

- Implement lessons learned from other communities.
- Raise awareness and acceptance of hazards and mitigation programs.
- Identify potential cost sharing opportunities to fund mitigation projects.

1.3 Identification and Analysis of Mitigation Actions

As part of the 2023 HMP planning process, each County and its individual jurisdictions were tasked with reviewing mitigation actions that were identified in past County hazard mitigation plans. Each jurisdiction reviewed their individual actions and reported on the status of those actions, detailed in the annexes.

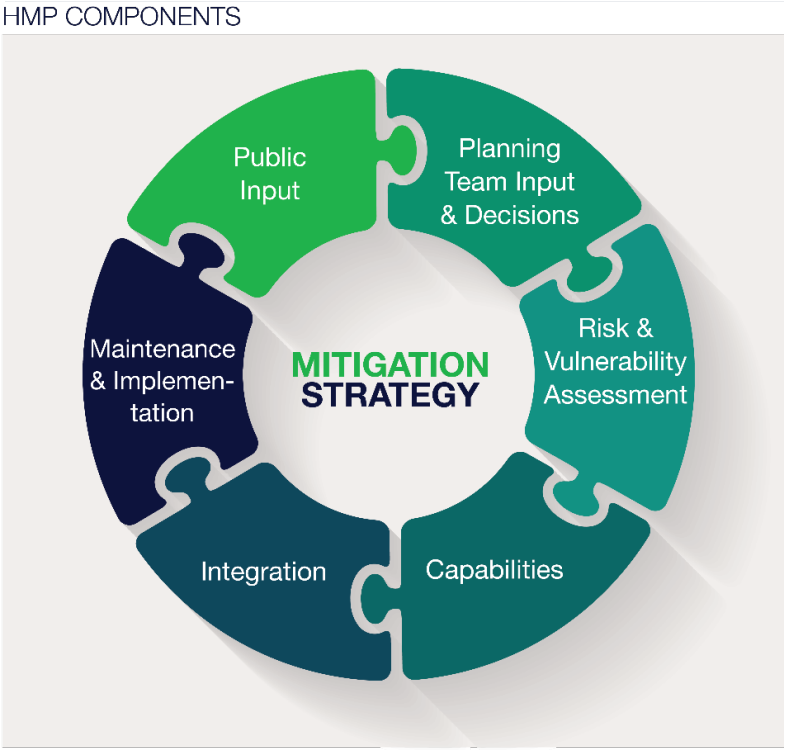
One of the most important outputs from this HMP is the identification of new mitigation actions for each county and jurisdiction to develop and implement. The creation of these actions was the focus of much of the planning process and stemmed from the identified goals and objectives. Ahead of the mitigation strategy workshops, an overview of the four types of mitigation efforts were shared with the HMPC, including some specific action and

project examples. The four types of projects are based on FEMA's Mitigation Ideas Handbook (2013) and include Structure & Infrastructure Projects, Natural Systems Protection, Local Plans & Regulations, and Education & Awareness Programs. Discussion of these potential types of mitigation actions helped the HMPC to better understand options in developing new mitigation projects for their communities and HMPC members were updated on the results of the public's responses to the survey soliciting ideas for mitigation actions.

All three counties and their local governments were invited to participate in the mitigation strategy workshops that were individual to each county. The workshops were organized to allow all participants to openly discuss their ideas for potential mitigation actions. The workshop agendas, along with invites, are provided in the individual County annexes. The HMPC was provided a "Mitigation Strategy Action Ideas Guide" which was compiled with input from the public, HMPC discussions, as well as other resources. Communities were encouraged to further discuss the content of the workshop and guide, as well as conduct research within their communities to develop feasible projects internally.

Several other components, or inputs, helped lead participants towards developing effective mitigation actions. These were all leveraged as part of the HMP planning process and are shown in Figure 1.1. In keeping with FEMA requirements, HMPC members were encouraged to consider actions that would focus on protecting future, as well as existing development.

Figure 1.1 Mitigation Strategy Sources



As part of the process of developing new mitigation actions, jurisdictions were tasked with prioritization of future project implementation. Prioritization took into account many of the previously mentioned mitigation strategy sources, as well as FEMA guidance. Based on the identified priorities, including cost-benefit, public impact, and environmental impact, as well as others, the HMPC chose to proceed with a simple high, medium, low prioritization method. Utilizing the qualitative ranking method of high, medium, and low for prioritization allows the document to be more accessible to the public and those unfamiliar with mitigation.

1.4 Updated Mitigation Action Plan

All counties and participating jurisdictions created mitigation actions for this 2023 HMP. These mitigation actions are found in the individual county annexes.

2 Planning Process

2.1 Purpose

The State of Wyoming's Office of Homeland Security (WOHS) coordinated with Wyoming Region 7 Counties to create a cross-regional Hazard Mitigation Plan (HMP). The purpose of the HMP is to help plan for and implement hazard mitigation projects and activities, with the goal of reducing or eliminating losses from future hazard events. The counties of Goshen, Laramie, and Platte, and with their respective jurisdictions and communities, led these efforts to conduct local hazard assessment and analysis. Their efforts have demonstrated a commitment and perseverance to mitigating future risk. This plan will be used as a tool for Region 7 communities to guide resiliency and help decision makers direct mitigation activities. This HMP was also developed in order to meet requirements set forth by the Federal Emergency Management Agency (FEMA), so communities are eligible for various disaster assistance funding opportunities. This plan will be updated and maintained in order to address the natural hazards addressed in the Plan.

2.2 Background and Scope

No community is immune from disasters. Past disasters within and around the Region have caused loss of life, damaged property and infrastructure, and have impacted local communities' economic, social, and environmental well-being. Local hazard mitigation planning is a process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process results in the hazard mitigation plan, which identifies specific mitigation actions that are designed to achieve both short term planning objectives and long-term community vision. To ensure the functionality of each mitigation action, responsibility is assigned to a specific individual, department, or agency along with a schedule for its implementation. Plan maintenance procedures are then established to help implement, evaluate, and enhance the Plan as necessary. Developing clear plan maintenance procedures ensures that this HMP remains a current, dynamic, and effective planning document over time.

Hazard Mitigation Planning helps to reduce a community's risks and produce long-term and recurring benefits to break the cycle of disaster loss. This includes the identification of policies, capabilities, activities, and tools necessary to implement successful and sustainable risk reduction actions. Benefits of mitigation planning can be seen in many ways, including;

- Protecting lives and property
- Safeguarding economic health and public and private investments
- Ensuring quick and effective recovery following disasters
- Reducing future vulnerability through wise development and post-disaster recovery and reconstruction
- Enhancing coordination within and across participating jurisdictions
- Enabling and expediting the receipt of pre-disaster and post-disaster grant funding
- Demonstrating a firm commitment to improving community health and safety
- Allowing the jurisdictions to integrate hazard mitigation planning across all levels of government

A core assumption of hazard mitigation is that pre-disaster investments will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go well beyond reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, improving water quality, maintaining environmental health, and enhancing recreational

opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with existing local planning efforts. It's also important that any proposed mitigation strategies take into account broader community goals.

During the last two decades, emergency management has evolved considerably. A renewed emphasis has been placed on planning for disasters before they occur as a complement to effective response and recovery. As a result, hazard mitigation has gained increasing prominence as a critical part of emergency management. By taking sustained mitigation actions to reduce or eliminate the long-term risk to human life and property, hazard risks can be proactively combated in a systematic manner. This approach to emergency management is much more effective than reacting to a hazard once it has occurred.

This Plan is the result of continuing work by the citizens and stakeholders of Goshen, Laramie, and Platte Counties, to update a regional pre-disaster multi-hazard mitigation plan that will not only continue to guide these communities towards greater disaster resistance, but also respect the character and needs of local jurisdictions and their residents.

2.3 Multi-Jurisdictional Planning

The 2023 Wyoming Region 7 HMP planning process began in 2021 and the plan was developed in coordination with the State's Office of Homeland Security and the Region 7 counties; Goshen, Laramie, and Platte. Each County's Local Emergency Manager led the planning process and facilitated discussions with their respective jurisdictions and communities. This participatory, community-based planning approach contributed heavily to the development of this multi-jurisdictional plan.

A Hazard Mitigation Planning Committee (HMPC) was formed for each County, early in the process, to discuss local hazard risks and mitigation strategies. The emergency managers engaged local government officials, public stakeholders, and community members to participate in the planning process to inform and develop the final plan. For the first workshop in the planning process, all three HMCPs in the Region attended to ensure an understanding of the Regional benefit and importance of the HMP. After this first workshop, each County HMPC met individually in two virtual workshops, which allowed each community the space to share their unique stories, concerns, and ideas.

Based on the information from these workshops, as well as data and research of hazard events since the last plan, a final draft of the HMP was distributed to HMPC members. Once the HMPC completed reviews and the plan was updated, it was released for public review. After the public comment period ended, the plan was reviewed by WOHS and submitted to FEMA Region VIII.

All three counties and their respective jurisdictions were invited to participate throughout the planning process. Numerous communities within each county participated in workshops, surveys, and assisted with providing data. Outreach was conducted through various methods, which is further detailed in the individual county annexes.

The table below lists the formal adoptees of the 2023 Region 7 HMP.

Table 2.1 Participating Jurisdictions

Jurisdiction	County
Goshen County	Goshen County
City of Torrington	Goshen County
Fort Laramie	Goshen County
Town of LaGrange	Goshen County
Town of Lingle	Goshen County

Jurisdiction	County
Town of Yoder	Goshen County
Goshen Irrigation District	Goshen County
Horse Creek Conservation District	Goshen County
Pathfinder Irrigation District	Goshen County
Laramie County	Laramie County
City of Cheyenne	Laramie County
Town of Albin	Laramie County
Town of Burns	Laramie County
Town of Pine Bluffs	Laramie County
Eastern Laramie County Sanitation District	Laramie County
Platte County	Platte County
Town of Chugwater	Platte County
Town of Glendo	Platte County
Town of Guernsey	Platte County
Town of Hartville	Platte County
Town of Wheatland	Platte County

In addition to these adoptees, three other districts participated in portions of the planning process. South Torrington Water & Sewer District, Torrington Irrigation District, and PV-Bar Improvement District may have interest in adopting future plan iterations.

This HMP will serve as a source document for risk reduction, policy making, and land use planning. It will be incorporated into existing planning mechanisms as they are updated or developed. These planning mechanisms will enhance the participating jurisdictions' ability to implement the actions outlined in this plan. During the hazard mitigation planning process, all participating jurisdictions worked internally to identify how mitigation efforts can be incorporated into their existing planning and regulatory mechanisms over time. More information can be found in each individual County annex.

2.4 Hazard Mitigation Planning Committee

The HMPCs were formed early in the planning process in order to discuss local hazard risks and mitigation strategies. This committee included at least one representative for each participating jurisdiction, along with other local and regional stakeholders, neighboring counties, emergency response personnel, and community organization members. The HMPC met virtually three times, one in which all County HMPCs attended and twice each for individual County workshops, which were held between February and July of 2022 . These teams helped in providing information about their local communities and were instrumental in making all decisions necessary to finalize the plan. Invitations to participate were sent via email based on these determinations. A comprehensive list of the invitees and participants of the 2023 Region 7 HMPC can be found Appendix E: Hazard Mitigation Planning Committee.

Planning Meetings

The preparation of this HMP required a series of meetings, webinars, and workshops intended to facilitate discussion and initiate data collection efforts with local community officials. More importantly, the meetings and workshops prompted continuous input and feedback from local officials, public stakeholders, staff, and subject matter experts throughout the process. Below is a summary of the key meetings and workshops conducted throughout the development of the 2023 HMP. Agendas and sign-in sheets for these meetings are provided in each specific County annex.

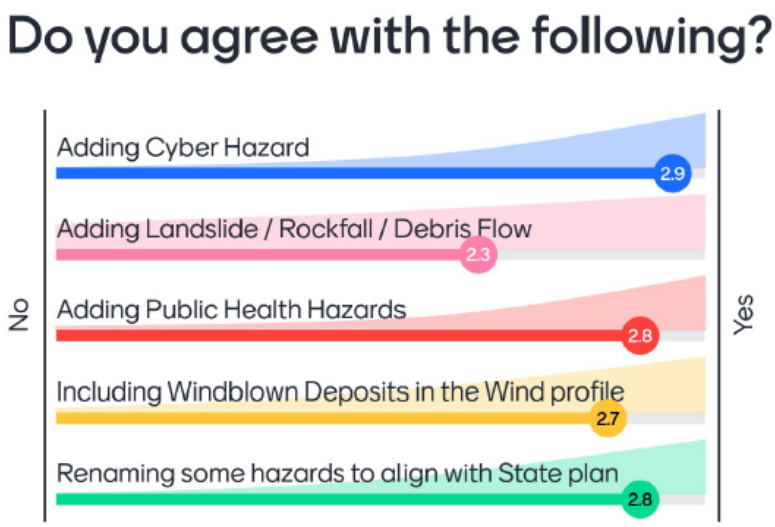
Wyoming Region 7 Pre-Kickoff Meeting (December 9th, 2021)

A preliminary kickoff meeting was held with the County Emergency Management Coordinators to review the project scope, expectations, and the format for the kickoff meetings with the HMPCs.

Wyoming Region 7 Kickoff Meeting (February 8th, 2022)

A kickoff meeting brought together all three county HMPCs. Information was presented on the scope and purpose of the plan update, participation requirements of HMPC members, and the proposed project work plan and schedule. The project's public involvement plan (PIP) was discussed, as well. The HMPC reviewed the hazard identification information for each county and the Region, as well as recounted the participating jurisdictions. Opportunities for input on the existing plan and previous planning processes were given, as well as to share any sources of best available data and hazard events in the last five years. Discussion occurred on the definition and application of the hazards being added to the 2023 plan update. Figure 2.1 shows the polling response of the HMPC regarding which hazards should be added.

Figure 2.1 Region 7 HMPC Polling Responses



At the end of the meeting, participants were given four action items:

- Provide the best available hazard data and recent / ongoing community plan
- Help expand the Planning Committee roster
- Provide input on the public involvement plan
- Assist with dissemination of the public involvement plan's messaging content

Hazard Identification and Risk Assessment (HIRA) Meetings (April 20th, April 21st, & May 12th, 2022)

Three risk assessment meetings, one specific to each county, were held to ensure that all participating jurisdictions were able to attend a meeting with information relevant to their communities. The information from these meetings was then looked at holistically for the Region.

The meetings began with a review of the existing goals and mission statement in the plan. Discussion of the goals resulted in updates to wording and addition of a new goal. Once the goals were updated, the Hazard Identification and Risk Assessment (HIRA) was presented for review, both as a high-level overview presentation and the draft copy for comment. Each hazard profiled was detailed as to the specific effects on each county in the respective meeting. This included detailing the past occurrences, losses and impacts experienced, and potential trends of each hazard. A comment period was established for the HMPC review of the draft HIRA, a crucial step prior to releasing the draft plan for public review.

This review of the draft was a post meeting request, as well as completing hazard risk rankings, capabilities assessments, developing new hazard mitigation actions and reporting on actions from the 2017 plan.

The FEMA Lifelines framework was a crucial part of the conversations in each county meeting. The framework is explained in the Hazard Identification and Risk Assessment chapter and was an important tool for creating a comprehensive plan that addressed the critical functions and infrastructure in the counties. The Lifeline categories and sub-components are shown in Figure 3.1.

Mitigation Strategy Meetings (June 22nd & July 26th, 2022)

Following the risk assessment meetings, three separate mitigation strategy webinars were held to discuss the multiple factors that influence the success of mitigation planning and implementation in each county. The meeting had a focus on remaining plan requirements, which included a discussion about plan maintenance and implementation over the next five years. Opportunities for plan integration were discussed, as well.

Conversations from the HIRA meeting pertaining to the mitigation goals were revisited to ensure the committee was in agreement on those updates. The conversation then turned to new mitigation actions. Multiple resources and ideas were presented to the committee for their consideration, as jurisdictions continued developing new actions. Prioritization of those new actions was then discussed, as the group felt a number of criteria should be evaluated when ranking these actions.

The final risk assessment results were reviewed and the Lifeline assessment was presented again.

Extensive information was given about various grant programs, including FEMA's new Building Resilient Infrastructure & Communities (BRIC) and resources to help implement mitigation actions. The webinars concluded with further discussion of mitigation funding opportunities and how communities can prepare now for future grant applications.

HMP Individual Municipality One-on-Ones (On-going throughout Planning Process

Region 7 county coordinators also facilitated a number of individual meetings and conversations with local governments over the course of the planning process. These meetings helped to inform and involve those who were unable to participate in HMPC meetings held during the planning process. It was important to each county that all interested local governments were able to meet planning process requirements so they could adopt the plan and remain eligible to pursue mitigation grant funding opportunities.

In Goshen County, each of the organizations adopting the plan, including the irrigation and conservation districts, were involved in a one-on-one meeting with the local emergency manager to ensure all participants were confident in the planning process and felt heard. To keep participants aware and involved, Laramie County one-on-ones included the Eastern Laramie County Sanitation District and all municipalities, with the exception of Cheyenne which was represented at all of the meetings. In Platte County, one-on-ones were held with Glendo and Hartville to ensure the municipalities were engaged in the development and advised of further steps in the process.

2.5 Public and Stakeholder Participation

An important component of the success of this mitigation planning process involved ongoing public, stakeholder, and jurisdictional participation. Individual citizen involvement provided the planning team with a greater understanding of local concerns and ensured a higher degree of mitigation success by developing community "buy-in" from those directly affected by the planning decisions of public officials. The survey responses helped the HMPC identify various ideas for mitigation actions the community members presented, as well as their priorities for the types of mitigation strategies they valued for future mitigation work. Residents shared experiences of various hazards and notable incidents which helped to better inform the HIRA and brought attention to those events that may not have been reported elsewhere.

A broad range of public and private stakeholders, including local public agencies, local businesses, citizens, and other interested parties were invited to participate in the development of this HMP. Each County Emergency Manager sent out invitations to local stakeholders encouraging them to become active in project participation and to attend local planning meetings. They were encouraged to bring plans, data, ideas, and hazard experience information to capture a whole community view. Public input was sought by all three counties throughout the planning process by advertising public input through the following outlets.

- Social media networks: Laramie, Goshen EM, and Platte Facebook
- Flyer distribution throughout the communities and via email
- Online agency website posting: Laramie County Emergency Management Agency, Goshen County Website, Goshen County Economic Development

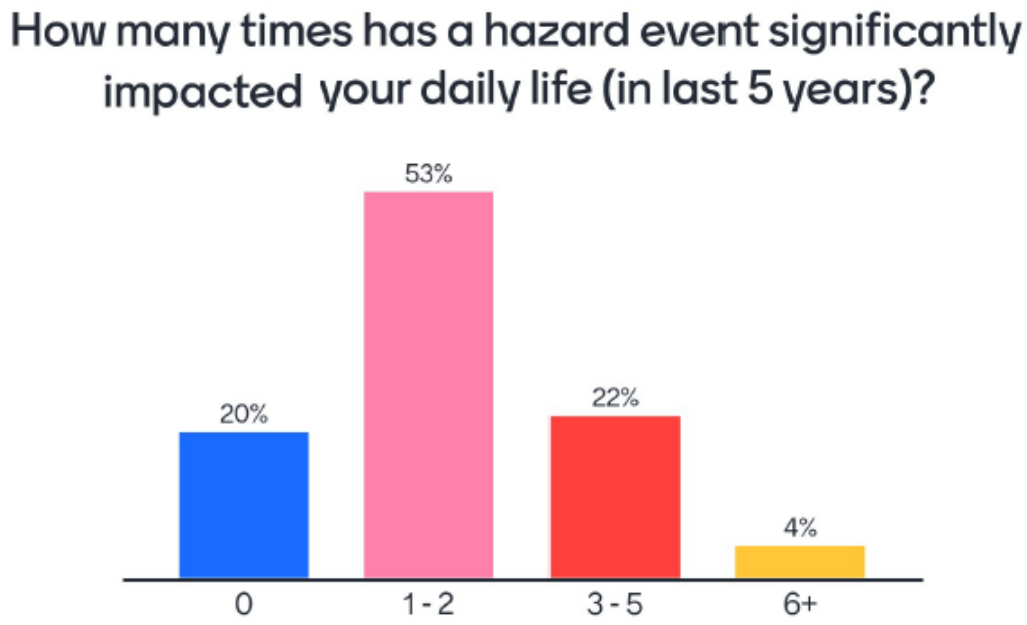
Additionally, a project-specific webpage was created to provide information to the public and stakeholders, and to obtain feedback on the HMP. Laramie County created a page on their Emergency Management Agency website, which was also leveraged by Goshen County and Platte County to inform the public about the HMP and any updates throughout the planning process. The project webpage was utilized to provide hazard mitigation information, contact information, survey links, and a link to the existing HMP. Appendix D: Outreach Documentation shows the websites and social media of the counties', which were used to make information accessible to the public and to gather feedback.

Survey

Public surveying was utilized during the planning process and results from the Region 7 respondents can be seen in the following figures. The survey highlighted the concerns residents in the region have regarding risk from hazards, access to resources post-event, and sense of vulnerability. Mitigation action ideas and priorities were also collected.

Notably, over half of the respondents have been through 1-2 hazard events, which had significant impacts, in the last 5 years. The hazards of highest concern to the public were winter storm, wind, hail and drought.

Figure 2.2 Public Polling Responses



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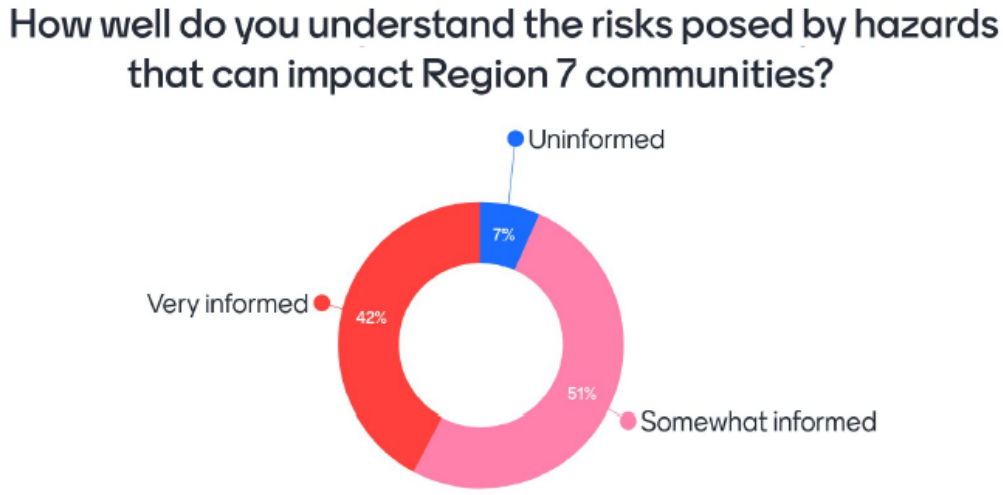

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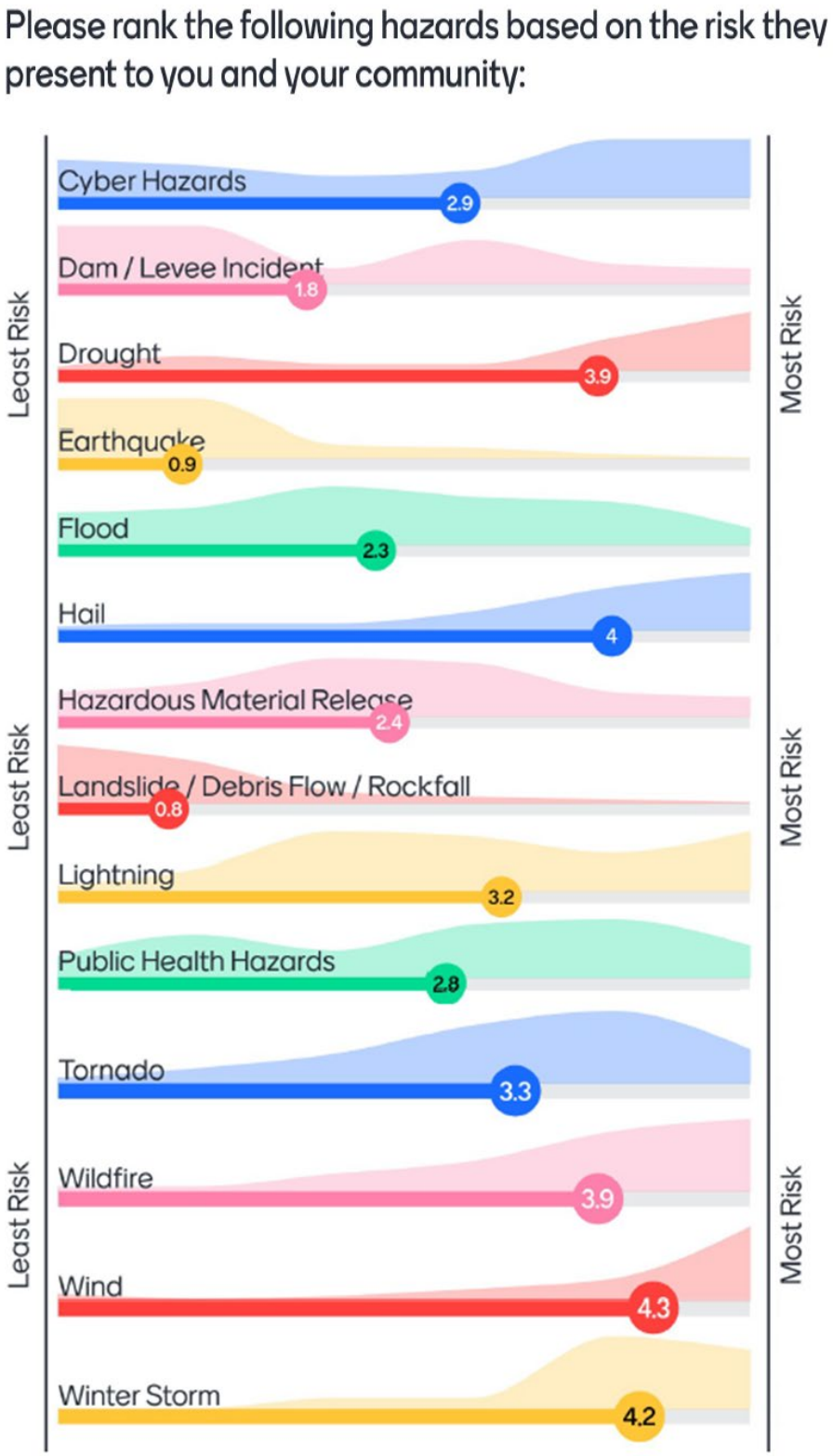

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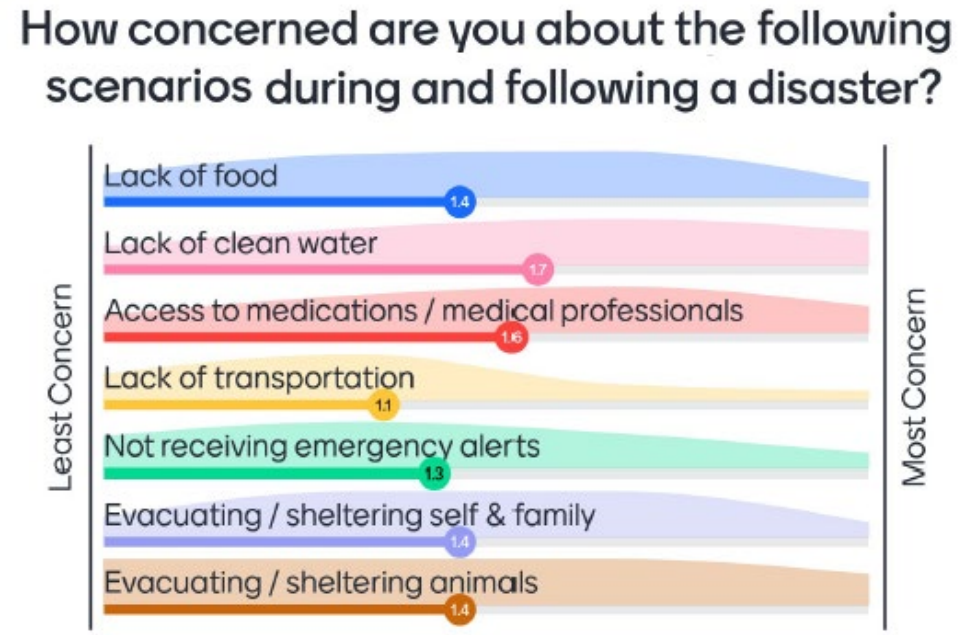

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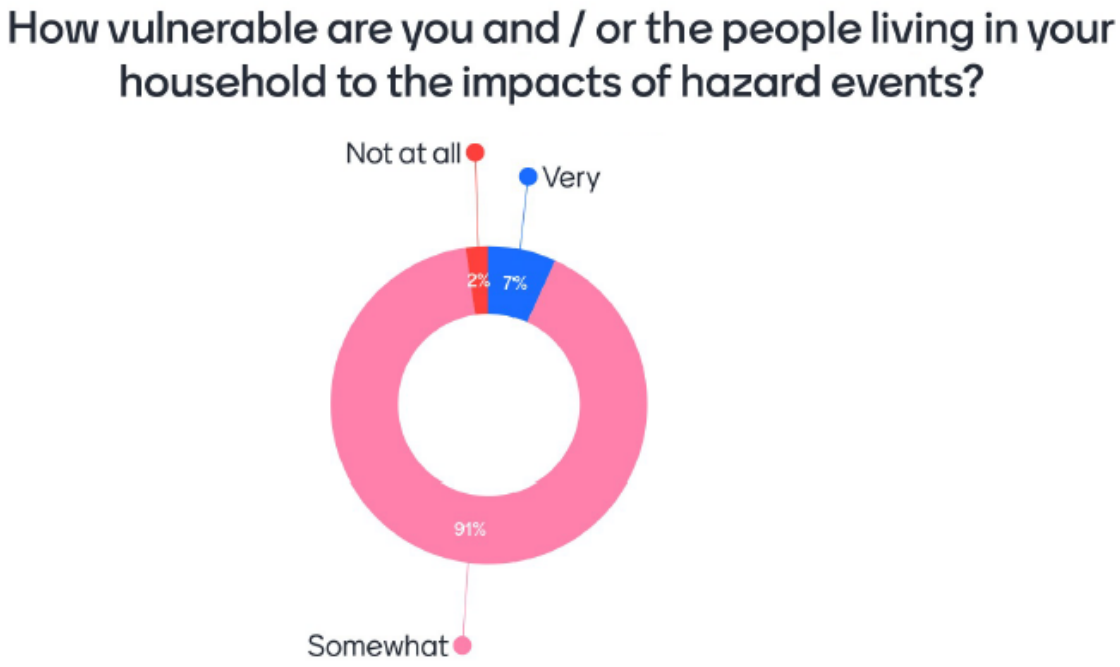


Figure 2.7 Public Polling Responses

Figure 2.8 Public Polling Responses

Public responses included ideas, strategies, and comments regarding the mitigation they prioritize in their communities. These were captured and used in the "Mitigation Strategy Action Ideas Guide" and shared with the HMPC.

Some of these comments included ideas for effective and timely public communication methods, increasing shelter availability, wind mitigation actions (burying power lines, building windbreaks), and better road maintenance. Specific community comments regarded flooding in the City of Torrington and the creation of a stormwater drainage system.

Public Draft Review

The last piece of participation in the planning process was to share the draft HMP with the HMPC and the public. Upon review and approval by the HMPC, the draft was posted on the State's website for public review and comment. The State as well as the County leads all made efforts to encourage participation in commenting on the draft plan. No comments on the draft HMP were received from the public.

3 Hazard Identification and Risk Assessment

3.1 Identified Hazards of Concern

Building a clear understanding of the hazards that pose risks to the communities of Region 7 is a key step in preventing disaster losses. For the purpose of this plan, the following terms facilitate comparisons between communities and can be found throughout the risk assessments and mitigation strategies.

- **Hazard:** Event or physical conditions that have the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, other types of harm or loss.
- **Vulnerability:** The degree of susceptibility to physical injury, harm, damage, or economic loss; depends on an asset's construction, contents, and economic value of its functions.
- **Exposure:** The people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area the hazard could affect.
- **Risk:** A hazard's likelihood of occurrence and its consequences to society; the estimated impact that a hazard would have on people, services, facilities, and structures in a community.

The Hazard Identification and Risk Assessment (HIRA) section involves a method for evaluating risk which is defined by probability and frequency of occurrence of a hazard event, exposure of people and property to the hazard, and consequences of that exposure. Different methodologies exist for assessing the risk of hazard events, ranging from qualitative to quantitative approaches.

Region 7 communities are vulnerable to a wide range of natural and manmade hazards that threaten life, property, and environment. The hazards identified by the HMPC for inclusion in the plan are those determined to be of potential threat to residents, businesses, visitors, and commuters. The hazards profiled for the 2023 Plan are:

- Cyber Hazards
- Dam / Levee Incident
- Drought
- Earthquake
- Flood
- Hail
- Hazardous Material Release
- Landslide
- Lightning
- Public Health Hazards
- Tornado
- Wildfire
- Wind
- Winter Storm

Many of these hazards are interconnected and discussion of how these hazards overlap occurred throughout the risk assessment. For example, prolonged drought impacts the likelihood of wildfire.

A public risk perception survey was also conducted as part of the risk assessment planning process in the form of an online survey. Emergency managers from each county took the initiative to distribute information and provide a link to the survey to local community members. The survey produced a great number of results, with a

total number of 46 participants. The following table presents the results of this survey and how the public perceives risk for the identified hazards. The public survey results rather clearly segmented hazards into a high/medium/ low risk grouping. This shows that the public considers winter storm, hail, wind, drought, and wildfire to be the highest risk hazards facing the Region.

Table 3.1 Public Hazard Risk Perceptions

Hazard	Perceived Risk
Wind	High
Winter Storm	High
Wildfire	High
Hail	High
Drought	High
Cyber Hazards	Medium
Tornadoes	Medium
Flood	Medium
Lightning	Medium
Hazardous Materials	Medium
Public Health Hazards	Medium
Earthquake	Low
Dam / Levee Incident	Low
Landslide	Low

Starting in Section 3.7, each identified hazard is profiled and defined for the Region as a whole. Each County specific annex includes a HIRA section that further discusses the identified hazard risk assessment and analysis for the County and its jurisdictions and special districts, when applicable. Each hazard profile includes the following information (when applicable): previous occurrences, inventory exposed, potential losses, probability of future occurrences, and relationships to land use & development.

3.2 Disaster Declaration History

To further understand the list of identified hazards for this HMP, the following tables present a list of all federal disaster and emergency declarations that have occurred in Goshen, Laramie, and Platte Counties, according to the Federal Emergency Management Agency (FEMA) and the United States Department of Agriculture (USDA). This list supports the identification of the hazards which pose the greatest risk to Region 7 communities.

Table 3.2 Major Disaster and Emergency Declarations

Community Affected	Disaster	Declaration	Declaration Date
Laramie	Severe Storms, Tornadoes	DR-591	7/19/1979
Laramie	Severe Storms, Hail, Flooding	DR-740	8/7/1985
Goshen	Severe Winter Storm	DR-1268	2/17/1999
Goshen & Platte	Winter Storm	DR-1351	12/13/2000

Community Affected	Disaster	Declaration	Declaration Date
Platte	Flooding	DR-1923	7/14/2010
Goshen & Platte	Severe Storms, Flooding, and Landslides	DR-4007	7/22/2011
Platte	Severe Storms and Flooding	DR-4227	7/7/2015
Region 7 Counties	Covid-19 Pandemic	EM-3479	3/13/2020
Region 7 Counties	Covid-19 Pandemic	DR-4535	4/11/2020

* DR represents a Major Disaster Declaration, EM represents an Emergency Declaration

The USDA makes Secretarial Disaster Declarations in the event of a natural disaster that causes a 30% production loss of at least one crop in a county. There is a specific process and criteria for drought declarations for severe drought, which provide for an expedited declaration when during the growing season, any portion of a county meets the D2 (Severe Drought) drought intensity value for eight consecutive weeks or a higher drought intensity value for any length of time as reported in the US Drought Monitor. Droughts that do not fall into these categories and for all other natural disaster occurrences, the process is not immediate and the 30% crop loss requirement must be met to receive a disaster designation.

Once a county is designated in the declaration, by quantitative data or the determination of surveying producers, emergency loans become available to the county producers, as well as those in contiguous counties. Table 3.3 shows the USDA primary designations the counties in Region 7 have received. USDA data is not readily available prior to 2012 and as a result some events may not be included. This table incudes only events where the county was designated a primary county in the declaration.

Table 3.3 USDA Secretarial Disaster Declarations

Community Affected	Disaster	Declaration	Declaration Date
Laramie & Platte	Drought	S2630	11/09/2007
Platte	Hail	S2958	12/31/2009
Laramie	Drought, High Winds, Wildfire, Excessive Heat, Insects	S3290	7/12/2012
Goshen & Platte	Drought, High Winds, Wildfire, Excessive Heat, Insects	S3319	8/1/2012
Goshen & Platte	Drought, High Winds, Wildfire, Excessive Heat, Frost/Freeze	S3350	8/15/2012
Region 7 Counties	Drought, High Winds, Wildfire, Excessive Heat, Insects	S3508	4/10/2013
Laramie	Hail	S4087	10/26/2016
Laramie	Excessive Rain, Flash Flooding, Hail, High Winds, Lightning, and Tornadoes	S4397	9/17/2018
Platte	Drought	S4793	9/8/2020
Goshen	Drought	S4802	9/11/2020
Laramie	Drought	S4852	10/16/2020
Region 7 Counties	Drought	S4926	3/5/2021

Platte County has the only Fire Management Assistance Declaration (FM-2992) in Region 7. This was declared during the Arapahoe Fire on June 29th, 2012. The Fire Management Assistance Grant (FMAG) is available for the mitigation, management, and control of fires that pose a risk of destruction constituting a major disaster. The assistance is given in the form of a grant with local cost share of 25% and can be used for equipment use, repair, and replacement; tools, materials, and supplies; and mobilization and demobilization activities.

3.3 Hazard Risk Summary

A qualitative risk ranking was performed by the individual county HMPCs and each local government for the hazards profiled in this plan. This risk ranking assesses the probability of each hazard's occurrence, as well as its likely impact on the people, property / environment, and economy of the planning area.

Table 3.4 presents a high-level summary of the region's and each county's hazard risk. Individual local government risk rankings are presented in the county annexes included in this plan.

Table 3.4 Region 7 Risk Rankings

Hazard	Region 7	Goshen County	Laramie County	Platte County
Cyber Hazards	Medium	Medium	High	Medium
Dam/Levee Incident	Medium	High	Medium	Medium
Drought	High	High	Medium	High
Earthquake	Low	Low	Low	Low
Flood	Medium	Medium	Medium	Medium
Hail	High	High	Medium	High
Hazardous Material Release	Medium	Low	Medium	Medium
Landslide	Low	Low	Low	Low
Lightning	Medium	Medium	Medium	Medium
Public Health Hazards	Low	Low	Medium	Low
Tornado	Medium	Medium	Medium	Medium
Wildfire	Medium	Medium	Medium	High
Wind	Medium	Medium	High	Medium
Winter Storm	Medium	Medium	Medium	Medium

3.4 County Annexes

County-specific annexes have been developed as part of this plan, to both streamline this document and to provide each county with an individualized and succinct version of the vulnerability assessment results. Readers are encouraged to review these annexes for information and data specific to each county and their municipalities.

The vulnerability exposure analysis presented in these county annexes utilized the State of Wyoming's statewide parcel layer, coupled with assessment information from the Wyoming Department of Revenue.

3.5 Hazard Data Viewers

The rapid evolution of hazards data creates the need for tools which present the most recent data in a useful way. The maps included in this plan are helpful to serve as an overview of the various hazard and risk information, but ultimately are static snapshots of the best available data at the time of this plan's writing. Additionally, the large size of Region 7's counties make it difficult to present many of the maps at a scale useful to the local communities.

With these disclaimers noted and as hazard and risk data is constantly evolving, it is important to utilize the latest and greatest hazard data available. Fortunately, the State of Wyoming and federal government have recently developed a number of hazard data viewers that present much of the same information contained in this plan. When possible, this plan directs readers to these online resources to ensure the most accurate information is being referenced and utilized.

Hazard Data Viewers:

- FEMA's National Risk Index for Natural Hazards
- FEMA's Resilience Analysis and Planning Tool
- WY State Geological Survey's Wyoming Geologic Hazards Map
- WY State Forestry Division's Wildfire Risk Assessment Portal

3.6 Lifelines

FEMA's Lifeline framework was created to provide an outcome-based, survivor-centric framework to assist responders with determining the scale, complexity, and severity of a disaster. This information is used to establish operational priorities for the response and involves identifying the root causes and interdependencies of impacts to critical services, especially those that are life-sustaining or lifesaving.

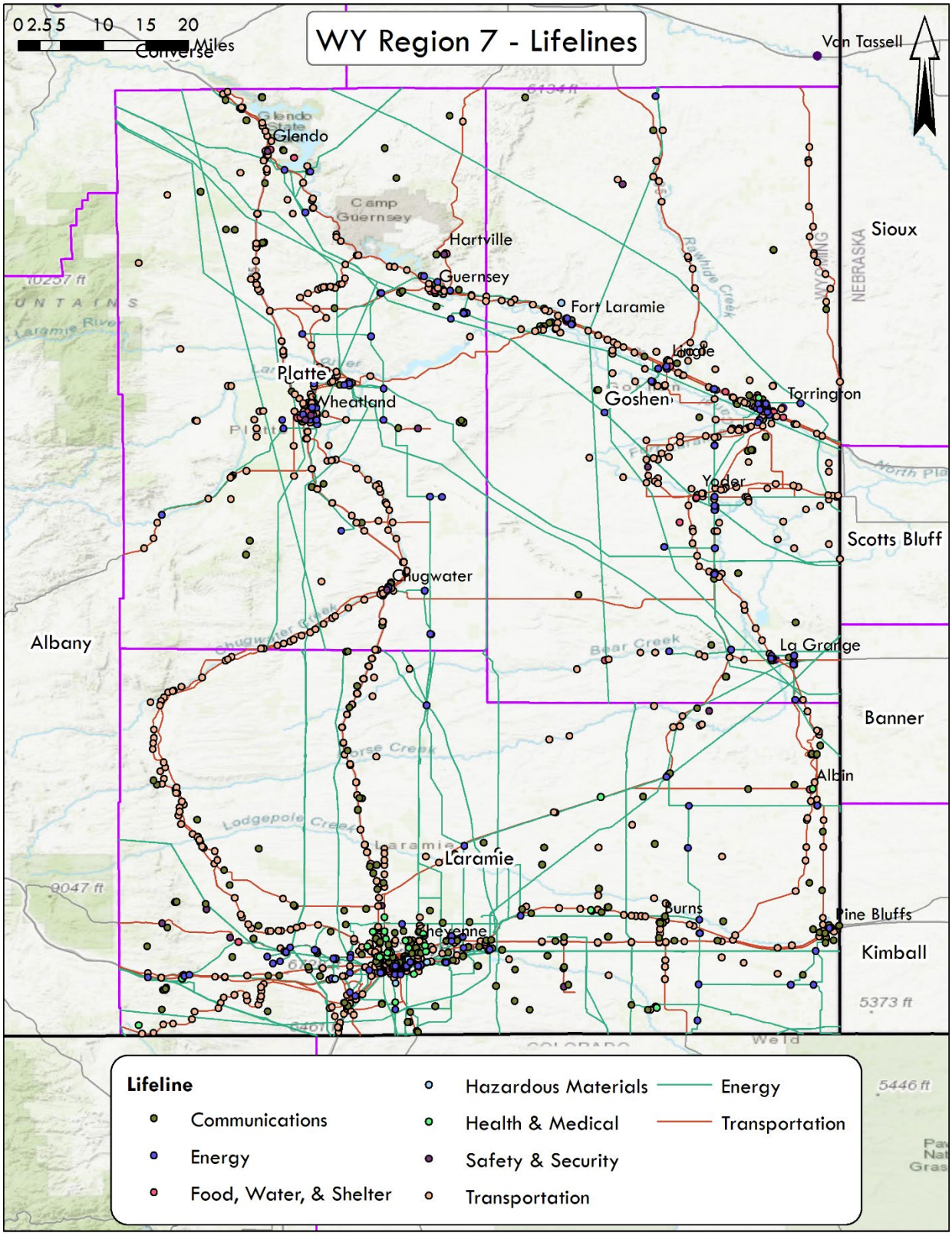
An important component to the Lifeline framework is the ability to communicate disaster-related information across all levels of public, private, and non-profit sectors using commonly understood, plain language. This is vital to preparedness education, community engagement, public outreach, and inclusion of those with access and functional needs (AFN).

Region 7 uses this Lifelines framework as a basis for emergency management planning, preparedness education, and mitigation planning. It is important to consider cascading effects when Lifelines are affected and how those effects will impact the community and other Lifelines. Figure 3.1 breaks down Lifelines by component and subcomponents which are integral parts of each critical service.

Figure 3.1 FEMA Lifelines and Sub-components

Figure 3.2 shows an overview of the Lifelines assessed as part of the exposure analysis in the county annexes.

Figure 3.2 Wyoming Region 7 Lifelines



3.7 Hazard Profiles

The 14 hazards profiled for Region 7 are detailed in this section. Specific county annexes contain the history, data, and impacts of each hazard.

3.7.1 Cyber Hazards

Society is dependent on technology for day-to-day operations, and a major cyber incident could have significant and widespread impacts. Cyber hazards vary in the method of attack and area of technology targeted. Incidents are increasing and have been shown to affect a large variety of organizations, including hospitals, schools, businesses, and governments. These cyber attacks can result in the drastic slowing or halting entirely of productivity for an agency or organization. Data breach due to an attack is of great concern, not only for privacy reasons, but for the negative impacts that deletion or altering of data can have on future work for the organization.

Physical infrastructure damage is another cyber related hazard and the potential cascading effects on the virtual systems communities rely on could be devastating and long lasting. Extended power outages, fiber optic cable impairment, and other infrastructure damage or disruption would have widespread consequences for conducting everyday operations. Critical facilities and infrastructure (Community Lifelines) for water distribution and treatment, power and fuel supply delivery, as well as communications could see drastic alterations to capabilities from a cyber attack.

In many cases, it takes months, sometimes years, to restore a system to its previous functionality, perpetuating disruption even after the initial incident is over. Organizations must rebuild technological infrastructure, recover lost data, and improve cyber security to ward off the possibility of another incident. The resulting cost in new equipment and manpower to rectify the situation can be prohibitive, adding up to millions of dollars separate from the payment of any ransom.

Potential Impacts

Cyber hazards have the potential to shut down critical operations of an organization or a community depending on the target, method of attack, and the ability to halt or disrupt the attack rapidly. Significant impacts can include an entity or organization losing all access to records, such as hospitals and local governments that become unable to serve the public. Operation of critical infrastructure can be overridden, and sensitive data can be breached and released. In many cases the data or operation control can be withheld in order to obtain a ransom payment.

3.7.2 Dam/Levee Incident

Dams and levees are man-made structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. These structures are typically constructed of earth, rock, concrete, or mine tailings. Dams, levees, and reservoirs serve a critical role for Wyoming residents and regional industry by controlling flooding and conserving water for summer months when rainfall is limited.

Although dam and levee incidents, either complete or partial compromise of the structure, are rare events, when they do occur they pose a significant hazard to communities downstream. Two factors that influence the potential severity of a structure compromise incident are the amount of water impounded and the density, type, and value of development and infrastructure located downstream.

Dam and levee incidents can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which result in overtopping
- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping or rodent activity
- Improper design

- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

Dam and levee incidents occur when the retention function of the structure is compromised, either in part or in its entirety. Spillway discharges are another potential mechanism for an event and discharges may be large enough to cause flooding in downstream areas or areas upstream of the structure due to the potential backwater effects or high pool levels upstream. Spillway discharges that are past the expected rate of cubic feet per second of water or cause upstream effects are considered emergencies and may cause significant property damage and loss of life.

Dam and levee incidents result in flash flooding, when a large amount of previously detained water is suddenly released into a normally dry area due to a compromise of the structure. The Wyoming State Hazard Mitigation Plan (2021-2026) classifies a dam based on their hazard potential. Classification is based on the consequences of a potential dam incident, not the likelihood of failure or the existing condition of a dam.

Based on these consequences, dams are rated High, Significant, or Low. High hazard dam failure would likely result in loss of life. Significant hazard dams have no probable loss of life, but can result in economic loss, environmental damage, Lifeline capability disruption, and other major impacts. Low hazard dams have no probable loss of life, low economic and environmental losses, and result primarily in personal property damage.

Dam failures can be classified into four categories: overtopping, foundation failure, structural failure, and other unforeseen failures. According to the Wyoming State Hazard Mitigation Plan (2021-2026), flood and overtopping, which is the uncontrolled flow of water over, around, and adjacent to the dam, incidents make up approximately 70% of events. Older dams are most susceptible to overtopping incidents. Foundation and structural incidents are usually tied to seepage through the foundation of the main structure of the dam, and seepage or piping account for about 12% of incidents. Erosion, deterioration, and deformation of the foundation or settling of the embankment can also result in dam failure.

Potential Impacts

The populations downstream of a dam are at risk of varying levels of damage and threat to public safety depending on the dam classification. The magnitude of impacts could be similar to that of a flood and could be potentially worse if the incident occurs during a flood event, due to overtopping.

Dam / levee incidents can have higher velocity flows, debris, and greater depths of flooding as compared to normal riverine flooding, all of which could contribute to higher losses.

People living downstream of a dam or levee and exposed to the potential inundation areas are at greatest risk. Evacuations and timely warning are critical to reduce loss of life and injury. Accurate warning delivery and lead time are dependent upon the detection of the issue and the rapid communication of evacuation orders to areas at risk of inundation.

Populations downstream that are especially at risk of an incident include residents living in inundation areas or nearby areas that may be affected and those with access and functional needs (AFN). This population can include the elderly and very young; those living in long-term care facilities; mobile homes; low-income housing areas; temporary shelters; people with limited English proficiency; tourists and visitors; and those with cognitive, mobility, or sensory disabilities. These populations may have issues with evacuation and be disproportionately impacted by the effects of an incident due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

Property vulnerabilities include structural damage, damage to vehicles, and damage to the contents of homes, storage units, warehouses, and businesses. Critical facilities, roads, Lifelines, and other community assets would

likely be impacted. First responders and emergency personnel would likely be affected due to impassible transportation routes, damaged critical facilities, and/or disrupted communications systems.

An indirect impact, such as an extended power outage, presents a challenge for all of the populations in the Region. Those who may need more assistance obtaining information and resources, such as those with mobility issues, powered medical equipment, and chronic illness, are especially at risk from extended power outages.

Damaged utilities including leaking gas lines, open electrical cables, and wastewater contamination pose tremendous risk to homes, businesses, and people. The potential for explosions and fires, exposed electrical currents, and exposure to contaminated water can cause fatalities and illness. Domestic and wild animals forced out of their homes and brought into contact with humans by floodwaters can also pose a threat.

Depending on the number of people impacted, there may be a strain on public sheltering operations. The hospitals may see patients ranging from minor injuries to life threatening conditions. Secondary effects may come later in the form of injuries during recovery and potential illness due to contaminated water exposure.

Dam / levee incidents can potentially impact economic revenue if roads or businesses are closed or destroyed. Property damages can close a business for an extended period or permanently. The economy of a community can be rapidly impacted if businesses are unable to reopen in a timely manner.

While the probability of such an event is low, the failure of one of the high hazard dams could result in millions of dollars of damage and potential loss of life.

Due to Homeland Security concerns, specifics on the expected areas of inundation are not mapped in this plan.

3.7.3 Drought

Drought is a normal part of virtually all climates, including areas with high and low average rainfall. Drought events are caused by a deficiency of precipitation and can be aggravated by other factors such as high temperatures, high winds, and low relative humidity.

Droughts can be grouped as meteorological, hydrologic, agricultural, and socioeconomic. Representative definitions commonly used to describe the various types of drought are summarized below.

- Meteorological drought is defined solely on the degrees of dryness. It is expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Hydrologic drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Agricultural drought is defined principally in terms of soil moisture deficiencies relative to water demands of plant life, usually crops.
- Socioeconomic drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of a weather-related supply shortfall. The incidence of this type of drought can increase because of a change in the amount of rainfall, a change in societal demands for water (or vulnerability to water shortages), or both.

The Palmer Drought Severity Index (PDSI) uses temperature and precipitation data to determine dryness. The Index is most effective in determining long term drought (several months) and is not used for short-term (weeks) forecasts. The PDSI is also used as a tool to capture the basic effects of climate change on drought. Drought is shown in terms of negative numbers, where a 0 represents normal conditions and -5 is exceptional drought. Table 3.5 provides an overview of the PDSI compared to other drought classification systems. The return period shows how often the type of drought typically occurs, such as a minor drought occurring every 3-4 years.

The other drought monitoring indices used in Table 3.5 are the Standardized Precipitation Index (SPI) and the National Drought Mitigation Center (NDMC) drought category classifications. The use and data timescales of all three indices differ in multiple ways. The SPI uses monthly precipitation input data, can be created for between 1-36 months, and is useful in comparison across different climate areas. The NDMC categories (D0- abnormally dry to D4- exceptional drought) are found in the United States Drought Monitor (USDM), which has both daily and long-term data. The data is based on precipitation and is the primary source used by the USDA when determining declaration eligibility for counties.

Table 3.5 Drought Monitoring Indices

Drought Severity	Return Period (years)	Description of Possible Impacts	Drought Monitoring Indices		
			Palmer Drought Severity Index	Standardized Precipitation Index (SPI)	NDMC Drought Category
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9	-0.5 to -0.7	D0
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-2.0 to -2.9	-0.8 to -1.2	D1
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed	-3.0 to -3.9	-1.3 to -1.5	D2
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions	-4.0 to -4.9	-1.6 to -1.9	D3
Exceptional Drought	44 +	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	Less than -2	D4

Potential Impacts

Typically, people are not directly vulnerable to drought, though secondary or indirect impacts can occur. Drought contributes to wildland fire risk, which in turn endangers life safety. Like people, structures are not typically directly vulnerable to drought. Underground water resources may become undrinkable during prolonged drought, as concentration of heavy metals increases.

Drought can adversely affect the incomes of people dependent on water for their livelihoods, such as ranchers, farmers, and outdoor recreation businesses.

Farms and ranches are known to be significantly impacted by drought conditions. The agricultural sector depends on water for irrigating crops, feeding, and watering livestock, and sanitation of animal pens and enclosures. Farmers and ranchers are sometimes forced to reduce their inventory of crops or livestock during droughts. This industry would be the most directly impacted from a prolonged event, mostly due to the drought's contribution to land degradation.

Water utility companies may be forced to impose water usage restrictions on customers during times of drought. In the past, local energy and power sectors have been impacted by drought due to the risk of losing cooling water to their systems. Statewide, the oil industry depends on water and could be financially impacted should a drought occur.

3.7.4 Earthquake

An earthquake is defined as the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10 – 20 miles of the Earth's crust. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of people, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake.

Earthquake Mechanics

Regardless of the source of the earthquake, the associated energy travels in waves radiating outward from the point of release. When these waves travel along the surface, the ground shakes and rolls, fractures form, and water waves may be generated. Earthquakes generally last a matter of seconds, but the waves may travel for long distances and cause damage well after the initial shaking at the point of origin has subsided.

Breaks in the crust associated with seismic activity are known as "faults" and are classified as either active or inactive. Faults may be expressed on the surface by sharp cliffs, very steep slopes, or may be buried below surface deposits.

"Foreshocks," minor releases of pressure or slippage, may occur months or minutes before the actual onset of the earthquake. "Aftershocks," which range from minor to major, may occur for months after the main earthquake. In some cases, strong aftershocks may cause significant additional damage, especially if the initial earthquake weakened structures or impacted emergency management and response functions.

Factors Contributing to Damage Extent

There are numerous variables that contribute to the extent of damage associated with each earthquake and the primary factors are seismic activity, geology and soils, development, and the time of day the event occurs.

The properties of earthquakes vary greatly from event to event. Some seismic activity is localized (a small point of energy release), while other activity is widespread (e.g., a major fault shifting or slipping all at once). Earthquakes can be very brief (only a few seconds) or last for a minute or more. The depth of release and type of seismic waves generated also play roles in the nature and location of damage. Shallow quakes will hit the area close to the epicenter harder but tend to be felt across a smaller region than deep earthquakes.

The surface geology and soils of an area influence the propagation (conduction) of seismic waves and how strongly the energy is felt. Generally, stable areas (e.g., solid bedrock) experience less destructive shaking than unstable areas (e.g., fill soils). The siting of a community or even individual buildings plays a strong role in the nature and extent of damage from an event.

An earthquake in a densely populated area, which results in many deaths and considerable damage, may have the same magnitude as a shock in a remote area that has no direct impacts. Large magnitude earthquakes that occur beneath the oceans may not even be felt by humans.

The time of day that an event occurs controls the distribution of the population in the affected area. On work days, the majority of the community will transition between work or school, home, and the commute between the two. The relative seismic vulnerability of each location can strongly influence the loss of life and injury resulting from an event.

Resulting Damage

Often, the most dramatic evidence of an earthquake results from the vertical and/or horizontal displacement of the ground along a fault line. This displacement can sever transportation, energy, utility, and communications infrastructure potentially impacting numerous systems and persons. These ground displacements can result in severe and complete damages to structures situated on top of the ground fault. However, most damage from earthquake events is the result of shaking.

Shaking produces a number of phenomena that can generate additional damage, including additional ground displacement, landslides and avalanches, liquefaction, subsidence, and seismic seiches.

During minor earthquake events, objects often fall from shelves and dishes rattle. In major events, large structures may be torn apart by the forces of the seismic waves. Structural damage is generally limited to older structures that are poorly maintained, poorly constructed, or improperly (or not) designed for seismic events. Un-reinforced masonry buildings and wood frame homes not anchored to their foundations are typical sites of earthquake damage.

Loose or poorly secured objects pose a significant hazard when they are loosened or dropped by shaking. These "non-structural falling hazard" objects include bookcases, heavy wall hangings, and building facades. Home water heaters pose a special risk due to their tendency to start fires when they topple over and rupture gas lines. Crumbling chimneys may be responsible for injuries and property damage.

Dam and bridge failures are significant risks during stronger earthquake events, and the potential consequences include considerable property damage and loss of life. In areas of severe seismic shaking hazard, shaking intensity levels of VII or higher (Table 3.6) can be experienced even on solid bedrock. In these areas, older buildings especially are at significant risk.

Small earthquake events can cause landslides and avalanches. Rock falls are common during seismic activity as unstable material on steep slopes is shaken loose, but significant landslides or debris flows can be generated if conditions are conducive. Roads may be blocked by landslide activity, hampering response and recovery operations. Avalanches are possible when the snowpack is sufficient and the necessary factors are present.

Liquefaction and subsidence of soils are possible when impacted by the seismic waves. Fill and previously saturated soils are especially at risk. The failure of the soils has the potential to cause widespread structural damage. The oscillation and failure of the soils may result in increased water flow and/or failure of wells as the subsurface flows are disrupted and sometimes permanently altered. Increased flows may be dramatic, resulting in geyser-like water spouts and/or flash floods. Similarly, septic systems may be damaged creating both inconvenience and health concerns.

Seismic waves may rock an enclosed body of water (e.g., lake or reservoir), creating an oscillating wave referred to as a "seiche." Although not a common cause of damage, there is a potential for large, forceful waves similar to a tsunami ("tidal waves") to be generated on the large reservoirs. A seiche would be a hazard to shoreline development and pose a significant risk on dam-created reservoirs, potential for overtopping or damage to a dam could lead to downstream flash flooding.

Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts are considered. These impacts can include induced flooding and landslides, damage to vegetation, poor water quality, and damage to sewage and hazardous materials.

Hazard Measurement

The impact an earthquake event has on an area is typically measured in terms of earthquake intensity. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects.

Another way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner and represents the rate in change of motion of the earth's surface during an earthquake as a percent. PGA can be partly determined by what soils and bedrock characteristics exist in the region. Unlike the Richter scale, PGA is not a measure of the total energy released by an earthquake, but rather of how hard the earth shakes at a given geographic area (the intensity). PGA is measured by using multiple instruments including accelerographs, is represented as a percentage of gravity (%g), and correlates well with the Mercalli scale. Peak velocity is the greatest speed of shaking recorded at a particular point during an earthquake. Table 3.6 shows a detailed description of the Modified Mercalli Intensity (MMI) scale including the correlating peak acceleration, peak velocity, and Richter magnitude.

Table 3.6 Modified Mercalli Intensity (MMI) Scale

Intensity	Shaking	Description of Effects	Peak Acceleration (%G)	Peak Velocity (cm/s)	Richter Scale Magnitude
I	**Not Felt**	Not felt except by a very few under especially favorable conditions.	< .17	< 0.1	Up to 4.7
II	**Weak**	Felt only by a few persons at rest, especially on upper floors of buildings.	.17-1.4	0.1-1.1	
III	**Weak**	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Majority do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck.	.17-1.4	0.1-1.1	
IV	**Light**	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	1.4-3.9	1.1-3.4	
V	**Moderate**	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.	3.9-9.2	3.4-8.1	4.8 – 5.3
VI	**Strong**	Felt by all. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.	9.2-18	8.1-16	5.4 – 6.0
VII	**Very Strong**	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.	18-34	16-31	6.1 – 6.8
VIII	**Severe**	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in	34-65	31-60	6.9 – 7.2

Intensity	Shaking	Description of Effects	Peak Acceleration (%G)	Peak Velocity (cm/s)	Richter Scale Magnitude
		poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.			
IX	**Violent**	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.	65-124	60-116	
X	**Extreme**	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.	>124	>116	7.3 – 8.0

The Richter Scale is the most commonly used scale for measuring earthquake magnitudes and potential impacts. The Richter Scale coupled with PGA is utilized for the hazard risk assessment.

According to the Wyoming State Hazard Mitigation Plan, about 47,000 earthquakes have been recorded in Wyoming over the past 145 years, but only a small percentage have been felt by people. Historically, earthquakes have occurred in every county in Wyoming, and are likely to occur in the future. The first reported event occurred in Yellowstone National Park, which is one of the more seismically active areas in the U.S., in 1871.

Earthquakes are extremely difficult to predict and the recurrence rate is determined using historical evidence of events or geologic feature information. If geologists can find evidence of distinct, datable earthquakes in the past, the number of these ruptures is used to define a recurrence rate. If evidence of ruptures is not available, geologists estimate fault slip rates from accumulated scarp heights (very steep bank or slope) and estimated date for the oldest movement on the scarp. Because a certain magnitude earthquake is likely to produce a displacement (slip) of a certain size, the rate of recurrence of earthquakes of that magnitude can be estimated.

Recurrence rates are different for each assumed magnitude thought to be "characteristic" of that fault type. Generally, a smaller magnitude quake will produce a faster recurrence rate, and for moderate levels of ground motion, a higher hazard risk. Future earthquakes are assumed to be likely to occur where earthquakes have produced faults in the geologically recent past. Quaternary faults are faults that have slipped in the last 1.8 million years and it is widely accepted that they are the most likely source of future large earthquakes. For this reason, quaternary faults are used to make fault sources for future earthquake models.

Potential Impacts

There is no mandatory residential building code in the State of Wyoming, meaning homes may not be built to withstand a 2,500 year return earthquake. The lower risk and incidence of earthquakes in the Region, along with no code requirements, means it is likely that buildings may not be designed to deal with an earthquake event; and therefore, impacts to property and life safety could be catastrophic. Older venues and historical properties are at more risk of consequences from an earthquake.

Most earthquake-related injuries and deaths, as well as property damage, are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, epicenter location and depth, and regional geology. Ground shaking can lead to the collapse of buildings and bridges and the disruption of Lifelines including utility pipelines, power, communications, and access to medical care.

Public buildings have particular importance as they house critical assets for government response and recovery activities and damage to these building could slow various agency efforts significantly. Damage to public water and sewer systems, transportation networks, emergency facilities, and offices can hinder the ability of the government to deliver services. Loss of power and communications can be expected. Drinking water and wastewater treatment facilities may be temporarily out of operation. First responders could be hindered by damages to various Lifelines and hospitals have the potential to be unsafe for use depending on damages.

Damaged utilities including leaking gas lines, open electrical cables, and wastewater contamination pose tremendous risk to homes, businesses, and people. The potential for explosions and fires, exposed electrical currents, and exposure to contaminated water can cause fatalities and illness. Domestic and wild animals forced out of their homes and brought into contact with humans can also pose a threat.

Populations especially at risk of damages from earthquakes include residents that may have access and functional needs (AFN). AFN populations can include the elderly and very young; those living in long-term care facilities; mobile homes; low-income housing areas; temporary shelters; people with limited English proficiency; tourists and visitors; and those with cognitive, mobility, or sensory disabilities. These populations may have issues with evacuation and be disproportionately impacted by flooding due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

An earthquake could cause an extended power outage, presenting a challenge for all of populations in the Region. Those who may need more assistance obtaining information and resources, such as those with mobility issues, powered medical equipment, and chronic illness, are especially at risk from extended power outages.

Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, seiches, and dam failure. Other damaging earthquake effects include liquefaction, in which ground soil loses shear strength and the ability to support foundation loads. This can result in roads becoming impassible and structures sinking into the ground.

Earthquakes can potentially impact economic revenue if roads or businesses are closed or destroyed. Property damages can close a business for an extended period or permanently. The economy of a community can be rapidly impacted if businesses are unable to reopen in a timely manner.

3.7.5 Flood

A flood is a naturally occurring event for rivers and streams and occurs when a normally dry area is inundated with water. Excess water from snowmelt or rainfall accumulates and overflows onto the stream banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, streams, and creeks that are subject to recurring floods. Flash floods, usually resulting from heavy rains or rapid snowmelt, can flood areas not typically subject to flooding, including urban areas. Additionally, extreme cold temperatures can cause streams and rivers to freeze, creating ice jams and subsequent flood conditions.

Floods are considered hazards due to the risk to public safety and property. Hundreds of floods occur each year nationwide and flooding is one of the most common hazards across all states and U.S. territories. Most injuries and deaths from flooding happen when people are swept away by flood currents and most property damage results from inundation by sediment-filled water, often causing extensive damages to basements of homes. Fast-moving water can wash buildings off of their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be impacted when high water combines with flood debris. Damage to crops and the loss of livestock can heavily impact the agriculture sector in a community.

Several factors determine the severity of floods including rainfall intensity and duration, topography, and ground cover. Floods can be slow or fast rising, but generally develop over a period of many hours or days. There are many factors that cause or worsen flooding including dam failure, extended, localized, and heavy precipitation, especially in a wildfire burn scar area, as well as issues with stormwater drainage systems.

Riverine flooding originates from a body of water, typically a river, creek, or stream, as water levels rise onto normally dry land. Water from snowmelt, rainfall, freezing streams, ice flows, or a combination thereof, causes the river or stream to overflow its banks into adjacent floodplains. Winter flooding usually occurs when ice in a river creates dams, or streams freeze from the bottom up during extreme cold spells. Spring flooding is usually the direct result of melting winter snow packs, heavy spring rains, or a combination of the two.

Flash floods can occur anywhere that a large volume of water flows or melts over a short time period, usually from slow moving thunderstorms or rapid snowmelt. Because of the localized nature of flash floods, it is difficult to define specific hazard areas. These types of floods typically occur quickly and bring significant impacts. Rapidly moving water, only a few inches deep can lift people off their feet, and a depth of a foot or two is enough to sweep cars away. Most flood deaths result from flash floods.

Potential Impacts

The type of property damage caused by flood events depends on the depths and velocity of the floodwaters. Faster moving floodwaters can wash buildings off their foundations and sweep cars downstream. Pipelines, bridges, and other infrastructure can be damaged when high waters combine with flood debris. Landslide likelihood increases due to soil saturation from flood events and poses more risk of damages.

Extensive damage can be caused by basement flooding and seepage into basements is common during flood events. Most flood damage is caused by water saturating materials susceptible to loss (e.g., wood, insulation, wallboard, fabric, furnishings, floor coverings, and appliances). Homes in flooded areas can also suffer damage to septic systems and drain fields. In many cases, flood damage to homes renders them uninhabitable.

Flood events impact businesses by damaging property and by interrupting business operations. Flood events can limit or halt customer access to a business, as well as close a business for an extended period or permanently. The economy of a community can be rapidly impacted if businesses are unable to reopen in a timely manner.

Damaged utilities, including leaking gas lines, open electrical cables, and wastewater contamination pose tremendous risk to homes, businesses, and people. The potential for explosions and fires, exposed electrical currents, and exposure to contaminated water can cause fatalities and illness. Domestic and wild animals forced out of their homes and brought into contact with humans by floodwaters can also pose a threat.

In rural areas, property damage caused by flooding can be devastating to ranchers and farmers. When flooding occurs during the growing season, farmers can suffer widespread crop loss. Stock growers may lose livestock if they are unable to find safety from rising floodwaters. Flooding may also cause damage to pasture land, fences, barns, and out buildings.

Public buildings have particular importance as they house critical assets for government response and recovery activities and damage to these building could slow various agency efforts significantly. Damage to public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and offices can hinder the ability of the government to deliver services. Loss of power and communications can be expected. Drinking water and wastewater treatment facilities may be temporarily out of operation.

Populations especially at risk of flooding include residents living in known flooding areas or near areas susceptible to flash floods. Residents that may have access and functional needs (AFN) include the elderly and very young; those living in long-term care facilities; mobile homes; low-income housing areas; temporary shelters; people with limited English proficiency; tourists and visitors; and those with cognitive, mobility, or sensory disabilities. These populations may have issues with evacuation and be disproportionately impacted by flooding due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

3.7.6 Hail

Hail is a form of precipitation that occurs when updrafts in severe storms carry raindrops upward into extremely cold areas of the atmosphere. The super cooled raindrops grow into balls of ice, posing a hazard to property, people, livestock, and crops when they fall back to the earth. The process of falling, thawing, moving up into the updraft, and refreezing before failing again may repeat many times, increasing the size of the hailstone. Typically, hailstones are less than 2" in diameter, although much larger have been reported and hailstones may fall at speeds of up to 120 mph. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. These events are often associated with thunderstorms that may cause high winds and tornadoes. One of the requirements for the National Weather Service (NWS) classification of 'severe' thunderstorms is the presence of hailstones of more than one inch in diameter. Hail causes nearly $1 billion in damage to crops and property each year across the nation and is one of the primary natural disasters resulting in USDA Secretarial disaster designations.

The NWS classifies hail by diameter size and corresponding everyday objects to help relay scope and severity to the population. The range is from the size of a pea (0.25 inches) to the size of a softball (4.5 inches). The largest hailstone reported in Wyoming was 5 inches in diameter. Based on data from the National Centers for Environmental Information (NCEI), the largest hail most recently reported, in Region 7 was 4.25 inches in diameter, in Goshen County in 2019. Smaller sizes are more characteristic of storms in the planning area, but multiple events have been reported across the region since 1950 with hail over 4 inches and the largest hailstone, 4.38 inches, was reported in Goshen County in 2000.

Hailstorms occur during severe storms and are therefore regional in nature. The amount of precipitation in the form of snow or rain may vary significantly within a single storm, and so may the amount, size, and duration of hail within a severe storm. This can have a wide range of impacts as the storm travels and the effects on life safety and property can vary greatly across the region. Region 7 communities are located in what is considered to be the nation's "Hail Alley." Together with adjacent portions of Colorado and Nebraska, the southeast area of Wyoming is battered by more hailstorms than any other part of the United States. Climatological data shows this area of Wyoming averages five to nine days annually when hail is reported. It is worth noting that hail frequency may be difficult to quantify, as it is most commonly reported in populated areas eliminating many storms from record.

Potential Impacts

While a given damaging hail event does not typically affect the entire county, all crops, livestock, property, people, buildings, and vehicles are vulnerable to hail damage. Risk from hail is uniform across the entire population of the county and hailstones can cause extensive damages and risk public safety.

Hail is a geographically isolated event that affects only several square miles at any one time. An event with large hailstones, some the size of a grapefruit have been recorded in the Region, can cause significant losses to property, livestock, and crops.

People caught outside during a storm are at risk of injury or death if they cannot find adequate shelter during a hail event. Additionally, flooding can accompany a hailstorm increasing potential negative impacts dramatically depending on the severity and location of the flooding.

In terms of property losses, the damages will depend on the housing density and density of vehicles in the impacted area, which varies widely across the Region. Livestock losses are dependent upon finding sheltering for the animals. Crop losses depend on the type of crop and the growth stage of the plants when the hail occurs. A hail storm in a rural area in the early spring when the plants are just emerging will have much less of an impact than a storm of the same intensity occurring later in the growing season. Later in the season the plants are more susceptible to damage and the crop may be a total loss, if there is no time to replant damaged plants.

Hail can cause transportation incidents and make travel difficult or dangerous, including the arrival of first responders and emergency personnel, if needed. The environment and habitats of plants and animals can sustain serious damage, while the animals are at risk of injury or death due to hailstones.

Essential buildings and Lifelines could be damaged by hail or resulting broken tree branches, which could especially impact communications and electricity. Historic and cultural resources experience the same vulnerability as general property and essential facilities but depending on the nature of construction could suffer structural damage from hail.

3.7.7 Hazardous Material Release

The U.S. Department of Transportation (USDOT) designates materials as hazardous which pose "an unreasonable threat to the public and environment". This includes a variety of substances, wastes, pollutants, and materials. These materials are divided into nine classes, which contain substances that are gases, flammable, explosive, corrosive, toxic, oxidizing, and radioactive. There are strict regulations on the labeling and required handling of these substances. The treatment, storage, transport, and disposal of these materials is also strictly regulated and closely monitored.

A hazardous material release transportation incident refers to accidental and uncontrolled releases of chemicals or other hazardous materials during transport (i.e., highways, pipelines, and railways). Trains and fuel trucks traveling through the county are of particular concern in regard to transportation incidents. Weather in Region 7 can increase the risk that a hazardous material release incident will occur. All three counties are subject to very high winds capable of tipping over large trucks. Trucks often have to stop in local communities if the NWS issues a high wind advisory or if roads are closed during severe winter storms.

A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a facility. Fixed facilities include companies that store hazardous waste at their facility and all hazardous waste sites. The Toxics Release Inventory (TRI) is a federal program established by the U.S. Environmental Protection Agency (EPA) that tracks the management of certain toxic chemicals that may pose a threat to human health and the environment. Certain industrial facilities in the U.S. must report annually how much of each chemical is recycled, combusted for energy recovery, treated for destruction, and disposed of or otherwise released on- and off-site. This information is collectively referred to as production-related waste managed and is not solely unintended releases.

The EPA also oversees the Emergency Planning and Community Right-to-Know Act (EPCRA) which requires certain regulated entities to report information about hazardous chemicals and substances at their facilities to federal, state, and local authorities. This allows improved ability of the facilities, and local government agency's to plan for and respond to chemical emergencies, as well as educate citizens about chemicals present in their communities. EPCRA also mandates the creation of two organizations, the State Emergency Response Commission (SERC) and the Local Emergency Planning Committee (LEPC). EPCRA requires facilities to submit material safety data sheets or Tier II forms, which list hazardous chemicals on-site above threshold quantities, to SERC's, LEPC's, and local fire departments. LEPC's are instrumental in many communities response and recovery planning.

The Risk Management Program, in addition to EPCRA, builds upon existing industry codes and standards, requiring companies of all sizes using certain flammable and toxic substances to develop a Risk Management Program. These plans include a hazard assessment, accident history, scenario evaluations, prevention program, and an emergency response program.

The Risk Management Program is about reducing chemical risk at the local level and increasing public communication. This information helps local fire, police, and emergency response personnel (who must prepare for and respond to chemical accidents) and is useful to citizens in understanding the chemical hazards in communities.

Region 7 communities are susceptible to incidents involving hazardous material release on roads, railroads, highways, and at fixed facilities that manufacture, use, or store dangerous chemical substances. A hazardous material release incident may occur at any time during routine business operations or as a result of a natural hazard. The release of hazardous materials can threaten people and natural resources in the immediate vicinity of the occurrence. Air releases can prompt large-scale population evacuations and spills into water or onto the ground can adversely affect public water and sewer systems.

Primary issues of concern include transported fuels and chemicals, substances used for agricultural purposes, such as pesticides and insecticides, those used in water and wastewater treatment, and substances used in mining and explosives. Many of these materials are transported along the Burlington Northern Santa Fe and Union Pacific rail lines, as well as federally regulated pipeline transportation systems. In addition, awareness of which facilities keep specific hazardous materials in storage and the function of the facility is necessary for oversight and regulation.

Potential Impacts

A hazardous material release event creates risk for the people, structures, and areas nearby. The impacts of an exposure depend on a variety of factors including, the type of material, method of release, location, weather, and the proximity to populated areas and waterways.

Evacuations may be necessary depending on the characteristics of the release. If people come into contact with the release, including the public, the personnel handling the materials, and first responders, the potential for injuries and deaths could be significant. Additionally, a hazardous material release can compromise water, air, and soil quality, posing a serious public health hazard for community members.

Structures and areas could be physically damaged or contaminated and rendered unfit for occupation. If businesses were forced to shut down due to a hazardous material release, the affected local economy would potentially be impacted.

Incidents that happen while hazardous material is in transit can affect traffic. Roadways can be closed for extended periods of time, possibly requiring extensive remediation and repairs. Any closures could impact commuters, and first responders, ability to travel.

Hazardous materials are transported along major rail and road corridors (I-25 and I-80) in the Region regularly, if not every day. The Union Pacific rail line and the Burlington Northern Santa Fe rail line both have rail lines that run through the Region. Residential and commercial structures are located near rail-switch yards and along the major transportation corridors across the Region, which would present a serious public health and safety concern if a hazardous material release incident were to occur.

3.7.8 Landslide

According to the United States Geological Survey (USGS), a landslide is the movement of a mass of rock, debris, or earth down a slope under the direct influence of gravity. The term "landslide" encompasses five modes of slope movement: falls, topples, slides, spreads, and flows. These are further subdivided by the type of geologic material (bedrock, debris, or earth). In Region 7, the focus is on landslides, debris flows and rock falls.

Significant landslide events are influenced by seasonal temperature and precipitation patterns. These events typically occur in the spring after periods of above-average precipitation over an extended duration, which is then followed by several days of intense rainfall. Slides are more likely on the days of intense rainfall or those with extensive snow melt. Landslide triggering rainstorms often produce damaging floods which can be made worse by the effects of the landslide. Other contributing factors include erosion and alternating freezing and thawing. Vibrations or earth shaking from construction and earthquakes are also known to trigger landslides and rockfalls.

Areas that are generally prone to landslide hazards include: existing old landslides; the bases of steep slopes; the bases of drainage channels; and developed hillsides where leach-field septic systems are used. Landslides are often a secondary hazard related to other natural disasters. In areas burned by forest and brush fires, a lack of stabilizing vegetation can increase the risk of landslides.

Debris Flow

Debris flows are sometimes referred to as mudslides, mudflows, or debris avalanches. A debris flow occurs when a combination of fast moving water and a great volume of sediment and debris surges down slope with tremendous force. Similar to a flash flood, these events generally occur during periods of intense rainfall or rapid snowmelt and may occur with little warning. Vegetation and soil changes after a fire increase the runoff and erosion in a watershed, and significantly increase the likelihood of debris flows and flash flooding. Flash flooding and debris flows can initiate during even moderate rainstorms over burn areas. The consistency of debris flow ranges from watery mud to thick, rocky mud that can carry large items such as boulders, trees, and cars.

Debris flows typically start on steep hillsides, as shallow landslides that liquefy and accelerate to speeds of about 10 miles per hour but can exceed 35 miles per hour. Their destructive power may be greatly increased if debris flows from many different sources combine in channels. Once they reach more level or flatter ground, debris flows spread over a broad area. This can result in the accumulation of thick deposits that can drastically impact developed areas. Debris flows are covered under the National Flood Insurance Program (NFIP); however, landslides are not.

Rockfall

A rockfall is the falling of a detached mass of rock from a cliff or down a very steep slope. Weathering and decomposition of geological materials produce conditions favorable to rockfalls. Rockfalls are caused by the loss of support, from underneath, through erosion or are triggered by ice wedging, root growth, or ground shaking. Manmade changes to an area or slope, such as cutting and filling activities, can also increase the risk of a rockfall. The dimensions of the rocks in a rockfall can vary significantly,

Potential Impacts

Landslides pose a risk to life safety and any property or infrastructure exposed in the area. Injuries, deaths, and damages are potential impacts, however landslide events are typically isolated to a geographic area minimizing the severity of damages. Although, depending on the event, damages may be extensive, such as with a debris flow where the geographic area impacted is larger, while a landslide may create localized damages that are difficult to repair, such as infrastructure buried in a landslide.

Disruption of Lifelines can impact day-to-day operations, of communities, local government, and response agencies. Power outages and communications failure can put community members at increased risk, limiting the ability of first responders to receive valuable information.

Roadways can be closed for extended periods of time due to a landslide, possibly requiring extensive debris removal and repairs. Any closures could impact commuters, and first responders, ability to travel.

3.7.9 Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. Intra-cloud lightning is the most common type of discharge and occurs between oppositely charged centers within the same cloud.

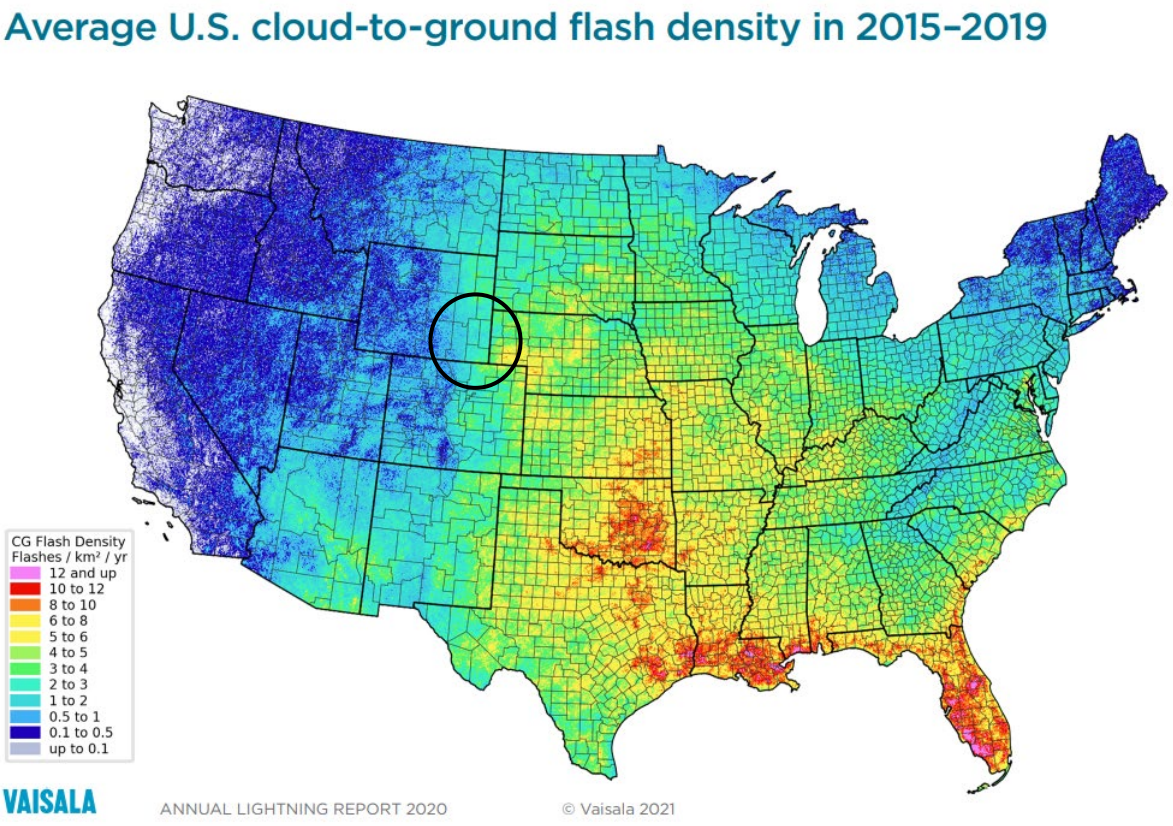
The less common type, cloud-to-ground lightning, is the most damaging and dangerous form. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a minority of flashes carry positive charge to earth and these positive flashes tend to occur during the dissipating stage of a thunderstorm's life. Positive flashes are more common during the winter months, as a percentage of total ground

strikes. Cloud-to-ground lightning frequently strikes away from the rain core, either ahead of or behind the thunderstorm and strike up to 10 miles from the storm, in areas that may be considered out of harm's way. Positive lightning has a longer duration and usually carries a high peak electrical current, potentially resulting in greater damage and increasing the likelihood of igniting a fire.

According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of $6-7 billion per year. Impacts can be direct or indirect, as people or objects can be directly struck, or damage can occur indirectly when the current passes through or near the object or person.

The geographic extent for lightning can be a regional hazard measured by the possible places of occurrence, or referred to a single-point occurrence and measured according to density. While anywhere in the planning area is susceptible to lightning, examining the density of the lightning flashes can assist in identifying the potential impacts of the hazard. According to data in the 2021 report from Vaisala's U.S. National Lightning Detection Network (NLDN), Wyoming ranked 31st in the nation, for 2021, for total cloud-to-ground and cloud pulse lightning counts with over 1.5 million strokes and pulses. In the 2020 lightning report, Wyoming ranked 29th with 1.2 million strikes which was 46% of the average density compared with the averages from 2015-2019, shown in Figure 3.3 Average US Cloud-to-ground Flash Density 2015-2019. Region 7 overall has an average cloud-to-ground flash density of between 0.5 to 3 flashes per km^2 per year, based on data from 2015-2019.

Figure 3.3 Average US Cloud-to-ground Flash Density 2015-2019



Potential Impacts

All property, structures, livestock, and people outside during a thunderstorm are at risk of being struck by lightning. The unpredictability of lightning and the recorded instances of lightning strikes occurring miles away from an active thunderstorm illustrate the risk this hazard poses indiscriminately across the county. Lightning strikes cause intense but localized damage. In contrast to other hazards, lightning does not cause typically widespread disruptions with the community.

Property is more vulnerable to lightning than population because of the exposure ratios, since buildings are always exposed. Mitigation techniques, such as choice of building materials or landscaping help, reduce the vulnerability of these properties, but there is no data available to segment these properties out of the overall vulnerability assessment.

Structural & wildland fires, damage to buildings, electronics and electrical appliances as well as electrical power and communications outages are typical consequences of a lightning strike. The indirect social and economic impacts of lightning damage are typically associated with the loss of electrical power. Since society relies heavily on electric power, any disruption in the supply, even for a short time period, can have significant consequences.

Those in the Region who rely on constant, uninterrupted electrical supplies may have a greater, indirect vulnerability to lightning strike consequences. Prolonged outages can impact those who use durable medical equipment and/or are especially sensitive to temperature changes. Rural residents, and agricultural operations reliant on electricity for heating, cooling, and water supplies are also especially vulnerable to power outages.

Critical facilities have the same vulnerability to lightning as other structures, but the potential impacts could be more significant, such as affecting medical care availability or striking a building with crucial communications equipment. Some aspects of infrastructure are constructed of materials and/or located in places that increase their vulnerability to lightning. Sometimes, communications and infrastructure are interrupted by lightning strikes. These events impact essential functions by delaying response times, hindering interagency communication efforts, and potentially downing communication networks.

Natural resources may be vulnerable to indirect impacts of lightning, such as wildfires caused by lightning strikes. The presence of large areas of water, or of wide, open spaces in natural habitats may increase the danger of lightning strikes to trees, people, or structures, but these vulnerabilities are not directly related to natural resources. Campgrounds are areas where lightning strikes have increased risk due to populations utilizing the campgrounds.

3.7.10 Public Health Hazards

Public health hazards are those that can adversely impact the health and environment of a large number of people. These hazards can manifest as primary events by themselves, such as epidemics and pandemics, or they may be secondary to another disaster or emergency, such as a flood, severe storm, or hazardous materials incident. Environmental components of public health hazards that can affect the health of the community include air and water quality, which can be affected by pollutants, such as smoke from a fire or contaminants such as disease.

Public health hazards affect communities differently, based on the exposure to a hazard and the health and well-being of each resident. Many factors are looked at when determining risk for the public and individuals at the local level including the quality of health, the availability of clinical services, and the level and duration of exposure to a hazard.

There are daily operations in communities which could pose health risks, such as water and air quality, as well as proximity to hazardous materials. Communities live with these every day, but the hazards that garner the most attention are those that affect the population at a greater rate and to a greater extent, such as disease outbreaks.

Disease outbreaks come in many forms, such as bacteria, viruses, and fungi, which can be spread through the air, water, and on surfaces. Outbreaks, including epidemics and pandemics, have the potential to cause serious illness, distress, and death, especially among those who have compromised immune systems due to age or underlying medical conditions.

Epidemics are disease outbreaks that typically only affect members of the local community and do not spread to other areas. A pandemic is an epidemic that spreads to a large population across country borders. These are most often caused by new subtypes of viruses or bacteria for which humans have little or no natural resistance. Consequently, pandemics typically result in more deaths, social disruption, and economic loss than epidemics.

Another public health issue is traumatic events, when a community has a shocking or distressing event which impacts physical, emotional, and psychological well-being. These events can have long-term impacts on the public and require extended support resources. It is important to recognize the needs for behavioral and mental health in the community, in day-to-day life after an event, to better support the affected population.

Potential Impacts

Life safety is the most significant impact from public health hazards, as there is a risk of death, injury, or illness resulting from immediate or secondary effects of an event. Impacts can be more severe for some of the population than others, depending on the hazard and who is exposed. One example would be those with asthma or breathing conditions, who would likely be impacted more by the effects of wildfire smoke and poor air quality.

People with chronic health conditions and access and functional needs (AFN) are often disproportionately affected by public health hazards than those who do not fall into these demographics. AFN also includes those living in poverty, who may have difficulty seeking needed medical care or following public health orders, such as staying home from work. Those for whom English is not their first language may struggle to understand public health messaging and not comply with a water boil order, putting themselves and their families at risk.

Mental and behavioral health impacts can come from a variety of situations. In the case of an acute traumatic event, those who are direct survivors, were watching close by, or were helping during a traumatic incident, especially first responders, are at significant risk of negative mental health impacts. In a longer event, such as an epidemic or pandemic, the effects are widespread but drastically varied based on one's experience during the event.

Understanding the ways in which mental health can be impacted and how needs might manifest themselves is important to life safety and public wellbeing. Partnering with agencies that are trained to support and assist with getting someone the help they might need is crucial before an incident happens.

The effects of a public health event can impact the economy and day-to-day operations, including events that result in less available staff, a water quality issue that results in water shutoff for any period, and an air quality shelter in place order to protect the public from airborne hazards.

3.7.11 Tornado

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud, usually accompanying a thunderstorm, and whirling at destructive speeds of up to 300 mph. Tornadoes are incredibly powerful and along a path less than 300 yards wide can have the same pressure differential fueling a 300 mile wide hurricane. Funnel clouds are closely associated with tornadoes however, the rotating columns of air and condensed water droplets do not make contact with the ground.

Tornadoes form when cool, dry air sits on top of warm, moist air. In Wyoming, this most often happens in the spring and early summer (i.e., May, June, and July) when cool, dry mountain air rolls east over the warm, moist air of the plains during the late afternoon and early evening hours. However, tornadoes are possible anywhere in the state, at any time of year, and at any point during the day.

Tornadoes can cause damage to property and loss of life. Violent winds and flying debris can result in injuries and deaths. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Tornadoes affecting the developed portions in Region 7 are more likely to cause high dollar damage amounts than tornadoes that strike in more remote parts of the planning area, even if they are comparatively smaller.

Tornadoes are classified on an intensity scale and prior to 2007 this scale was the Fujita (F) Scale, which has seven categories (F0-F6). The Fujita Scale was used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure.

On February 1, 2007, the Fujita scale was decommissioned in favor of the more accurate Enhanced Fujita Scale (EF Scale). The EF Scale measures tornado strength and associated damages and classifies tornadoes into six intensity categories, as shown in Table 3.7. The EF Scale better reflects examinations of tornado damage surveys, so as to align wind speeds more closely with associated storm damage. The new scale takes into account how most structures are designed and is thought to be a much more precise representation of the surface wind speeds in the most violent tornadoes.

Table 3.7 Enhanced Fujita (EF) Scale

Enhanced Fujita Category	Wind Speed (mph)	Potential Damage
EF0	65-85	**Light damage:** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	**Moderate damage:** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage:** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage:** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage:** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	**Incredible damage:** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yds.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

The NWS, along with the Texas Tech University Wind Science and Engineering Research Center, developed 28 damage indicators to be used with the Enhanced Fujita Scale for different types of buildings and ranges of wind speeds. Some of these indicators include type of building, number of floors, construction material, building purpose, and types of trees.

Wyoming lies just west of "Tornado Alley," and is fortunate to experience less frequent and intense tornadoes than its neighboring states to the east. Although, tornadoes remain a significant hazard in the state. Tornadoes are possible anywhere in Wyoming, especially in the plains region where Region 7 communities are located. The severe weather conditions that spawn tornadoes are regional events which may impact any extent of the planning area at a given time. However, tornadoes, as a stand-alone event are single-point (or limited point) occurrences, are more likely to have a localized impact than affecting the overall region.

Potential Impacts

Tornadoes can wreak havoc on all aspects of a community. Life safety, property, livestock, crops, and Lifelines are all at risk of impacts from a tornado event.

General damages are both direct, what the tornado physically destroys, and indirect. Indirect focuses on additional costs, damages, and losses attributed to secondary hazards and/or damages caused by the tornado. Depending on size of the tornado, its path, and the length of time on the ground, a tornado is capable of damaging or destroying almost anything in its path. Buildings that are close to large trees or overhead power lines are at greater risk of more extensive damages. Construction practices can help maximize the resistance of the structures to damage.

Public buildings have particular importance, as they house critical assets for government response and recovery activities, and damage to these building could slow various agency efforts significantly. Damage to public water and sewer systems, transportation networks, emergency facilities, and offices can hinder the ability of the government to deliver services.

Damaged utilities including leaking gas lines, open electrical cables, and wastewater contamination pose tremendous risk to homes, businesses, and people. The potential for explosions and fires, exposed electrical currents, and exposure to contaminated water can cause fatalities and illness. Extended power outages create negative impacts for the community, especially those who are reliant on powered medical equipment.

In rural areas, property damage caused by a tornado can be devastating to ranchers and farmers. If a tornado occurs during the growing season, farmers can suffer widespread crop loss. Stock growers may lose livestock if they are unable to find safety. Tornadoes may also cause damage to pasture land, fences, barns, and out buildings.

Populations especially at risk of tornado impacts include residents that may have access and functional needs (AFN) including the elderly and very young; those living in long-term care facilities; mobile homes; low-income housing areas; temporary shelters; people with limited English proficiency; tourists and visitors; and those with cognitive, mobility, or sensory disabilities. These populations may have issues with seeking safe shelter and be disproportionately impacted by the event due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings. Recovery for these populations is often more difficult and time consuming, depending on the needs, than for other residents of the community.

Tornado events impact businesses by damaging property and by interrupting business operations. Tornado events can limit or halt customer access to a business, as well as close a business for an extended period or permanently. The economy of a community can be rapidly impacted if businesses are unable to reopen in a timely manner.

3.7.12 Wildfire

As defined by the National Interagency Fire Center (NIFC), a "wildland fire" is any non-structure fire, other than prescribed fire, that occurs in the wildland. Wildland Urban Interface (WUI) is a widely used term within the wildland fire management community to describe any area where man-made buildings are constructed close to or within a boundary of natural terrain and fuel, where high potential for wildland fires exists.

As the population and the WUI development in Wyoming increases, the higher the risk of wildland fire hazard becomes. The past 100 years of wildland fire suppression has led to heavy vegetation growth and thus has greatly increased the potential fuel-load for a wildfire to burn. As the WUI has grown into these densely packed forests, the potential for catastrophic wildland fires has increased as well.

Although different reports, assessments, plans, and programs have been developed by different organizations at all levels of government, interagency coordination has proven to be more effective, and today Wyoming wildland fires are managed and supported to varying extents through these cooperative efforts.

Historical wildfire incidents are reported through the Wyoming Wildfire Risk Assessment Portal (WYWRAP) and the Historic Fires Database, which were used to identify incidents that have occurred within or near the planning area. For this plan, population risk was analyzed using the footprint of structures exposed to the top 20% highest risk areas for wildfire. These data sets are considered the best-available data for assessing the planning area's previous occurrences of wildfires and their associated risk.

Fuels (combustible material) to wildfires are subject to a variety of ignition sources, including natural and human caused variations. Another important aspect of fuel quality is the total surface area of the material that is exposed to heat and air. Fuels with large area-to-volume ratios, such as grasses, leaves, bark and twigs, are easily ignited when dry. Historically, fire starts have been contained quickly with minimal loss to property and structures. Several factors can contribute to a fire spreading quickly, including drought, Red Flag conditions (warm temperatures, very low humidity, and stronger winds), and high wind events. Due to the arid climate within the planning area, wildland fires can and do occur on a year-round basis.

Climatic and meteorological conditions that influence wildfires include solar insulation, atmospheric humidity, and precipitation, all of which determine the moisture content of wood and leaf litter. Dry spells, heat, low humidity, and wind increase the susceptibility of vegetation to fire. Additional natural agents can be responsible for igniting wildfires, including lightning, sparks generated by rocks rolling down a slope, friction produced by branches rubbing together in the wind, and spontaneous combustion.

Arson and accidents, including sparks from equipment and vehicles, cause wildfires and human-caused wildfires are typically worse than those caused by natural agents. Arson and accidental fires usually start along roads, trails, streams, or at dwellings that are generally on lower slopes or bottoms of hills and valleys. Nurtured by updrafts, these fires can spread quickly uphill. Arson fires are often set deliberately at times when factors such as wind, temperature, and dryness contribute to the spread of flames.

Potential Impacts

Wildfire is unpredictable and can change direction and intensity level in a matter of minutes, as well as make large runs which burn acres rapidly. Due to this, property damage ranges drastically even within a small area. In some cases, a small portion, or the roof, of a house may be damaged by hot embers that are blown onto the structure and ignite the materials, while the house next door may burn completely.

Wildfire has the potential to contaminate water supply and burn crops in a prairie fire. Fires can lead to debris flows and flooding, affecting the landscape and the habitats in the area, as well as any communities in the flow path.

Lifelines could be affected by wildfire. Transportation can be affected with roads closing due to the fire itself, the responders needing access, or evacuated areas that are not open for the public. Communication equipment and infrastructure can be damaged, hindering the abilities of responders. Power can be affected if infrastructure is damaged and depending on the length of the outage, can impact the ability of residents to stay at home. This can be especially dangerous for those who rely on powered medical equipment.

Wildfires have the potential to impact the economy in all counties in the Region. If a large number of public buildings and businesses were damaged within a community it could result in negative economic impacts until cleanup, repair work, and necessary construction is completed.

Public health can also be affected, even significant distances away, by the smoke and ash from a nearby fire. This is dangerous for the entire population, but especially hazardous to those with respiratory conditions, children, and the elderly.

Populations especially at risk of wildfire impacts include residents that may have access and functional need (AFN) including the elderly and very young; those living in long-term care facilities; mobile homes; low-income housing areas; temporary shelters; people with limited English proficiency; tourists and visitors; and those with cognitive, mobility, or sensory disabilities. These populations may have issues with evacuating and will likely be disproportionately impacted by the event due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings. Recovery for these populations is often more difficult and time consuming, depending on the needs, than for other residents of the community.

3.7.13 Wind

The risk assessment for wind includes windstorms, thunderstorm winds, and other high wind events, as well as windblown deposits. The following sections further define high wind events that are discussed in each county's risk assessment section.

While many people correlate wind damage with tornadoes, straight-line winds associated with severe thunderstorms can cause extensive damage as well. These winds can become hurricane-force in the worst cases. The following table lists relative wind speeds and anticipated effects.

Table 3.8. Wind Speeds and Effects

Wind Speed (knots)	Wind Speed (mph)	Wind Effects
22-27	25-31	Large branches in motion.
28-33	32-38	Whole trees in motion, inconvenience in walking against the wind.
34-47	39-54	Twigs and small branches break off trees, difficulty in walking against the wind, high profile vehicles such as trucks and motor homes may be difficult to control.
48-64	55-74	Potential damage to antenna structures, wind may push over shallow rooted trees, especially if the soil is saturated.
65-83	75-95	Potential for minor structural damage, particularly to manufactured homes, power lines, trees, and signs may be blown down.
84-96	96-110	Moderate structural damage to walls, roofs, and windows, trees blown down, and manufactured homes may be destroyed.
97-113	111-130	Extensive damage to walls, roofs, and windows, trees blown down, moving vehicles pushed off roads.
114-135	131-155	Extreme damage to structures and roofs, trees uprooted or snapped.
Greater than 135	Greater than 155	Catastrophic damage, structures destroyed.

Source: National Weather Service Spotters Guidance

Non-thunderstorm, widespread "high wind" behind cold-frontal passages in the wake of strong synoptic-scale low pressure systems can bring extensive wind damage. Severe thunderstorms develop powerful updrafts and downdrafts. An updraft of warm, moist air helps to fuel a towering cumulonimbus cloud reaching tens of

thousands of feet into the atmosphere. A downdraft of relatively cool, dense air develops as precipitation begins to fall through the cloud. Winds in the downdraft can reach in excess of 87 knots (kts) or 100 miles per hour (mph). When the downdraft reaches the ground, it spreads out forming a gust front: the strong, often refreshing wind that kicks up just before the storm hits. As the thunderstorm moves through the area, the full force of the downdraft in a severe thunderstorm can be felt as horizontal, straight-line winds with speeds well over 44 kts (50 mph). Severe thunderstorms in Wyoming can produce wind gusts to 50 to 91 kts (58 to 105 mph) per NWS and NCEI data.

Straight-line winds are currents of air in which the ground-relative motion does not have any significant curvature. They are used in the context of surface winds that inflict damage and are distinguished from winds in tornadoes, which have significant curvature. Straight-line winds are often responsible for most of the damage associated with a severe thunderstorm. Damaging straight-line winds occur over a range of scales. At one extreme, a severe single-cell thunderstorm may cause localized damage from a microburst, which is a severe downdraft extending less than two miles across. In contrast, a powerful thunderstorm complex that develops as a squall line can produce damaging winds that carve a path as much as 100 miles wide and 500 miles long. Severe thunderstorm wind events can inflict considerable damage on trees, power lines, and other wooden structures.

The non-thunderstorm, widespread "high wind" events usually occur during the cooler part of the year, from October through April. During this time of the year, the atmospheric pressure differences between high pressures and low pressures are maximized. This results in tighter pressure gradients which generate stronger surface winds. These non-thunderstorm "high wind" events usually have wind gusts from 50 to 87 knots (58 to 100 mph) that can persist for 6 to 18 hours over large areas. Non-thunderstorm winds account for most high wind events within the planning area.

The Beaufort Wind Scale, summarized in the following table, is also used to measure the severity of high winds. Hurricane force winds are defined as a speed equal to or greater than 64 knots (74 mph) or Beaufort Number 12 (Force 12). Hurricane-force winds are not exclusive to hurricanes; they occur quite often in strong non-tropical storms such as the northeaster, or even in severe thunderstorms.

Table 3.9. Beaufort Wind Scale

Force	Wind Speed (kts)	WMO Classification	Appearance of Wind Effects (on Land)
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicated wind direction, still wind vanes
2	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs

Force	Wind Speed (kts)	WMO Classification	Appearance of Wind Effects (on Land)
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	
12	64+	Hurricane	

Source: NOAA Beaufort Wind Scale

Damaging windstorm events may occur anywhere in Region 7. However, damaging winds may not affect all jurisdictions equally, as damage associated with a severe thunderstorm tends to be a geographically isolated event, affecting only small areas of several square miles at any one time. On the other hand, widespread, non-thunderstorm high winds can affect much of the planning area.

Windblown deposits, also called loess, form when very small particles of sand, silt, or clay materials are carried by wind and deposited on the ground. Windblown deposits are considered a part of the wind hazard, as the Wyoming State Geological Survey (WSGS) states they have the potential to damage property. They can also affect water supplies, agriculture, and infrastructure. While some counties in the Region have a considerable number of locations identified for windblown deposits, they do not pose a notable risk to the populations in the Region. The majority of locations for deposits are outside of municipal areas, although there are homes in unincorporated areas which sit in identified windblown deposits locations. Increased development of identified areas can potentially destabilize soil, contributing to more deposit movement occurring.

Potential Impacts

The entire population of the Region is vulnerable to high winds and thunderstorm winds. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. Extended power outages present a challenge for all of the population in the Region. Those who may need more assistance obtaining information and resources, such as those with mobility issues, powered medical equipment, and chronic illness, are especially at risk from extended power outages. Without a back-up power source, rural residents and agricultural operations that are reliant on electricity for heating, cooling, and water supplies are especially vulnerable to power outages.

In terms of property losses caused by any high-wind hazard, the damages will depend on the building density and quality of construction in the impacted area. Buildings that are close to large trees or overhead power lines are at greater risk of suffering more extensive damages. Damages could be significant to local residential structures and commercial buildings, as well. Construction practices can help maximize the resistance of the structures to damage.

In terms of crop losses, the damages that occur will depend on the type of crop and the growth stage of the plants. A wind storm in a rural area in the early spring when the plants are just emerging will have much less of an impact than a storm of the same intensity occurring later in the growing season when the plants are more susceptible to damage and when there is no time to replant if the crop is a total loss.

High wind events have the potential to wreak havoc on above-ground infrastructure, such as power and communication lines. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies.

It is not uncommon for semi-trailers to blow over in high wind events and multiple events listed this occurrence in the NCEI narrative. Other potential damages due to high wind events include power pole and power line downing, leading to power outages that can be significant and extended. For property, damaged roofs, toppled trees, broken branches, and blown-out windows are possible and crops may be destroyed in an event.

Windblown deposits have the potential to cause air quality issues for people outdoors during an instance of loess being carried. Damage to infrastructure and property are possible as the silt or small sand particles may create issues if they infiltrate sensitive areas. Large movement of deposits or dunes can cover roads or build up against a structure, much like a snow drift.

New development in areas of windblown deposits have the potential to destabilize the deposit, which can create movement of a large amount of deposits. Mobile, large deposits have been known to cover roads, and in some cases build up around homes.

3.7.14 Winter Storm

Winter storms are storms that occur during the winter months and produce snow, ice, freezing rain, sleet, etc. Winter storms are a yearly occurrence in climates, like Region 7, where precipitation may freeze but are not always considered a disaster. Winter storms can produce heavy snow, significant ice accumulation, or prolonged blizzard conditions. Disasters occur when the winter storms impact the operations of the affected community by damaging property, stalling the delivery of critical services, or causing injuries or deaths among the population.

Winter storm watches and warnings, issued by the NWS, help determine the difference between a seasonal winter storm and a severe winter storm. Warnings are issued if the storm is producing or suspected of producing heavy snow or significant ice accumulations. Watches are usually issued 24 to 36 hours in advance for storms capable of producing those conditions, though criteria may vary between locations. Winter Weather Advisories are issued when a low-pressure system produces a combination of winter weather that presents a hazard but does not meet warning criteria.

Heavy snow can immobilize a region, strand commuters, stop the flow of supplies, and disrupt emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for extended periods until damages are repaired. Even small accumulations of ice may put motorists and pedestrians at risk.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Winter storms within Region 7, including strong winds and blizzard conditions, may cause localized power and phone outages, closures of streets, highways, schools, businesses, and non-essential government operations, and increase the likelihood of winter-weather related injury or death. People may be stranded in vehicles or other locations not suited to sheltering operations or isolated from essential services. A winter storm can escalate, creating life threatening situations when emergency response is limited by severe winter conditions. Other issues associated with winter storms include the threat of physical overexertion that may lead to heart attacks or strokes, as people try to shovel large amounts of snow. Snow removal costs can pose significant budget impacts, as can repairing damages caused by downed power lines, trees, structural damages, etc.

Winter storms are a yearly feature of the Wyoming climate and may occur anywhere in the state. Generally, winter storm events are considered regional, which implies that the storms impact multiple counties simultaneously, often for extended time periods. It is possible for the geographic extent of the hazard to vary significantly within a single county. A regional storm may directly impact only a small portion of the planning area, while still extending over a large portion of the surrounding area. The impacts and effects of a regional hazard are often felt elsewhere within the planning area and surrounding geography.

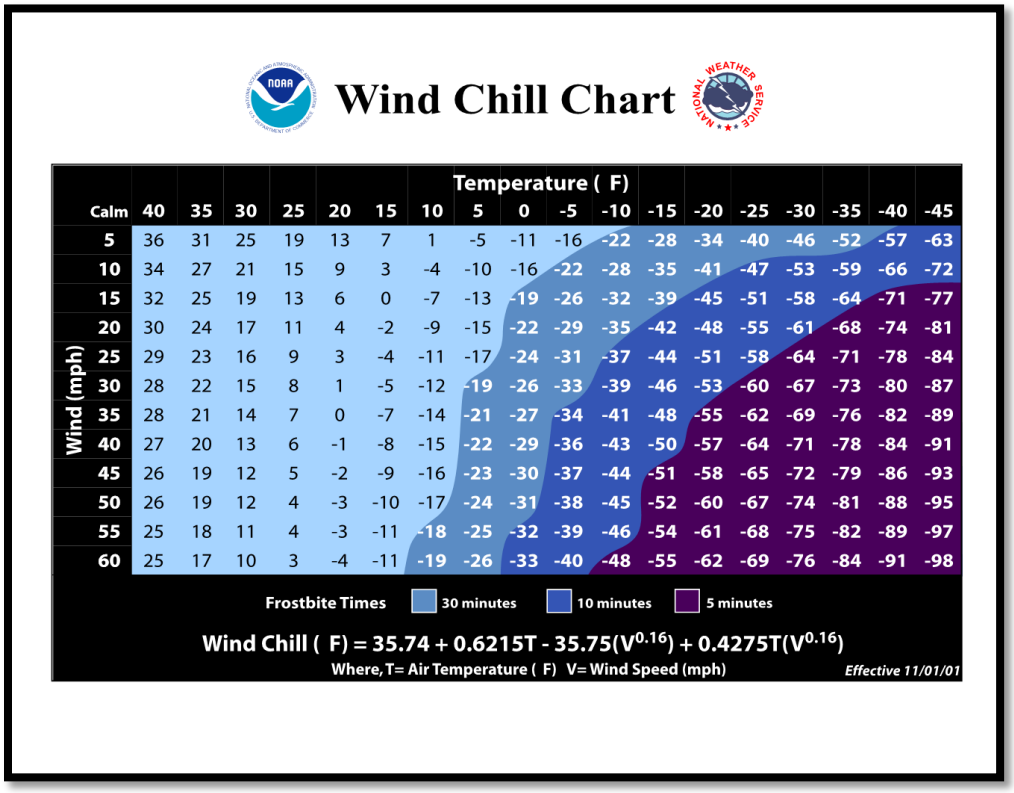
Extreme Cold

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Populations at considerable risk to this hazard include those with access and functional needs that may be isolated and unable to get to a warm location, as well as children and the elderly who have less ability to cope with the cold. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities and cause utility outages, leaving people without water or power until the utility companies are able to restore service. Extreme cold temperatures can destroy crops and kill livestock that are not adequately protected.

What constitutes extreme cold temperatures varies across the United States and is based on normal climate temperatures for the time of year. In Wyoming, cold temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter lows, the cold is considered extreme and begins to impact the daily operations of the county.

In 2001, the National Weather Service (NWS) implemented an updated Wind-Chill Temperature index (Figure 3.4). Wind-chill is not a direct measurement of temperature, this index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature, increasing the likelihood of severe injury or death to exposed persons and animals.

Figure 3.4. NWS Wind-Chill Chart



The inherent nature of extreme cold makes it a regional hazard, impacting most or all of the planning area, as well as extending the effects into surrounding communities. Wind-chill impacts Region 7 with similar variability

of other widespread weather hazards, as one county may experience significantly colder wind-chill than another and wind speed and direction can quickly change the affected locations.

Potential Impacts

The damages caused by severe winter storms and blizzards vary and are dependent on several factors. The duration of the storm; the geographic extent; the time of year; meteorological factors such as wind, moisture content of the snow, ground, and air temperatures; and the advance warning of the storm all have significant effects to the impacts of an event. Impacts from the storm dictate the magnitude of the event, emphasizing that the amount of snow may not always directly correlate to the severity of the storm.

The weight of the snow, driven by water content, increases the potential for damage to structures and trees. Lighter snow, caused by extreme cold, increases the damage caused to crops, livestock, and agricultural operations which are highly vulnerable to winter storms and freezing conditions. Ice storms or high winds during winter storms can cause extensive loss of overhead utility lines due to buildup of ice on the lines or on adjacent trees falling onto the lines due to wind or weight of the ice. Ice or heavy accumulations of snow, particularly blowing and drifting snow, can temporarily impact the roadway system. The road management overtime costs can be considerable to maintain the safety of roadways.

Heavy, wet snow which packs down densely, may create strains on structures, causing partial or entire collapses of walls, roofs, or windows. This is impacted both by architecture and construction material and should be assessed on a building-by-building basis. Contents of homes, storage units, warehouses, and storefronts may be damaged if the structures are compromised or fail due to the weather, or during potential flooding caused by melting snow. Older venues and historical properties are at more risk of consequences from winter storms and extreme cold.

Winter storms go through thaw and freeze cycles, which prolong dangerous icy conditions, increases the likelihood of impassable or dangerous roadways, putting the commuting public at greater risk. This cycling can cause extensive damages to infrastructure and structures due to seeping water freezing under roofs, porches, patios, and inside sidings, or cause damage to vehicles. Property damages can be caused by high winds, ice, or melting snow pack.

The threat to public safety is the greatest concern during severe winter storms. While the entire population is vulnerable to winter weather, there are segments of the population that are more likely to experience potential indirect impacts of a winter storm than others, particularly the loss of electrical power.

Extended power outages present a challenge for all populations in the Region. Those who may need more assistance obtaining information and resources, such as those with mobility issues, powered medical equipment, and chronic illness, are especially at risk from extended power outages. Without a back-up power source, rural residents and agricultural operations that are reliant on electricity for heating, cooling, and water supplies are especially vulnerable to power outages.

With a longer warning time, it is possible to address insufficient supply levels and test emergency generators. Unanticipated storms increase the number of people stranded, in cars and at public locations, potentially increasing the number of injuries and deaths, often caused by exposure. Strains on public sheltering capacities can occur depending on the number of people needing shelter in an area.

The risks of carbon monoxide poisoning or structure fires increases as individuals attempt to warm cars in garages and use improper heaters indoors. Stalled vehicles, or those that fail to start, may result in minor economic loss if individuals are unable to commute between work, school, and home.

Hospitals may see an increase in cold-related injuries directly, or injuries associated as secondary effects of the cold, and a prolonged extreme cold/wind chill of a winter storm event may impact hospital personnel capabilities.

Severe winter weather may disrupt the services from essential infrastructure, including utility delivery (gas, electric and water), telephone service, emergency response personnel capabilities, road plowing, and childcare availability. Events have the potential to hinder operations of the Region, if staff are unable to travel to their necessary locations. Personnel working in the cold, such as farmers, ranchers, firefighters, EMTs, police officers and construction workers, have a higher vulnerability due to exposure times, and emergency response capabilities may be affected.

4 Plan Adoption, Implementation, and Maintenance

4.1 Formal Plan Adoption

The purpose of formally adopting this HMP is to secure support from all participants in this Region 7 HMP. Adoption resolutions from all plan participants can be found in the individual County specific Appendices.

4.2 Implementation

This plan is intended to be implemented so that Region 7 communities' vulnerability to natural hazards will be reduced over time. County specific maintenance details are included in Section 4 of Appendices A-C.

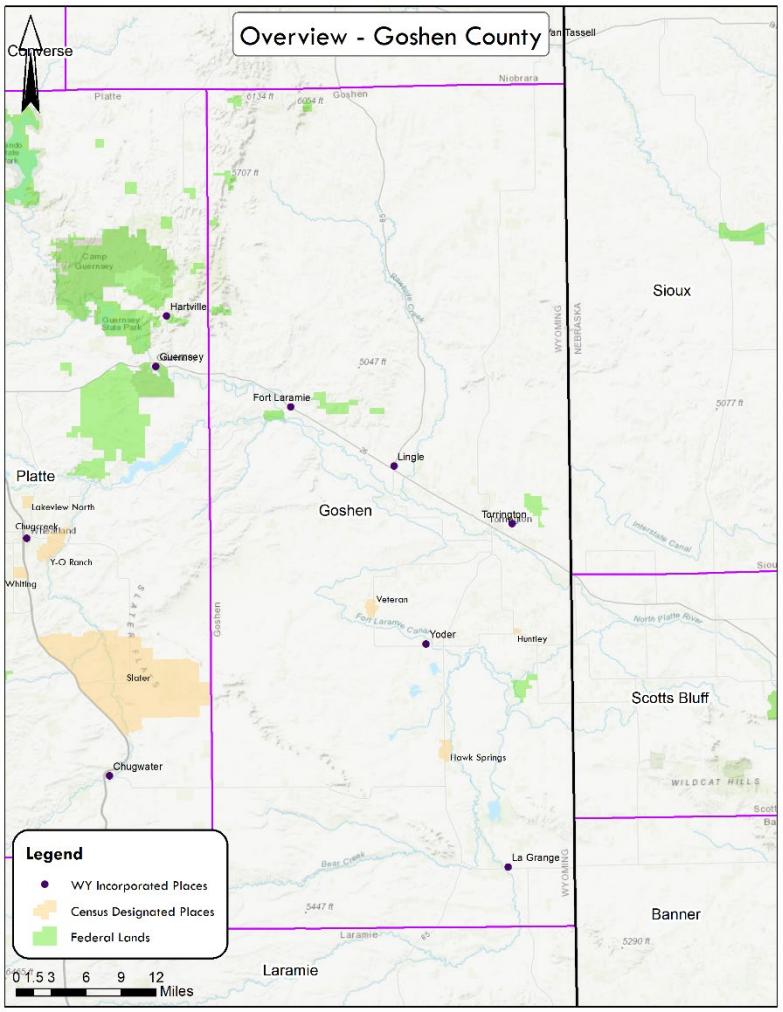
4.3 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation. This includes updating the plan as required or as progress, roadblocks, or changing circumstances are recognized. County specific maintenance details are included in Section 4 of Appendix A-C.

Appendix A: Goshen County

Wyoming Region 7 Hazard Mitigation Plan

Goshen County Annex - 2023 Update



GOSHEN COUNTY EM
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Contents

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SYNERGY DISASTER RECOVERY

1 Mitigation Strategy

1.1 Overview

The intent of the Mitigation Strategy is to help organizations identify implementable mitigation actions that will guide future mitigation policy and project administration. The Mitigation Strategy includes a list of proposed actions deemed necessary to meet those mitigation goals and objectives identified in the updated Hazard Mitigation Plan (HMP) and reduce the impact of hazards. The actions identified in this Appendix are specific to Goshen County and its participating organizations.

1.2 Mitigation Action Plan

1.2.1 Progress on Previous Mitigation Actions

As part of the 2023 HMP planning process, Goshen County and participating jurisdictions were tasked with reviewing mitigation projects that were identified in the existing Region 7 Hazard Mitigation Plan. Each jurisdiction reviewed their individual actions and reported on the status of those actions, shown in Table 1.1. Mitigation actions that have not yet been completed at the time of this plan's writing are listed as 'On-Going,' 'In Progress,' or 'No Progress – Continue Action.' Those actions identified as either 'In Progress' or 'No Progress – Continue Action' will be tracked and reported on, along with new actions, as part of future plan maintenance activities.

Recognition of mitigation successes when reviewing the status of the last plan's actions. For Goshen County, the completed actions from the 2017 plan include the purchase of new election system equipment for the county and the Town of Lingle installing backup generators for their water system, ensuring the pumps are able to run in the event of a power outage. In addition, the county and the City of Torrington are actively pursuing grant funding to aid in implementing their actions.

Table 1.1 2017 Mitigation Actions Status

ID	Lead Jurisdiction	Title	Description	2022 Status
2017-GoshenCo-1	Goshen County	Outdoor Warning Sirens	Install warning sirens for additional coverage area. Lowered potential for injuries and fatalities.	On-going
2017-GoshenCo-2	Goshen County	Government facilities / Election System	Purchase new equipment to increase reliability and cyber security. Use federal advocates and ensure compliance with Presidential Policy	Complete
2017-GoshenCo-3	Goshen County	Gravel Project	Apply gravel to help residents travel on main roads	On-Going
2017-GoshenCo-4	Goshen County	Jail Flooding Mitigation	Implement mitigation measures to prevent flooding and keep safety and security of inmate population.	No Progress - Continue Action
2017-JayEm Fire Dist-1	Goshen County	Water Storage Facilities	Install water storage facilities to reduce loss of grassland and support structures to wildfire by increasing water availability.	No Progress - Continue Action
2017-Fire Districts-1	Goshen County	Water Storage	Increase water storage capacity to avoid potential loss of structures, and grazing lands for livestock, etc.	On-Going

ID	Lead Jurisdiction	Title	Description	2022 Status
2017-GID-1	Goshen County	Culverts and Canal Gates	Install new infrastructure for spillway gates and new culverts	No Progress - Continue Action
2017-Torrington-1	Torrington	Storm Abatement	Implement measures to prevent loss or damage to property and prevent loss of mobility (streets)	On-Going
2017-Torrington-2	Torrington	Winter Storm Abatement	Implement measures for improved snow removal, improve travel safety and access to health and safety resources	On-Going
2017-Torrington-3	Torrington	Tornado Education and Preparedness	Educate public on tornado hazard awareness and preparedness measures	On-Going
2017-Fort Laramie-1	Fort Laramie	Dust/Flooding Abatement of Town Streets	Pave town roads to alleviate road washouts, increase drainage due to flooding, and eliminate the heavy dust.	No Progress - Continue Action
2017-Fort Laramie-2	Fort Laramie	Tornado Shelters	Incorporating any construction/addition to the community center would bring to shelter safety compliance	No Progress - Continue Action
2017-Fort Laramie-3	Fort Laramie	Generator for the Community Center	Install large capacity generator, to help shelter residents if needed	No Progress - Continue Action
2017-Town of LaGrange-1	LaGrange	Coordinating with Bureau of Reclamation (BOR)	Hold yearly meeting with Bureau of Reclamation (BOR) and with Bureau of Land Management (BLM) to coordinate and discuss potential impact of flooding in LaGrange	On-Going
2017-Town of LaGrange-2	LaGrange	Repair of County Roads	Implement repair of county roads to increase access into/out of La Grange for residents and commuters, and EMS/Fire Vehicles	On-Going
2017-Town of LaGrange-3	LaGrange	NFIP Participation	Participate in National Flood Insurance Program (NFIP)	No Progress - Continue Action
2017-Town of LaGrange-4	LaGrange	Manage Stormwater System	Implement measures to improvement management of stormwater system	No Progress - Continue Action
2017-Town of LaGrange-5	LaGrange	Hazardous Materials Training	Provide additional training and personnel to handle hazardous material releases	No Progress - Continue Action
2017-Town of LaGrange-6	LaGrange	Water Storage for County	Install water storage facilities to increase water availability and support wildfire response	In-Progress

ID	Lead Jurisdiction	Title	Description	2022 Status
2017-Lingle-1	Lingle	Town Maintenance Shop/Fire Hall	Implement mitigation measures to maintain critical equipment and infrastructure	On-Going
2017-Lingle-2	Lingle	Storm Shelter	Establish a storm shelter to reduce risk to life safety	No Progress - Continue Action
2017-Lingle-3	Lingle	Emergency Generators to Run Pump	Install generators to ensure continued operation of water system	Complete
2017-Yoder-1	Yoder	Storm Shelter	Establish a storm shelter to reduce risk to life safety	On-Going
2017-Yoder-2	Yoder	Generators	Install generator at fire station to ensure continuity of operations and communications, install in other critical sites as prioritized	In-Progress
2017-Yoder-3	Yoder	Tornado Shelter	Establish a shelter for severe weather to reduce risk to life safety	On-Going

1.2.2 Continued Compliance with National Flood Insurance Program (NFIP)

Given the importance of the NFIP in mitigating flood losses and the degree of flood risk in certain parts of Region 7, an emphasis will be placed on continued compliance with the NFIP by participating communities (Goshen County, City of Torrington, Fort Laramie, and Town of Lingle). As NFIP participants, the county and participating jurisdictions have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining the floodplain zoning ordinance. The current effective map was recently updated in June 2022.

1.2.3 Updated Mitigation Action Plan

Goshen County and participating jurisdictions selected and completed worksheets for a number of mitigation actions for this 2023 HMP. Each action worksheet was completed by a jurisdictional representative, and includes the following information:

- Project ID
- Local Government
- Project Title
- Issue / Background
- Benefits (Losses Avoided by Implementing Action)
- Priority
- Goals Met
- Lead and Support Organization(s)
- Hazard(s) Mitigated
- Potential Funding Source
- Expected Completion Year

Table 1.2 presents a summary of these new mitigation actions, in addition to the 2017 continued actions in Table 1.1, that were identified to be included in this updated HMP.

Table 1.2 2023 Mitigation Actions

ID	Local Govern-ment	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- G Multi-01	Goshen County Fort Laramie	Flooding Abatement	Assess functionality of spillways for two dams north of town to address dispersal issues	H	1,2	Goshen EM, Ft Laramie EM	Dam/Levee Incident, Flooding, Winter Storm, Heavy Rain Event	$250,000	Local, State, Federal	2027
2023- G Multi-02	Goshen County Torrington Fort Laramie La Grange Goshen Irrigation District Horse Creek Conservation District	Xeriscape education and incentives	Educate people on how the structure of their landscaping could retain water for essential community purposes	M	3	Goshen EM, Torrington EM, Ft Laramie EM, La Grange, Goshen Irrigation District, Horse Creek Conserv. District	Drought	Staff Time, Local Budgets	Local	2026

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- G Multi-03	Fort Laramie La Grange Goshen Irrigation District	Hail Protection Canopy/ Solar Panel Assembly for Off-Grid Backup Power	Evaluate priority locations to construction canopy structures over existing parking areas, with photovoltaic solar panels on the surface, connected to utility interface equipment and power storage equipment	L	2	Ft Laramie EM, La Grange, Goshen Irrigation District	Hail, Emergency Power Needs	$20,000	Local, Energy grant, FEMA HMA	2025
2023- G Multi-04	La Grange Lingle	Tornado Shelter	Assess primary town shelter locations to identify potential tornado retro-fits	M	1	La Grange, Lingle	Tornado, Wind	$20,000	Local, State, Federal	2026
2023- G Multi-05	Fort Laramie La Grange	Wind Mitigation	Assess waste, wastewater, and electric systems to determine those most at risk from wind losses and mitigate the risk to those most vulnerable components.	M	1, 2	Ft Laramie EM, La Grange	Wind	Unknown	Town Budget, FEMA HMA Grants	2027
2023- G Multi-06	Torrington LaGrange Lingle Horse Creek Conservation District	Emergency Generator for Shelters	Install emergency backup power to enhance the capabilities of the main sheltering facilities for each local government	H	1,2	Torrington EM, LaGrange EM, Lingle, Horse Creek Conserv. District	Winter Storm, Tornado, Wind, Other Emergencies	$100,000 each	Local, FEMA HMA	2028

ID	Local Govern-ment	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- G Multi-07	LaGrange Horse Creek Conservation District	Wildfire	Assess town assets and mitigate risk for wildfire, especially wind driven. Perform assessment to identify areas of deadfall to reduce wildfire risk.	M	1	La Grange, Horse Creek Conser-vation District	Wildfire	Unknown	Local, FEMA HMA, Other Federal Grants	2027
2023- Goshen County-01	Goshen County	Deer Creek Road Project	Complete re-work of the road foundation, drainage and surface of road in significantly impacted area	M	1,2,3	Goshen County EM	Rain Storm, Wind Storm, Blizzard, Other Emergencies	$500,000	Local, State DOT, Hazard Miti-gation Grant	2027
2023- Goshen County-02	Goshen County	Various Culverts and Crossing County-wide Project	Upgrade and replace culverts and water crossing infrastructure to safer travel, increased first responder times, flood protection, and lower maintenance costs	M	1,2	Goshen County EM	Rain Storm, Flooding, Other Emergencies	$50,000,000	Local, State DOT, Hazard Mit-igation Grant	2027
2023- Goshen County-03	Goshen County	Hail Protection Canopy/ Solar Panel Assembly for Off-Grid Backup Power	Construction of a canopy structure over existing parking areas, with photovoltaic solar panels on the surface, connected to utility interface equipment and power storage equipment	L	2	Goshen County EM	Hail, Emergency Power Needs	$200,000	Local, Energy grant, Hazard Miti-gation Grant	2027
2023- LaGrange-01	LaGrange	Public Warning System	Upgrade siren equipment to model that can provide voice warning	H	1,2	LaGrange EM	Tornado, Dam/Levee Failure, Other Emergencies	$30,000	Local, FEMA	2028

ID	Local Govern-ment	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-LaGrange-02	LaGrange	Lightning Safety Education	Develop an annual public education program focused on the hazards posed by lightning	L	3	LaGrange EM	Lightning	Staff Time, Local Budgets	Local	2026
2023- Fort Laramie-01	Fort Laramie	Emergency Generator	Installation of a backup generator to provide emergency power to primary town shelter	H	1	Ft Laramie EM	Tornado, Flooding, HazMat Spill, Winter Storm, Dam/Levee Incident	$65,000	Local, State Federal	2025
2023- Fort Laramie-02	Fort Laramie	Tornado Shelter	Implement all possible tornado retro-fits to the primary town shelter	H	1	Ft Laramie EM	Tornado, Earthquake, HazMat Spill, Dam/Levee Incident	$200,000	Local, State, Federal	2026
2023- PV Bar-01	PV Bar Improve-ment and Sewer District	Sanitary Sewer Flooding Mitigation Project	Construction of a lift station and two miles of force main to convey sewage to the collection system of the West Highway Sewer District	H	1,2,3	PVBISD Staff	Dam/Levee Incident, Public Health Hazard, Flood, Environmenta l Hazard	$2,000,000	Local, Grants	2028
2023- Lingle-01	Lingle	Storm Shelter/ Main-tenance Shop	Construct a facility to protect town utility equipment used to maintain critical infrastructure from hail and storm damage, provide a safe working environment for utility workers, and have a community shelter	H	1,2,	Lingle Staff	Wind, Hail, Tornado, Blizzard, Other Emergencies	$1,500,000	Local, FEMA	2028

ID	Local Govern-ment	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- Goshen Irrigation-01	Goshen Irrigation District	Flood Mitigation	Assess, design, repair or replace flood mitigation structures in the district	H	1,2	Goshen Irrigation District	Dam/Levee Incident, Flood, Landslide, Debris Flow,	$4,000,000	Local, FEMA	2028
2023- Goshen Irrigation-02	Goshen Irrigation District	Cyber Security	Install SCADA equipment and intrusion detection equipment at control points within the system	H	1,2	Goshen Irrigation District	Dam/Levee Incident, Flood, Cyber Hazard, Landslide, Debris Flow	$500,000	Local, Grants	2028
2023- Torrington Irrigation-01	Torrington Irrigation District	Flood Mitigation	Assess, design, repair or replace culvert crossings in the district	M	1,2	Torrington Irrigation District	Dam/Levee Incident, Flood, Debris Flow	$500,000	Local, Grants	2028
2023- Horse Creek-01	Horse Creek Conservation District	Flood Mitigation	Assess, design, repair or replace culvert crossings in the district	M	1,2	Horse Creek Conser-vation District	Dam/Levee Incident, Flood, Debris Flow	$500,000	Local, Grants	2028
2023- Horse Creek-02	Horse Creek Conservation District	Cyber Security	Install SCADA equipment and intrusion detection equipment at control points within the system	M	1,2	Horse Creek Conser-vation District	Cyber Hazards, Flood, Dam/Levee Incident, Debris Flow	$500,000	Local, Grants	2028
2023- Pathfinder Irrigation-01	Pathfinder Irrigation District	Flood Mitigation	Assess, design, repair or replace flood mitigation structures in the district	H	1,2	Pathfinder Irrigation District	Dam/Levee Incident, Flood, Landslide, Debris Flow,	$4,000,000	Local, Grants	2028

ID	Local Govern-ment	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-Pathfinder Irrigation-02	Pathfinder Irrigation District	Cyber Security	Install supervisory control and data acquisition (SCADA) equipment and intrusion detection equipment at control points within the system	H	1,2	Pathfinder Irrigation District	Cyber Hazards, Flood, Dam/Levee Incident, Debris Flow	$500,000	Local, Grants	2028
2023- Yoder-01	Yoder	Tornado Shelter	Construct a community storm shelter	H	1,2	Yoder EM	Storm, Hail, Wind, Blizzard, Tornado	$200,000	Local, FEMA	2028
2023-Torrington-01	Torrington	Mitigate Storm-related Street Flooding	Assessment of current drainage systems, and modification or enlargement of systems	M	1,2	COT EM, Water / Waste-water Dept	Flood	$20,000,000	Local, FEMA	2028
2023-Torrington-02	Torrington	Potable Water Wellfield Protection	Installation of a floodwall or dike protection and added security fencing	H	1,2	COT EM, Water / Waste-water Dept	Flood	$500,000	Local	2028
2023-Torrington-03	Torrington	Sewage Treatment Lagoon Erosion Protection & Physical Security Measures	Structural protection such as sheet piling and large rip-rap added to prevent further erosion and physical security measures	H	1,2	COT EM, Water/ Waste-water Dept	Flood, Dam/Levee	$1,000,000	Local	2028

ID	Local Govern-ment	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-Torrington-04	Torrington	Hail Protection Canopy/ Solar Panel Assembly for Off-Grid Backup Power	Construction of a canopy structure over existing parking areas, with photovoltaic solar panels on the surface, connected to utility interface equipment and power storage equipment	L	2	COT EM, City Hall	Hail	$200,000	Local	2028
2023-Torrington-05	Torrington	Public Warning System	Upgrade siren equipment to current equipment standards that can provide voice warning	H	1,2	COT EM	Tornado, Dam/Levee Failure, Other Emergencies	$300,000	Local	2028
2023-Torrington-06	Torrington	Police Dept. Evidence Processing and Secure Storage Facility	Create a secure, climate isolated area within the existing building and install a fume hood and isolated ventilation system	M	1,2,3	COT EM, Torrington Police	Public Health Hazards, Hazardous Materials Release	$200,000	Local	2028

1.3 Mitigation Capabilities Assessment

As part of the plan update, the county and its jurisdictions conducted a mitigation capability assessment. Capabilities are those plans, policies, and procedures currently in place that contribute to reducing hazard losses. There are multiple categories of capabilities and all of them are powerful tools for implementing hazard mitigation. It is crucial that these tools are reviewed regularly and opportunities for further risk reduction efforts are identified.

By collecting information about each jurisdiction's capabilities, the strengths, weaknesses, and resources of each jurisdiction are identified.

Planning and regulatory capabilities are foundational to an informed mitigation strategy and successful implementation of actions. Table 1.3 shows those mitigation capabilities specific to planning and regulatory tools across the county.

Table 1.3 Planning & Regulatory Capabilities

Mitigation Capability	Goshen County	Town of Fort Laramie	Town of LaGrange	Town of Lingle	City of Torrington	Town of Yoder
Comprehensive, Master, or General Plan	X					
Capital Improvement Program or Plan (CIP)	X				X	
Floodplain Management Plan	X				X	
Stormwater Program / Plan	X				X	
Community Wildfire Protection Plan (CWPP)	X					
Erosion / Sediment Control Program					X	
Economic Development Plan	X				X	
Other: Required Permits						
Building Codes (Year)					2015 IBC	
Site Plan Review Requirements	X				X	
Other:						
Zoning Ordinance (Land Use)		X	X	X	X	X
Subdivision Ordinance	X				X	
National Flood Insurance Program (NFIP) Participant	X	X		X	X	
Flood Insurance Study / Flood Insurance Rate Map / DFIRM	X	X		X	X	
Floodplain Ordinance	X	X		X	X	
Elevation Certificates for Floodplain Development	X	X		X	X	
Community Rating System (CRS) Participant						
Open Space / Conservation Program	X					
Growth Management Ordinance					X	
Stormwater Ordinance					X	

Mitigation Capability	Goshen County	Town of Fort Laramie	Town of LaGrange	Town of Lingle	City of Torrington	Town of Yoder
Other Hazard Ordinance (steep slope, wildfire, snow loads, etc.)					X	
Other:	No ordinances in county					

Administrative and technical capabilities are all vital for a community to be able to implement hazard mitigation. Table 1.4 provides an overview of these capabilities across the county.

Table 1.4 Administrative & Technical Capabilities

Mitigation Capability	Goshen County	Town of Fort Laramie	Town of LaGrange	Town of Lingle	City of Torrington	Town of Yoder
Planning Commission	X				X	
Mitigation Planning Committee	X				X	
Maintenance Programs (tree trimming, clearing drainage, etc.)	X				X	
Emergency Manager	X	X			X	X
Building Official		X	X	X	X	X
Floodplain Administrator	X	X		X	X	
Community Planner					X	
Transportation Planner					X	
Civil Engineer		X	X	X	X	X
GIS Capability	X				X	
Other:						
Warning Systems / Services (flood)	X				X	
Warning Systems / Services (other / multi hazard)	X				X	
Grant Writing / Management					X	

The ability of a community to implement a comprehensive mitigation strategy is largely dependent on available funding. These related municipal capabilities are outlined in Table 1.5 and show that the county and its jurisdictions utilize a number of these financial tools that can support mitigation activities.

Table 1.5 Financial Capabilities

Mitigation Capability	Goshen County	Town of Fort Laramie	Town of LaGrange	Town of Lingle	City of Torrington	Town of Yoder
Levy for Specific Purposes with Voter Approval	X					
Utilities Fees		X	X	X	X	X
System Development / Impact Development Fee					X	
General Obligation Bonds to Incur Debt	X				X	
Special Tax Bonds to Incur Debt	X					
Open Space / Conservation Fund						
Stormwater Utility Fees					X	
Capital Improvement Project Funding	X				X	
Community Development Block Grants (CDBG)	X				X	X
Other:					USDA, WWDRF, Wyoming MRG	USDA

Education and outreach are important capabilities that allow a community to continue the conversation with their public regarding hazard risk and opportunities to mitigate. Table 1.6 shows that the county does leverage these capabilities.

Table 1.6 Education & Outreach Capabilities

Mitigation Capability	Goshen County	Town of Fort Laramie	Town of LaGrange	Town of Lingle	City of Torrington	Town of Yoder
Public Hazard Education / Outreach Program	X					
Local Citizen Groups That Communicate Hazard Risks	X					
Firewise	X					
StormReady	X				X	
Other:	Weather Nation Ready					

Districts require different capabilities than those of a jurisdiction or municipality. Depending on the type of service a district represents, some capabilities, tools, or plans may not be practical to develop and maintain. The following capabilities were identified by the participating districts.

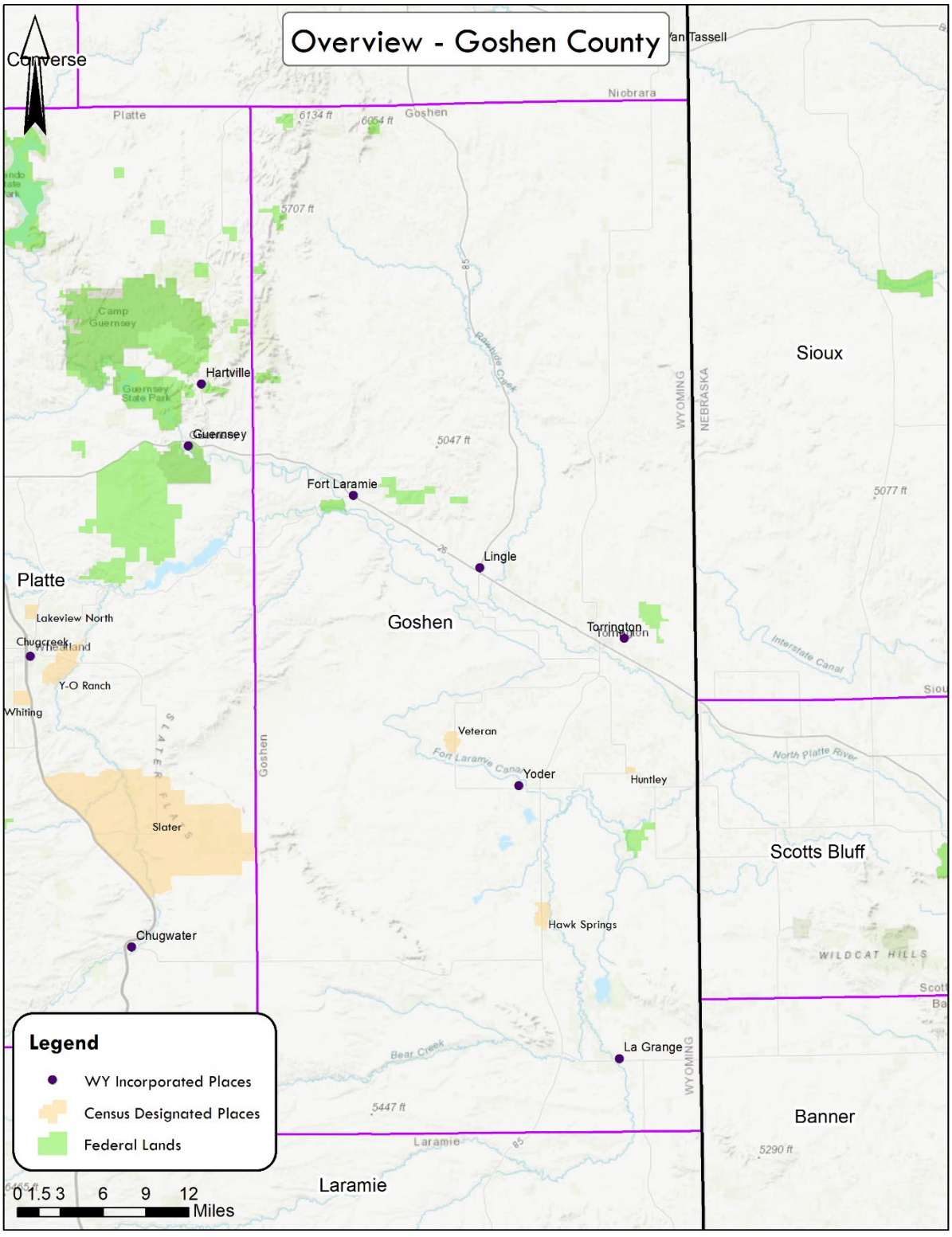
Table 1.7 District Capabilities

Mitigation Capability	Goshen Irrigation District	Pathfinder Irrigation District	Horse Creek Conservation District
Comprehensive, Master, or General Plan	X	X	
Capital Improvement Program or Plan (CIP)	X	X	X
Erosion / Sediment Control Program	X	X	
Maintenance Programs (tree trimming, clearing drainage, etc.)	X	X	X
GIS Capability	X	X	
Grant Writing / Management	X	X	X
Capital Improvement Project Funding	X	X	X
Public Hazard Education / Outreach Program		X	
Local Citizen Groups That Communicate Hazard Risks		X	

2 County Profile

Goshen County is comprised primarily of private land, with approximately 2% Federal lands.

Figure 2.1 Goshen County Overview



2.1 Population

2.1.1 Projections

According to the 2021 Headwaters Economics Profile, which looks at demographics, economics, and social characteristics of communities, Goshen County grew over 7% in population between 2000 and 2020. The population of the county, as of the 2020 census, is 12,498 people.

A 2019 report from the Wyoming Department of Administration & Information, Economic Analysis Division (EAD), shows population projections for all counties and jurisdictions through 2040. The county population projection for 2040 is almost 7% growth to 13,430 people. The City of Torrington will see approximately 3% growth, from the current census of 6,501 to a projected 6,703. U.S. Census data is not available for the other jurisdictions, as the populations are below the counting threshold of 2,500 people. However, the EAD shows no projected population growth for Fort Laramie, LaGrange, Lingle, and Yoder between 2020 and 2040.

2.1.2 Demographics

The composition of a community is critical information when identifying risks and understanding the demographics creates more holistic planning. Table 2.1 illustrates a high-level overview of some of the characteristics of Goshen County and City of Torrington residents. Data for the other municipalities is not available from the U.S. Census Bureau due to collection thresholds.

Information worth noting in these areas are the percentage of the populations living in poverty and populations who have identified as having a disability. In comparison to the state's figures, these are considerably higher, with persons in poverty being 3.8% and 3.6% above the state percentage for Torrington and the county respectively. Based on the disability demographics, Torrington and the county have significantly higher percentages of those with a reported disability than the state, 6.3% and 3.4% respectively.

Recognition of the differences in demographics across the county allows resources to be directed to the residents with highest need, such as the elderly, children, and those with access and functional needs. Populations vary greatly in communication abilities, financial means to respond on their own, and resource needs.

Table 2.1 Demographic Snapshot

Demographic	City of Torrington	Goshen County	Wyoming
Population (April 2020)	6,501	12,498	576,851
Persons under 5 years of age	6.7%	5.3%	6.0%
Persons under 18 years of age	21.1%	19.6%	23.1%
Persons 65 years of age and older	18.5%	22.3%	17.1%
Persons with a disability, under age 65 years	14.7%	10.8%	8.8%
Persons with a disability	19.7%	16.8%	13.4%
Language other than English spoken at home	7.2%	5.4%	7.4%
Median Household Income	$51,818	$54,289	$64,049
Persons living in poverty	13.0%	12.8%	9.2%

Source: 2020 ACS 5-Year Estimates

2.1.3 Health

Similar to the demographics snapshot, an understanding of the health of communities can inform preparedness and response actions. For example, in Goshen County and Torrington, of those who identified as having a disability, the highest percentages of people have ambulatory and cognitive difficulties. Responders may need

training to better assist residents in an event and the public should be educated on what would happen during a potential disaster event, to minimize any additional fears during a stressful situation.

Chronic illness and health condition data may seem unnecessary, but awareness of a community's overall health is important, especially considering potential public health hazards. For example, beyond the risk of pandemics, wildfire smoke can worsen asthma conditions for children and adults, and if sheltering is needed during an event diabetics will likely need insulin provided onsite. Goshen County and Torrington have notably higher percentages of those with coronary heart disease than the state, however with the majority of other health indicators they align closely to state reporting.

Table 2.2 Health Indicator Snapshot

Demographic	City of Torrington	Goshen County	Wyoming
Adults with Asthma, over age 18	9.3%	9.0%	9.2%
Adults with Coronary Heart Disease, over age 18	7.2%	6.1%	3.9%
Adults with Diagnosed Diabetes, over age 18	8.6%	8.5%	9.1%
Adults with Obesity, over age 18	*	32%	30.7%
Disability Type			
Hearing Difficulty	4.9%	5.5%	8.8%
Vision Difficulty	1.6%	1.9%	4.2%
Cognitive Difficulty	7.3%	5.7%	10.1%
Ambulatory Difficulty	7.9%	8.6%	11.3%
Self-care Difficulty	2.4%	2.3%	2.8%
Independent Living Difficulty	4.5%	4.2%	6.2%

*Source: CDC 2018-2021, Behavioral Risk Factor Surveillance System (BRFSS), 2019 American Community Survey (ACS) *Data unavailable*

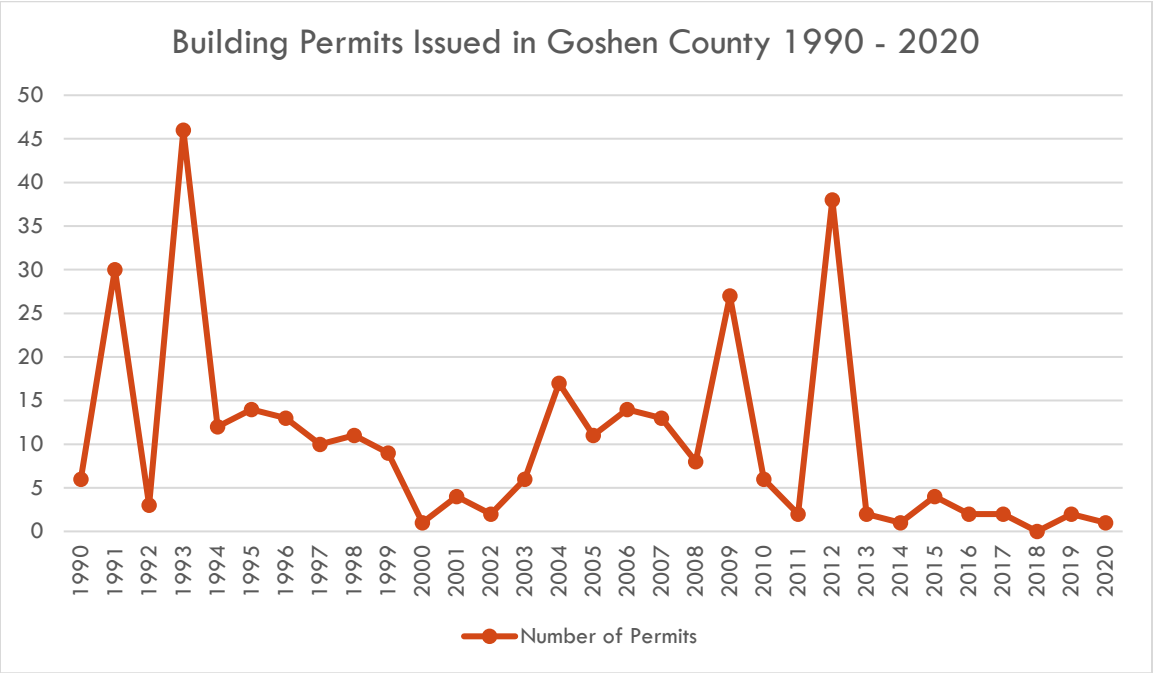
2.2 Development

2.2.1 Land

Goshen County has seen fluctuating periods of growth and development. According to the U.S. Census Bureau between 1990 and 2020, there were 317 new private housing structure building permits issued. The years with the most permits issued were 1993 with 46, 2012 with 38, and 2009 with 27 permits. In 2018, no permits were issued and there have been 12 years in addition to that where less than 5 permits were issued.

Figure 2.2 illustrates these details and the trends that occurred between 1990 and 2020.

Figure 2.2 Goshen County Building Permits 1990-2020



2.2.2 Economic Overview

According to data from the U.S. Bureau of Economic Analysis, Goshen County's highest gross domestic product since 2000, was in 2015 and was over $570 million.

The unemployment rate, as of February 2022, was 3.1%. Approximately 430 jobs were lost between 2010 and 2020, the majority of which are in the manufacturing (43%) and government (34%) sectors. Of the almost 7,000 jobs in Goshen County, approximately 3,800 are in the services industry followed by roughly 1,500 in the government sector. The table below shows the industries that hold the highest number of total jobs and the change in growth in number of jobs between 2010 and 2020.

Table 2.3 Top 5 Industries by Number of Jobs

Industry	Number of Jobs (2020)	Change 2010-2020
Government	1,449	-10%
Farm	974	9%
Health Care and Social Assistance	*899	-14%
Retail Trade	562	-11%
Construction	372	-11%

*U.S. Department of Commerce. 2021. Bureau of Economic Analysis * denotes an estimation based on data available*

3 Hazard Identification and Risk Assessment (HIRA)

3.1 Hazard Ranking

As discussed in Section 3.1 in the main body of the HMP, Goshen County conducted a risk ranking exercise. Meeting participants ranked the identified hazards risk to property / environment, people, and the economy, as well as the probability of future damaging events on a scale of high, medium, or low. The table below shows the results of this exercise with a breakdown of the identified hazards score and the perceived level of impact. It can be seen that Dam / Levee Incident, Drought, and Hail, scored the highest whereas Hazardous Material Release, Landslide, and Public Health Hazards scored the lowest.

Table 3.1 Hazard Ranking Exercise Results

Hazard	Goshen County	Fort Laramie	LaGrange	Lingle	Torrington	Yoder	Goshen Irrigation District	Horse Creek Conservation District	Pathfinder Irrigation District
Cyber Hazards	Medium	Low	Low	Low	Medium	Medium	Medium	Low	Medium
Dam/Levee Incident	High	High	Low	Medium	Medium	Low	Medium	Low	Low
Drought	High	High	High	Medium	High	Low	High	High	Medium
Earthquake	Low	Low	Low	Low	Low	Low	Medium	Medium	Low
Flood	Medium	Medium	Low	Low	Low	Medium	Low	Medium	Medium
Hail	High	High	High	High	Medium	High	High	Medium	Medium
Hazardous Material Release	Low	Low	Low	Low	Medium	Low	Medium	Low	Low
Landslide	Low	Low	Low	Low	Low	Low	Low	Low	Low
Lightning	Medium	Medium	High	Medium	Medium	Medium	Medium	Medium	Low
Public Health Hazards	Low	Low	Low	Medium	Medium	Low	Low	Low	Low
Tornado	Medium	High	High	High	Medium	Medium	Medium	Medium	Low
Wildfire	Medium	Medium	High	Low	Medium	Medium	Medium	High	Medium
Wind	Medium	High	High	Medium	Medium	Medium	Medium	Medium	Low
Winter Storm	Medium	Medium	High	High	High	Medium	Medium	High	Low

The following county-specific hazard profiles each include five subsections that cover; previous occurrences, inventory exposed, potential impacts, probability of future occurrences, and land use and development. The following hazard profiles are specific to Goshen County and their participating communities.

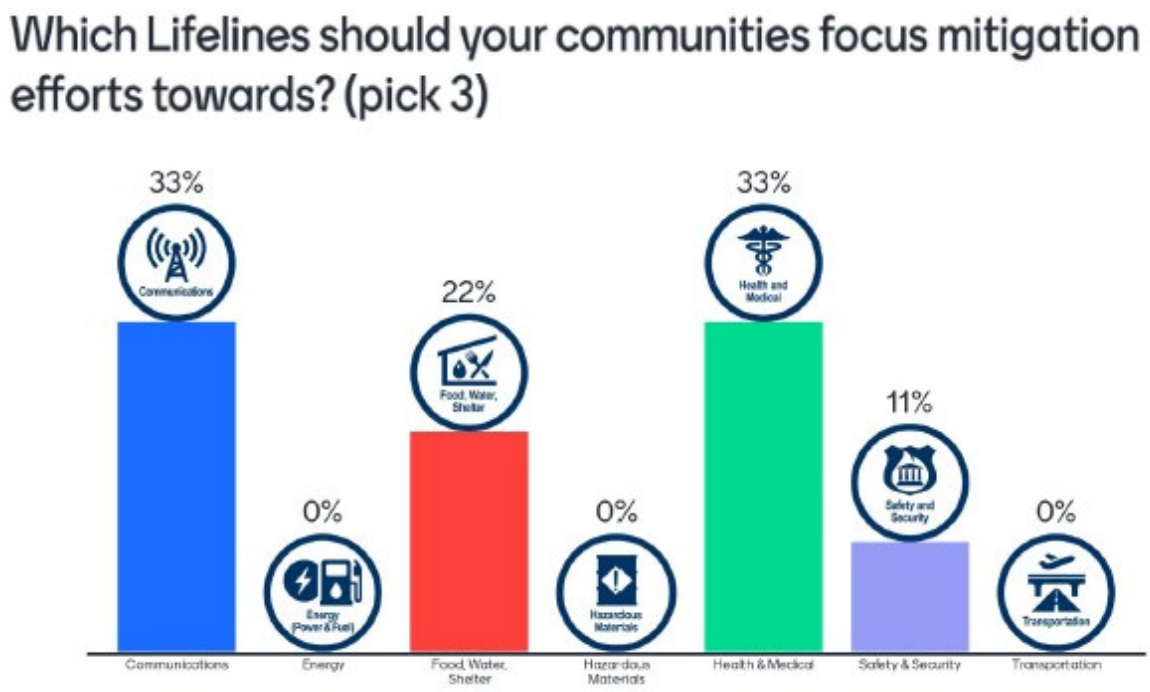
3.2 Lifelines

The Lifelines framework is used in this plan as a base for emergency management planning, preparedness education, and mitigation planning. It is important to consider cascading effects when Lifelines are affected and how those effects will impact the community and other Lifelines. The Lifelines are shown in the following graphic.

Lifelines are essential to a community's long-term disaster resilience, each one providing diverse critical services and resources. As part of the HMP planning process, the Hazard Mitigation Planning Committee identified Lifelines utilizing the best available data, supplemented by Laramie County geographic information system (GIS) data for the region. Within each hazard profile the specific Lifeline exposure data for Goshen County infrastructure is highlighted, as applicable.

The HMPC was surveyed to determine which Lifelines communities should focus mitigation efforts towards. Figure 3.1 illustrates the results of this poll, showing Communications and Health and Medical as the priorities for mitigation. This is followed by Food, Water, and Shelter and Safety and Security.

Figure 3.1 Lifeline Mitigation Efforts



3.3 Hazard Viewers

The rapid evolution of hazards data creates the need for tools which present the most recent data in a useful way. The maps included in this plan are helpful to serve as an overview of the various hazard and risk information, but ultimately are static snapshots of the best available data at the time of this plan's writing. Additionally, the large size of Region 7's counties make it difficult to present many of the maps at a scale useful to the local communities.

With these disclaimers noted and as hazard and risk data is constantly evolving, it is important to utilize the latest and greatest hazard data available. Fortunately, the State of Wyoming and federal government have recently developed a number of hazard data viewers that present much of the same information contained in this plan. When possible, this plan directs readers to these online resources to ensure the most accurate information is being referenced and utilized.

Hazard Data Viewers:

- FEMA's National Risk Index for Natural Hazards
- FEMA's Resilience Analysis and Planning Tool
- WY State Geological Survey's Wyoming Geologic Hazards Map
- WY State Forestry Division's Wildfire Risk Assessment Portal
- United States Forest Service's Wildfire Risk to Communities Portal

3.4 Cyber Hazards

3.4.1 Previous Occurrences

In June 2021, Eastern Wyoming College in Torrington was the victim of a ransomware cyber attack. This event disabled the school's network, computers, and communications. By August the school was still operating at a lower capacity than prior to the event.

According to the 2020 FBI Internet Crime Complaint Center (IC3) crime report, Wyoming residents were victim to over $5 million in losses through a variety of cyber crime techniques. The majority of which was lost to victims over the age of 60.

3.4.2 Inventory Exposed

All systems, people, and entities are exposed to cyber hazards, including individuals, small businesses, healthcare facilities, local governments, schools, and large infrastructure. Those perpetrating these attacks are indiscriminate and will take control of whatever they are able to. Those organizations with older technology, hardware, or software, and minimal or no information technology (IT) support are especially at risk.

The primary concern of participating irrigation districts are the potential impacts if the Supervisory Control and Data Acquisition (SCADA) systems were compromised, including canal water regulation and alarms.

3.4.3 Probability of Future Occurrences

It is possible that Goshen County technology operations may be compromised, and community members could fall victim to malicious acts. The majority of technology users, including individuals, businesses, and organizations are using inadequate cyber security and this creates a large pool of potential victims.

3.4.4 Future Development Trends

Cyber hazards are unlikely to affect land use and development.

3.4.5 Climate Change Impacts

Cyber hazards are not likely to be immediately impacted by climate change.

3.5 Dam / Levee Incident

3.5.1 Previous Occurrences

There have been no documented dam failures in Goshen County. Statewide, there have been a few dam incidents, which have caused loss of life and property damage, however none received presidential emergency declarations.

3.5.2 Inventory Exposed

In 1981, the U.S. Army Corps of Engineers (USACE) completed an inspection program for nonfederal dams under the National Dam Inspection Act (P.L. 92-367). This was a four-year work effort and included compiling an inventory of about 50,000 dams and conducting a review of each state's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams. Part of the inspection included evaluating the dams and assigning a hazard potential based on the effects downstream should one of the dams fail. The dams were rated (1) high, (2) significant, and (3) low hazard. The Corps of Engineers based the hazard potential designation on such items as acre-feet capacity of the dam, distance from nearest community downstream, population density of the community, and age of the dam. High hazards dams would, in case of failure of the dam, likely cause loss of life. Significant hazard dams would, in case of failure, likely cause significant property damage, but no loss of life. Failure of a low hazard dam would likely cause only minimal property damage. Hazard potential classification is no guarantee of safety.

The Wyoming State Engineer's Office (SEO) inspects dams more than 20 feet high or with a storage capacity of 50 acre-feet or more, although smaller dams are also regulated if the potential for failure indicates a need. In 2018, the SEO regulated 1,553 dams. 88 of these were rated high hazard, 104 were rated significant hazard, and 1,361 were rated low hazard. The SEO inspects these dams once every five years.

According to the National Inventory of Dams, a USACE database, the county has a total of 26 dams. Two of these are classified as high hazard dams and six are classified as significant hazard. Additionally, an incident at the Guernsey or Glendo Dams in Platte County could significantly impact Goshen County downstream.

Table 3.2 presents those dam's in the county that have a high or significant hazard ranking. The nearest downstream community is also identified, as is the fact that none of these dams currently have Emergency Action Plans (EAPs). Emergency Action Plans are used to create a common understanding of what a response to a dam/levee incident would entail and they are developed by the owner, in collaboration with local response agencies and other key stakeholders.

The dam incident vulnerability concern detailed by the participating irrigation districts is the potential damage to reservoir dams, outlet structures, and canal banks.

Table 3.2 High and Significant Hazard Dams in Goshen County

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Hawk Springs	Horse Creek Conservation District	Horse Creek	High	Hawk Springs	8	**N**
Spring Canyon	Lucerne Canal and Ditch Company	Spring Canyon	High	-	-	**N**
Glowmill	Jim House	Box Elder Creek	Significant	Veteran	10	**N**

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Goshen Hole	Goshen Hole Water User Association	Horse Creek Offstream	Significant	Yoder	1	**N**
Goshen No. 1	Goshen Mutual Reservoir & Ditch Co.	Horse Creek	Significant	Morrill, Nebraska	27	**N**
Goshen No. 2	Goshen Mutual Reservoir & Ditch Co.	Horse Creek	Significant	Morrill, Nebraska	27	**N**
Sinnard	Horse Creek Conservation District	Sinnard Draw	Significant	Morrill, Nebraska	34	**N**
Torrington Wastewater Treatment	Town of Torrington	North Platte River	Significant	Torrington	0	**N**

Figure 3.2 illustrates where high hazard dams are located in relation to the Goshen County boundary. This map also includes the locations of other, national level inventoried dams. The high hazard dams located within Goshen County are the Spring Canyon and Hawk Springs dams. The high hazard dams located in Platte County can be seen as well.

Figure 3.2 Location of Dams in Goshen County

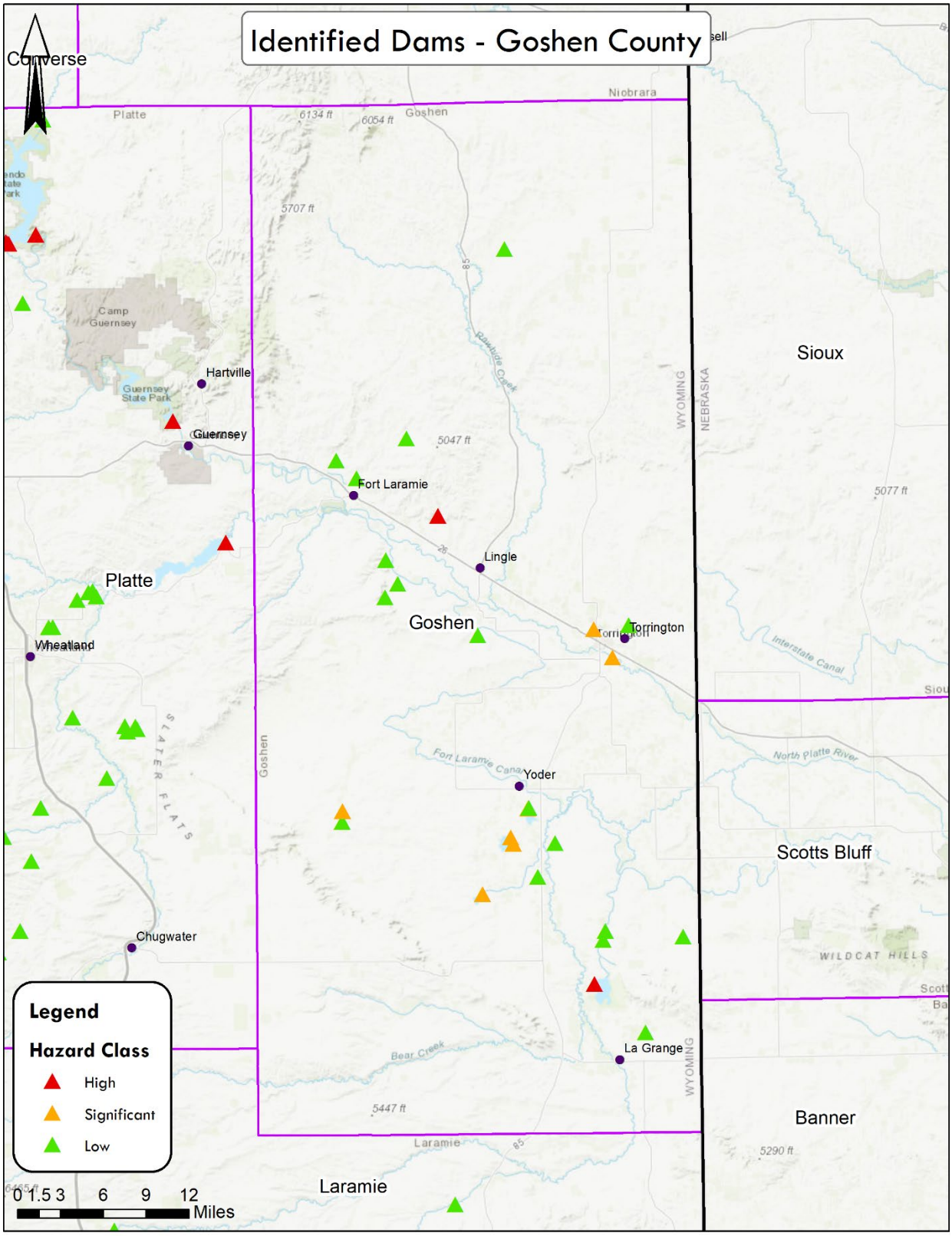


Table 3.3 shows the parcels in Torrington, Fort Laramie, and the unincorporated areas of the county with exposure to potential dam inundation areas. More than $125 million in parcel value (per Wyoming Department of Revenue data) is exposed to the impacts of a dam incident. These parcels are primarily residential and in the unincorporated areas of the county. The largest number of commercial parcels is also within the unincorporated areas.

Table 3.3 Parcel Exposure to Dam Inundation Areas

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Torrington	91	81	9,535,483	10	4,129,675
Fort Laramie	12	11	280,215	1	549
Unincorporated	776	719	100,704,559	57	11,016,198
County Total	**879**	**811**	**110,520,257**	**68**	**15,146,422**

The transportation lifeline has the highest exposure to dam inundation areas, with 72% of infrastructure exposed. This is followed by energy infrastructure with 14% exposed. The rest of the lifelines have exposure below 10% of the respective infrastructure. Table 3.4 further details the exposure of lifelines to the dam inundation areas in the county.

Table 3.4 Lifeline Exposure to Dam Inundation Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	225	9	4 %
Energy	56	8	14 %
Energy (miles)	575	44	8 %
Food, Water, & Shelter	48	3	6 %
Health & Medical	12	1	8 %
Safety & Security	16	1	6 %
Transportation	185	133	72 %

3.5.3 Probability of Future Occurrences

Although the chances of a dam incident occurring are perceived as being low, the magnitude of damage should an event occur is significant. The structural integrity of dams depends on regular inspections and maintenance, which do not always happen and could increase the likelihood of a dam failure event. In the past, a number of the dam failures in Wyoming and other Rocky Mountain states have occurred due to snow melt flooding exceeding the capacity and strength of dams. Wyoming's dams will continue to be tested by snow melt, heavy rains, and other types of floods every year. Thus, dam failures have the potential to threaten Goshen County's communities in the future.

3.5.4 Future Development Trends

Although Goshen County is not expecting any planned new development, the risk and impacts of a dam failure event are still prevalent to existing infrastructure. If an event occurs, there is greater risk for communities located closer to the dam or those are who are not notified. Communities with higher population densities and large numbers of structures, utilities, and critical facilities, are expected to experience greater damage and loss. As populations expand and new structures are built, it is important for jurisdictions to enforce building codes and standards to reduce future loss should a dam incident occur.

3.5.5 Climate Change Impacts

The lack of predictability in weather patterns, due to climate change, is a concern in the possibility of future dam incidents. As seasons change rapidly, snow melt flooding can exceed the capacity and strength of dams, as well as increase water levels in waterways testing levees. The expected increased size and intensity of future severe storms pose a risk as well, as prolonged precipitation is a major factor in incidents, especially overtopping and spillway discharges.

3.6 Drought

3.6.1 Previous Occurrences

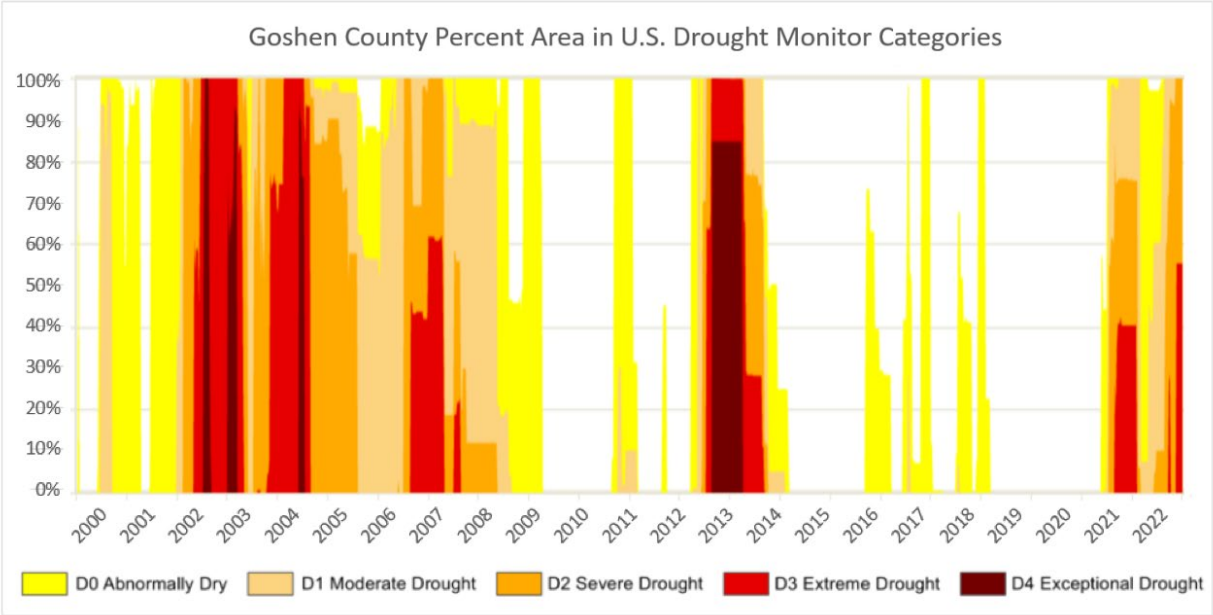
Goshen County has experienced several multi-year droughts over the past several decades. Most recently, the county has been included in several regional United States Department of Agriculture (USDA) disaster declarations for droughts and designated as a primary county twice in 2012 and once each in 2013, 2020, and 2021.

Figure 3.3 illustrates drought type, by time and exposure of Goshen County from 2000 to 2021. Based on data from the U.S. Drought Monitor, between 2001 and 2008, 100% of Goshen County was in some category of drought for the entire period, with the exception of a brief time where only 90% of the county was affected.

The type of drought varied throughout the period with multiple stretches of Extreme Drought early on, including Exceptional Drought on a few occasions. The categories dropped to Severe and Moderate through the mid-2000s, continuing to affect approximately 80% of the county, although for a period in 2006 to 2007 Extreme Drought occurred again to 50% of the county. The rest of the period tapered down with Moderate Drought.

In 2012, a month's long Exceptional Drought affected approximately 85% of the county, followed by a period of no events, until recently in 2021 when droughts began to affect up to 100% of the county again.

Figure 3.3 Goshen County Percent Area in Drought 2000-2021

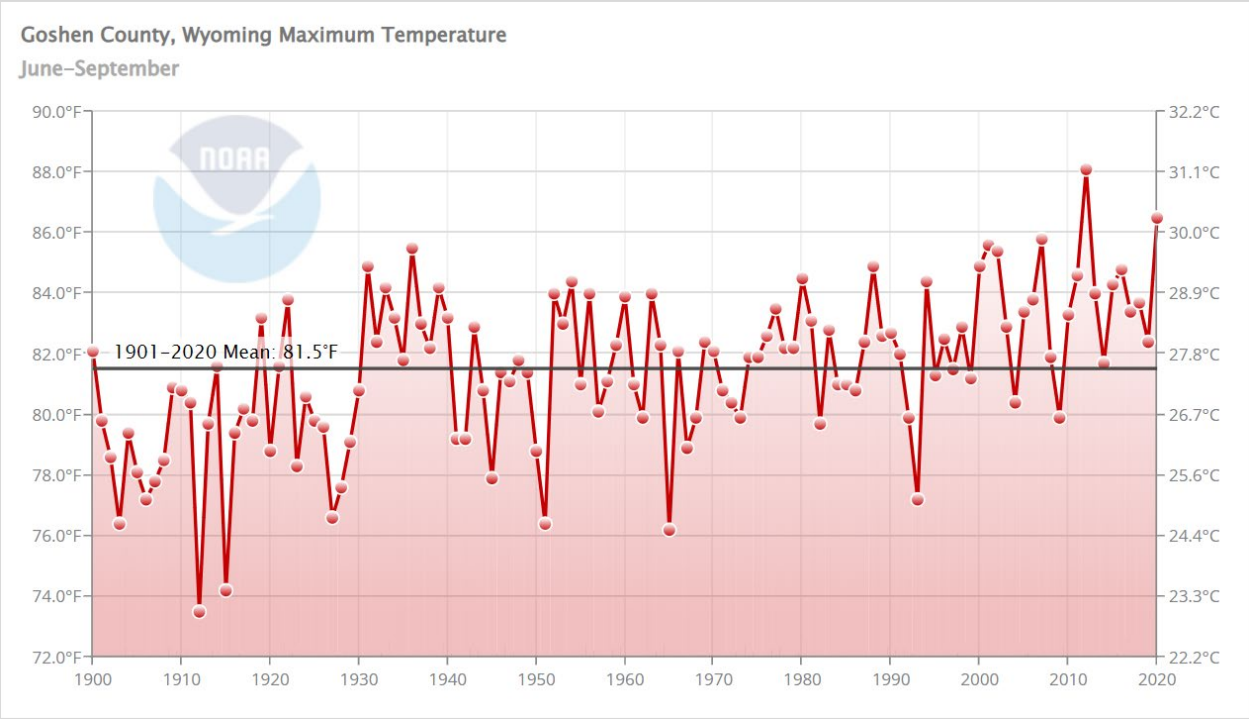


Source: U.S. Drought Monitor

In 2012, the county experienced a notable drought period during the spring and summer months. Impacts included extreme loss of grazing ground for cattle, resulting in several ranchers and farmers selling off their stock. Fires were also more noticeable during this time period, most likely due to the consistently dry conditions. Impacts were also seen in the form of low streamflow and reduced water supplies.

While high temperatures do not directly cause drought, they can greatly impact the effects, likelihood, and duration of occurrence. The average maximum temperature between June and September, from 1900 to 2020, can be found in Figure 3.4. Note the peak temperature of 88° for this period, which occurred in 2012 and correlates with the Exceptional Drought of that same year.

Figure 3.4 Average Maximum Temperature between June and September 1900-2020



Source: National Oceanic and Atmospheric Administration (NOAA)

3.6.2 Inventory Exposed

In Goshen County, data from the USDA shows disaster assistance payments have totaled over $19.8 million between 1995 and 2020. The majority of this, more than $11 million, were payments issued for livestock disaster assistance and another $7 million was issued for crop disaster and non-insured assistance. While these numbers seem substantial, it is likely that not all producers took advantage of these programs after a USDA declared disaster and designation for a multitude of reasons. Approximately one third ($7.3 million) of the overall total was paid out in 2014 alone, which is reflective of the impact of back-to-back drought declarations, both contiguous and primary, in 2012 and 2013.

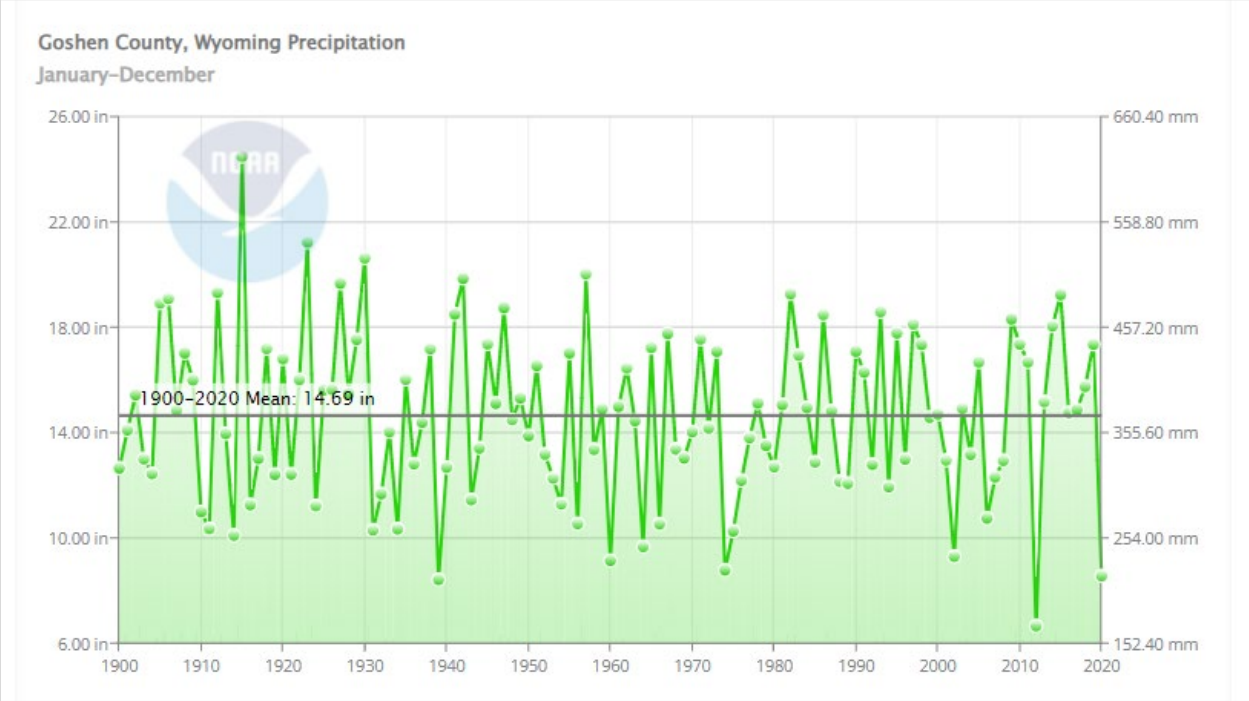
The USDA issues declarations for a number of other disasters and the available data does not distinguish between the cause of declaration for the payments in this time period. However, it is likely that a considerable portion of these payments were necessary due to the effects of multiple drought specific declarations

From an agricultural perspective all crops, grazing lands, and livestock in the county are exposed to drought. The population of the county is also exposed to the indirect economic impacts of drought, which can be difficult for community members to cope with long term. The irrigation districts may be unable to serve all customers due to insufficient quantity of water.

3.6.3 Probability of Future Occurrences

Drought is often difficult to predict, but based on historical records, it is reasonable that Goshen County will be impacted by drought conditions in the future. The county is located in an arid region and based on National Oceanic and Atmospheric Administration (NOAA) data since 1900, shown in Figure 3.5, the annual average precipitation is 14.7 inches each year. Droughts are often regional events, impacting multiple counties and states simultaneously. Therefore, as the climate of the county is fairly contiguous, it is reasonable to assume that a drought will impact the entire county.

Figure 3.5 Average Annual Precipitation 1900-2020



Source: National Oceanic and Atmospheric Administration (NOAA)

3.6.4 Future Development Trends

A community's vulnerability to drought is affected largely by population growth, urbanization, demographic characteristics, technology, water use trends, government policy, social behavior, and environmental awareness. These factors are continually changing, and society's vulnerability to drought may rise or fall in response to these changes. In scenarios where a community's population is increasing or shifting, increased pressure on water and other natural resources can be seen causing a shortage of water availability. Although Goshen County is not currently experiencing much growth, the risk and impacts of an extended drought are still prevalent to existing populations.

Any future growth will greatly impact drought hazards by stressing both surface and ground water resources. Agricultural and industrial water users consume large amounts of water and expansion of existing water services is limited when a drought occurs. In rapidly growing communities, new water and sewer systems or significant well and septic sites could use up more of the available water, particularly during periods of drought. Public water systems are monitored, but individual wells and septic systems are not as strictly regulated.

Related to both current land use and future development trends, the use of turf grass affects the available water supplies. Urban lawn watering is the single largest water demand for many municipal supplies.

Future water use regulations may be able to mitigate this trend. If Goshen County should grow, it is recommended that staff revisit existing standards for determining the impacts of drought.

3.6.5 Climate Change Impacts

The presence of droughts across the nation is due to the changing climate, which affects weather patterns and temperature fluctuations. As hotter weather increases in duration and precipitation is less predictable, droughts will likely continue to be a common occurrence, potentially being experienced more regularly.

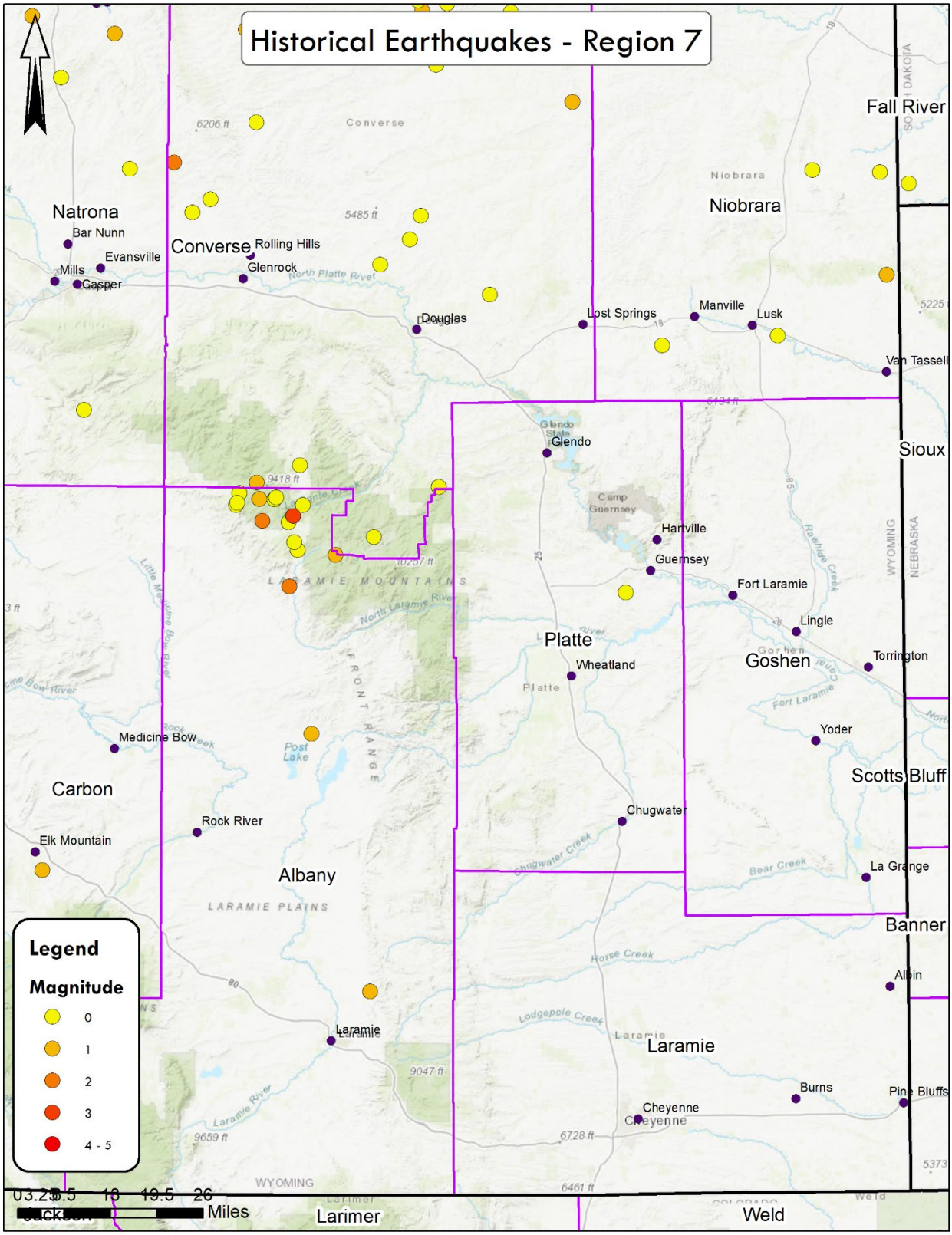
3.7 Earthquake

3.7.1 Previous Occurrences

Historically, earthquakes have occurred across much of Wyoming. The first reported event was in Yellowstone National Park in 1871. Yellowstone National Park is one of the more seismically active areas in the United States but is on the opposite corner of the state from Goshen County. Figure 3.6 shows the location of seismic events identified, with a magnitude of 0 or higher, within Region 7.

It is important to note that while no earthquakes have been recorded in the county, several historical earthquakes epicenters have occurred in neighboring counties.

Figure 3.6 Historical Earthquakes in Region 7



3.7.2 Inventory Exposed

For this risk assessment, a 2,500-year, magnitude 5.0 earthquake scenario was modeled in FEMA's Hazus v5.0 software. This scenario was used to represent the "worst case scenario" for the county and loss estimates were gathered through analysis of the modeled earthquake data at the census tract level.

In Goshen County, there are an estimated total of 6,000 buildings, with a total building replacement value of over $1.2 billion. This value represents the estimated costs to repair or replace the damage caused to a building and does not include building contents.

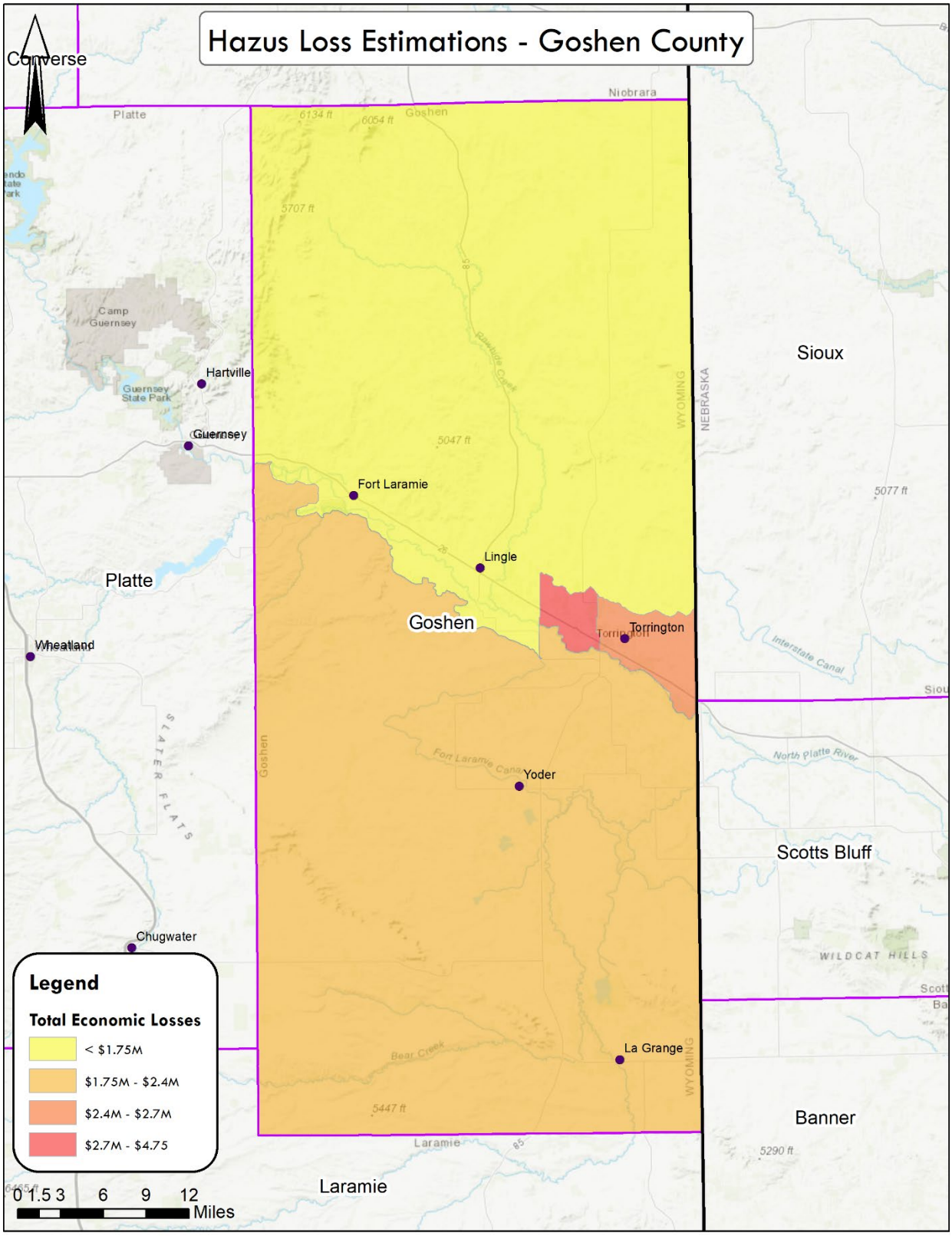
The total economic loss estimated for this modeled earthquake event is more than $28.6 million, which includes building and Lifeline related losses. Building-losses include both the direct loss of a building and its contents and business interruption costs. These costs of business interruption are the losses from the inability to operate a business due to earthquake damages.

Further notable loss estimations from Hazus include:

- $2 billion – Transportation Lifeline system replacement value, 104 bridges and 167 miles of highway
- $983 million – Utility Lifeline system replacement value, 10,000 miles of pipeline (water, wastewater, natural gas, oil systems, electrical power, communications)
- 20 – Utilities Lifeline system pipeline breaks
- $11.6 million – estimated total building-related losses, including business interruption which makes up 21% of the total building related losses
- 54% – percent of total build-related losses that were residential properties
- 174 – buildings at least moderately damaged, no buildings are estimated to be damaged beyond repair
- 30 – number of days for essential facilities to be 100% operational (hospitals, police and fire stations, EOC, and schools)

Figure 3.7 illustrates the breakdown of Hazus economic loss estimation by census tract. For more detailed information from the Hazus scenario model, see the Earthquake Hazus Risk Report.

Figure 3.7 Hazus Loss Estimations, Goshen County



The earthquake vulnerability concern detailed by the participating irrigation districts is the potential breaching of canal banks and damage to control structures, culverts, and crossings.

3.7.3 Probability of Future Occurrences

The likelihood of a future occurrence of an earthquake is very low, but not impossible. Since the historic record is limited, it is not feasible to determine when a 2,500-year event last occurred in the county. This type of event was used for loss estimation analysis because of the uncertainty involved and based upon the fact that the International Building Code utilizes 2,500-year events for building design. This conservative approach is in the interest of public safety.

3.7.4 Future Development Trends

Although Goshen County is not currently experiencing much growth, the risk and impacts of an earthquake are still prevalent to existing infrastructure. With the unpredictable nature of earthquake epicenter locations, there is potential for significant structural damage to occur anywhere in the county. Due to the nature of earthquake hazards, communities in the county with higher population densities and larger numbers of structures and critical facilities are expected to experience greater damage and loss from an earthquake event. If population and development should occur, continued enforcement of the unified construction code has great potential to mitigate increasing vulnerability and development pressure.

3.7.5 Climate Change Impacts

There is no evidence currently that climate change will influence earthquake activity.

3.8 Flood

3.8.1 Previous Occurrences

As stated in the 2007 Goshen County Hazard Mitigation Plan, documented flood history extends back to 1955 when the first recorded flood occurred along Cherry Creek and the North Platte River. The primary sources of flooding for Goshen County are the North Platte River and the Laramie River, which meet at the boundary of the Fort Laramie National Historic Site, as well as small creeks and drainages including Horse Creek, Rawhide Creek, Bear Creek, Cherry Creek, and Cameron Creek. Several dams on the North Platte River west of the county reduce the impacts of excess runoff from snowmelt. High intensity rains during spring and summer months have caused localized flooding problems on drainages around the county.

The following table summarizes floods that have impacted Goshen County in the form of damage, injury, or loss of life since 1955. This data was derived from monthly storm data reported generated and released by National Centers for Environmental Information (NCEI). Other sources include local resident and news accounts, unpublished reports from the Wyoming Office of Homeland Security, newspaper accounts, and periodicals from public libraries.

Table 3.5 Goshen County Flood History

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Torrington, Cherry Creek, North Platte River	**6/27/1955**	**0**	**0**	**$0**	**$0**
A cloudburst caused several hundred driven from homes, sugar beets damaged, and flooded basements. Response included help from the Red Cross.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Torrington and vicinity, Platte River	**7/30/1961**	**0**	**0**	**$22,500**	**$0**
High intensity rain showers with some 1 to ½ inch hail caused flash flooding with damage to homes, streets, crops, and farm land.					
LaGrange 4 W	**5/31/1962**	**0**	**0**	**$22,500**	**$0**
Severe thunderstorms with considerable small hail caused flash flooding along Bear Creek, damaging property, livestock, roads, and bridges. Flood waters piled hail into 8- to 10-foot. Drifts.					
LaGrange 4 W	**6/1/1962**	**0**	**0**	**$225,000**	**$0**
Severe thunderstorms with heavy rain and 4 to 6 inches of small hail caused damage and flash flooding to the area along Bear Creek and some along Horse Creek.					
Niobrara and Goshen	**6/15/1962**	**0**	**0**	**$225,000**	**$0**
Considerable small hail and heavy thundershowers caused flash flooding.					
Lingle 10 SW	**6/20/1977**	**0**	**0**	**$225,000**	**$0**
Tornado touched down briefly. Most all damage was done by heavy rains up to 4 inches unofficially with some small hail, causing low land flooding.					
25NW Torrington	**6/7/1986**	**0**	**0**	**$0**	**$0**
A tornado was reported by law enforcement personnel at 1910 MST between Lingle and Fort Laramie about 12 miles northwest of Torrington. Traffic along U.S. Highway 26, between Guernsey and Fort Laramie, was blocked from 1900 MST to 2200 MST due to debris and water up to 4 feet deep. This was about 25 miles northwest of Torrington.					
LaGrange	**5/28/1991**	**0**	**0**	**$0**	**$0**
Late afternoon thunderstorms on the 28th in southern Goshen County brought large hail to LaGrange at 1610 MST. Rainfall of 1.21 inches brought local flooding to some basements in LaGrange before 1800 MST.					
Goshen	**6/7/1991**	**0**	**0**	**$2,250,000**	**$225,000**
More than 7 inches of rain in the past 10 days resulted in flood damage to roads, bridges, and agriculture loss.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Platte and Goshen	**6/3/1995**	**0**	**0**	**$0**	**$0**
Heavy rain occurred from west-central Platte county to west-central Goshen county during the evening hours. Two to three inches of rain fell in west-central Platte county in two hours, and this produced flash flooding along the North Laramie River in west-central Platte county about 30 miles west of Wheatland. Flooding was also reported along Cottonwood Creek about 27 miles northwest of Wheatland. Heavy rain fell in Wheatland causing flooding of city streets. Water up to three feet deep was reported on a couple of city streets. Heavy rain in Guernsey (19 miles northeast of Wheatland) caused flash flooding and a few roads were under water as a result. Even some evacuations were necessary in low-lying areas. A rain gauge site located west of Yoder on the Platte/Goshen county line measured five inches of rain during the evening. Reports from this area the next morning (June 4th) revealed nearly 5,000 acres of grassland was under water and hail drifts were still 18 inches deep.					
2 SW Yoder to 2 SE Torrington	**5/24/1997**	**0**	**0**	**$30,000**	**$30,000**
Heavy rainfall totaling more than 3 inches fell from southwest of Yoder to around Torrington. Four feet of water was reported over state highway 156 about 2 miles south of Torrington at 1715 MST. The flooding continued through the evening along state highways 156, 154, and 161 in the Torrington, Veteran and Yoder areas, where water continued to cover highway 161 at 2027 MST. The water subsided by 2130 MST.					
30 NW Torrington to 5 NW Torrington	**7/29/1997**	**0**	**0**	**$30,000**	**$5,000**
Residential basements flooded and a county road washed out after about 6" of rain; Cameron Creek, Rawhide Creek and Torrington Ditch overflowed just north of U.S. Highway 26.					
Yoder	**8/3/2004**	**-**	**-**	**-**	**-**
Significant flooding reported in Yoder, WY, with many streets under several inches of water.					
LaGrange	**8/14/2006**	**-**	**-**	**-**	**-**
Rainfall from 3 to 4 inches fell over the LaGrange, WY. area and produced street flooding with some water in basements. A county road bridge was also washed out.					
Statewide	**5/18/2011**	**-**	**-**	**-**	**-**
On July 22, 2011, President Obama declared that a major disaster exists in the State of Wyoming. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, flooding, and landslides in Albany, Big Horn, Carbon, Crook, Fremont, Goshen, Johnson, Lincoln, Platte, Sheridan, Sublette, Teton, Uinta, Washakie, and Weston Counties, and the Wind River Indian Reservation. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures for all counties and Indian Tribes in the State of Wyoming.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Torrington	**5/21/2014**	**-**	**-**	**-**	**-**
Hail and Flash Flood Storm: Large, widespread, hail damage and flash flooding affecting homes located in and near Torrington.					

NCEI reports a total of 56 flood and flash flood events in Goshen County between 1997 and 2021. Table 3.6 shows details for events with reported damages. There have been no recorded injuries or deaths.

Table 3.6 Flood History, 1997-2021

Date	Location	Type	Injuries	Deaths	Property Damage ($)	Crop Damage ($)
5/24/1997	Yoder	Flash Flood	0	0	30,000	30,000
7/29/1997	Torrington	Flash Flood	0	0	30,000	5,000
8/3/2005	Yoder	Flash Flood	0	0	73,000	0
8/14/2006	LaGrange	Flash Flood	0	0	80,000	0
		Total	**0**	**0**	**213,000**	**35,000**

The Spatial Hazard Events and Losses Database for the United States (SHELDUS) reports nine flood events between 1962 and 2006, which had reported property damages totaling $1.7 million, as well as crop damages of approximately $256,000.

In addition to the events, the HMPC shared details of two significant flooding events:

In August of 2019, a tunnel collapse on the Goshen Irrigation District system, in unincorporated Goshen County, caused a plug in the water system. This plug caused a 300 yard long breach in the canal banks upstream of the tunnel entrance. Water from the canal moved overland to the river, causing significant erosion and sediment damage to an area of about 40 acres including one vacation home. Loss of irrigation water resulted in impact to over 100,000 acres of cropland in Wyoming and Nebraska. The economic impact to Goshen County of this incident has been estimated at over $120,000,000.

On July 1, 2022, a large breach occurred on the Interstate Canal operated by Pathfinder Irrigation District about one mile west of Lingle Wyoming. Water flowed overland toward low areas adjacent to US-26, causing flooding, erosion, and sedimentary damage to county roads, over 150 acres of cropland, and a commercial cattle feeding operation. In addition, three homes and a carpet/flooring business sustained damages. Diking/sandbagging operations were performed in the Town of Lingle and no damage occurred within the town. US-26 was closed for a period of 24 hours until the water subsided and Burlington Northern Santa Fe Railway (BNSF) also restricted operations for a period of time. Property damage estimates are not yet available.

3.8.2 Inventory Exposed

Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Specific examples of negative impacts from flooding on Goshen County span a comprehensive range. Flooding causes:

- damage to private property that often creates financial hardship for individuals and families;
- damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- loss of personal income for agricultural producers that experience flood damages;
- loss of income to businesses relying on recreational uses of county waterways;
- emotional distress on individuals and families; and
- harm to people and animals.

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the "event of record." The flood of record is almost always correlated to a peak discharge at a gage, but that event may not necessarily have caused the worst historic flood impact in terms of property damage, loss of life, etc. The June 7, 1991, flood is considered to be the flood of record for Goshen County. This was the costliest flood in Goshen County's history, causing more than $2 million in property damage.

The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year. Emergency management protocols, public emergency notification improvements, and development/land use codes will all help mitigate future impacts of floods.

Table 3.7 shows the parcels that are exposed to the 1% annual chance floodplain, also called the 100-year floodplain. The 1% annual chance flood has a one in 100 chance of being equaled or exceeded in any one year. While the recurrence interval is 100 years, this is an average and a flood of that magnitude may occur more than once within 100 years.

Table 3.8 shows the exposure of parcels to the 500-year floodplain, also called the 0.2% annual chance floodplain, which has a one in 500 chance of being equaled or exceeded in a given year. This summary includes those same parcels exposed to the 1% Annual Chance Floodplain.

The floodplains used for this vulnerability assessment are currently a preliminary product (as of May 2022) mapped by FEMA.
Figure 3.8 illustrates this floodplain, which determined the parcels exposed to the 1% annual chance floodplain.

Parcels exposed to the 1% Annual Chance Floodplain are approximately 93% residential with an overall value of almost $121 million. Approximately 70% of the residential parcels are located in the unincorporated areas of the county and are worth more than $95.4 million. Torrington has the largest number of impacted parcels across the municipalities, all but 7 of which are residential. The seven commercial parcels exposed in Torrington are valued at more than $870,000. In contrast, the 48 commercial parcels in the unincorporated county areas are valued over $13.6 million.

Table 3.7 Parcels Exposed to the 1% Annual Chance (100-year) Floodplain

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Torrington	183	176	18,607,788	7	873,102
LaGrange	6	4	243,936	2	95,162

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Yoder	56	54	6,559,588	2	186,081
Unincorporated	588	540	95,435,411	48	13,618,563
County Total	**833**	**774**	**120,846,723**	**59**	**14,772,908**

The parcels exposed in the 0.2% Annual Chance Floodplain include those in the 1% Annual Chance Floodplain, which is reflected in the values in Table 3.8. All of the exposed parcels are valued at over $163.8 million and are 93% residential. The unincorporated areas hold the highest number of residential and commercial parcels exposed to the 0.2% Annual Chance Floodplain.

Table 3.8 Parcels Exposed to the 0.2% Annual Chance (500-year) Floodplain

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Torrington	186	177	18,626,099	9	2,659,261
LaGrange	22	18	1,254,330	4	260,076
Yoder	64	62	7,442,934	2	186,081
Unincorporated	728	669	116,815,313	59	16,553,711
County Total	**1,000**	**926**	**144,138,676**	**74**	**19,659,129**

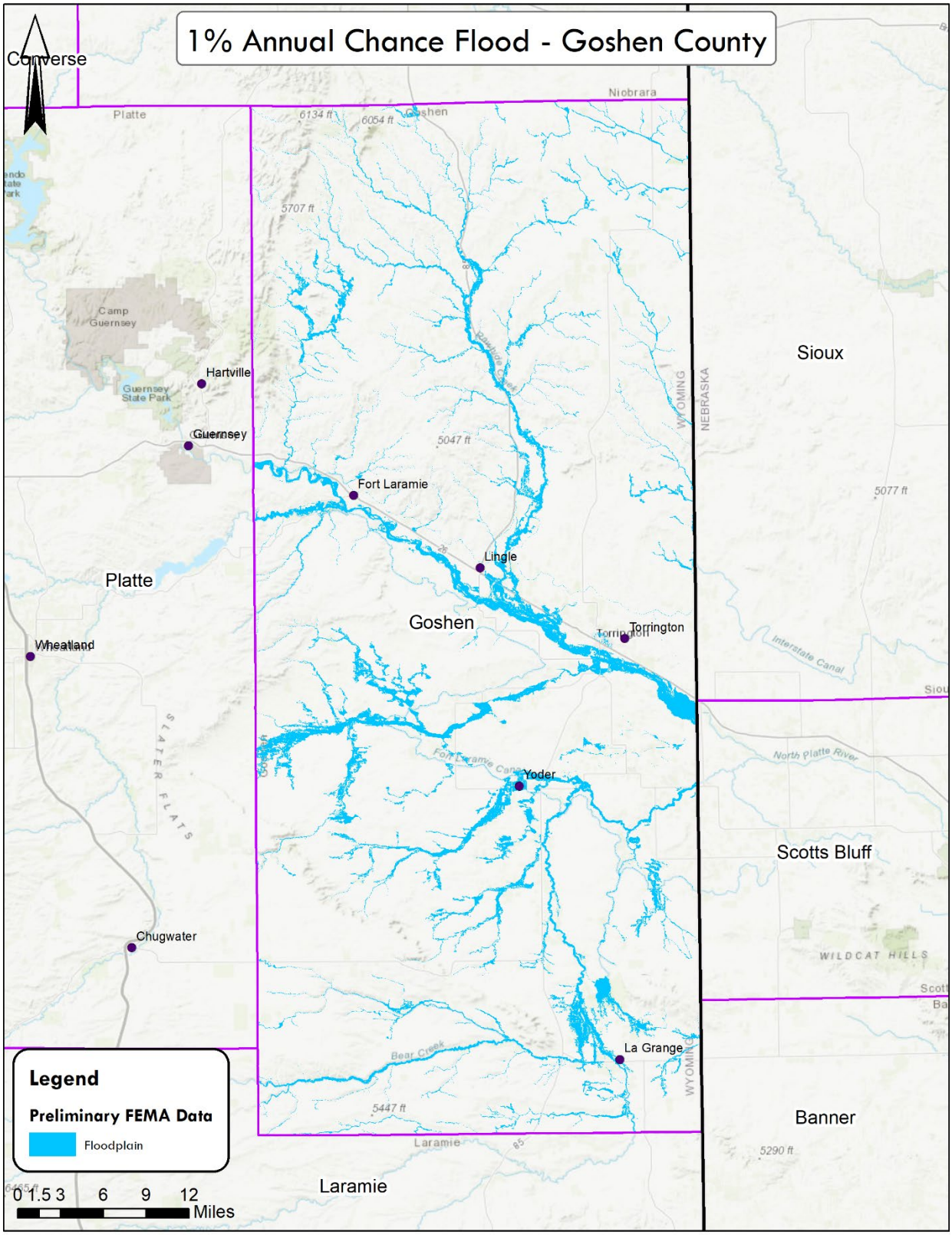
The transportation lifeline has the most exposure to the 1% Annual Chance Floodplain, with 43% of transportation infrastructure exposed. The health and medical lifeline has the next greatest exposure with 17% of infrastructure, followed by energy, in miles, of transmission and distribution line, with 11% of this infrastructure exposed. Food, water, and shelter has a notable exposure of 10% of infrastructure, while the other lifelines fall below 10%. Table 3.9 breaks down this exposure data further, including the counts of infrastructure exposed.

Table 3.9 Lifeline Exposure to the 1% Annual Chance (100-year) Floodplain

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	225	4	2 %
Energy	56	4	7 %
Energy (miles)	575	58	11 %
Food, Water, & Shelter	48	5	10 %
Health & Medical	12	2	17 %
Safety & Security	16	1	6 %
Transportation	185	58	43 %

The participated irrigation districts highlighted vulnerabilities due to flooding which include breach of dams or canal banks due to overtopping as well as damage to control structures, culverts, and crossings.

Figure 3.8 Goshen County Floodplain - 1% Annual Chance Flood



3.8.3 Probability of Future Occurrences

While the probability that the county will experience a flood event can be difficult to predict or quantify, the frequency of previously reported flood events in Goshen County shows that localized flooding will likely be experienced yearly. Flooding in general has the potential to cause moderate property and crop damage within the county and severe flooding has the potential to inflict significant damage to people and property. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

3.8.4 Participation in National Flood Insurance Program (NFIP)

According to the NFIP's Community Information System (CIS) all participating jurisdictions, with the exception of the Towns of Yoder and LaGrange, participate in NFIP. None of the jurisdictions participate in the Community Rating System (CRS), which is a program within the NFIP that can discount insurance rates of participating jurisdictions.

The floodplain mapping utilized for the NFIP was recently updated in June 2022 for Goshen County. The NFIP CIS lists the current effective map date as June 1, 2022. Fort Laramie is listed as having No Special Flood Hazard Area (NSFHA) within the CIS database, however this does not affect their participation in the NFIP.

Details of local jurisdiction NFIP participation, including current policies in force, are shown in Table 3.10. The table includes the date the initial Flood Insurance Rate Map (FIRM) and initial Flood Hazard Boundary Map (FHBM) were identified.

Table 3.10 NFIP Participation Details

Jurisdiction	Date of Entry	Initial FIRM ID	Initial FHBM ID	Policies in Force	Number of Paid Claims since 1978	Total Coverage	Claims Paid since 1978
Goshen County	3/1/1986	3/1/1986	7/19/1977	17	8	$3,747,900	$46,600
Torrington	12/11/1985	-	3/15/1974	0	5	0	$5,034
Lingle	5/22/2000	5/22/2000	8/15/1975	0	0	0	0
Fort Laramie	3/31/2014	-	-	-	-	-	-

The county is the only jurisdiction with repetitive loss properties. A repetitive loss property is an NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978.

Table 3.11 Repetitive Loss Data

Jurisdiction	RL Losses (Total)	RL Losses (Insured)	RL Payments (Total)	RL Payments (Insured)
Goshen County	2	0	$7,790	$0

3.8.5 Future Development Trends

Goshen County is not currently experiencing any major growth, but the risk and impacts of a flooding event are still prevalent to existing infrastructure. Any redevelopment must take into account which parcels are within the 100-year floodplain. Floodplain management ordinances, zoning and subdivision ordinances, and state regulations address methods and practices to minimize flood damage to new and substantial home improvement projects. Quality construction and compliance with local ordinances, which exceed NFIP requirements, are the greatest protection against flooding. The county along with the City of Torrington, and Towns of Fort Laramie and Lingle participate in the National Flood Insurance Program (NFIP) and support floodplain management activity at the local scale. Code adoption by local jurisdictions, compliance by builders, and local government inspection of new homes can greatly reduce the risk of flooding. Goshen County and its municipalities should continue to look into monitoring, analysis, modeling, and the development of decision-support systems and geographic information applications for floodplain management activities.

In addition to land-use planning, zoning, and codes applicable to new development, flood mitigation measures include structural and non-structural measures to address susceptibility of existing structures. Flood mitigation measures such as acquisition, relocation, elevation-in-place, wet/dry flood proofing, and enhanced storm drainage systems all have the potential to effectively reduce the impact of flood in the county.

3.8.6 Climate Change Impacts

The impacts of climate change on weather patterns and temperature fluctuations contribute to the potential for increased extent and frequency of floods in the future. The unpredictable nature of precipitation patterns and drought creates conditions conducive for flooding from heavy rains and/or rapid snowmelt. Wildfires are occurring more often due to drier conditions and the effects of these fires on the landscape also lead to more severe and frequent flooding.

3.9 Hail

3.9.1 Previous Occurrences

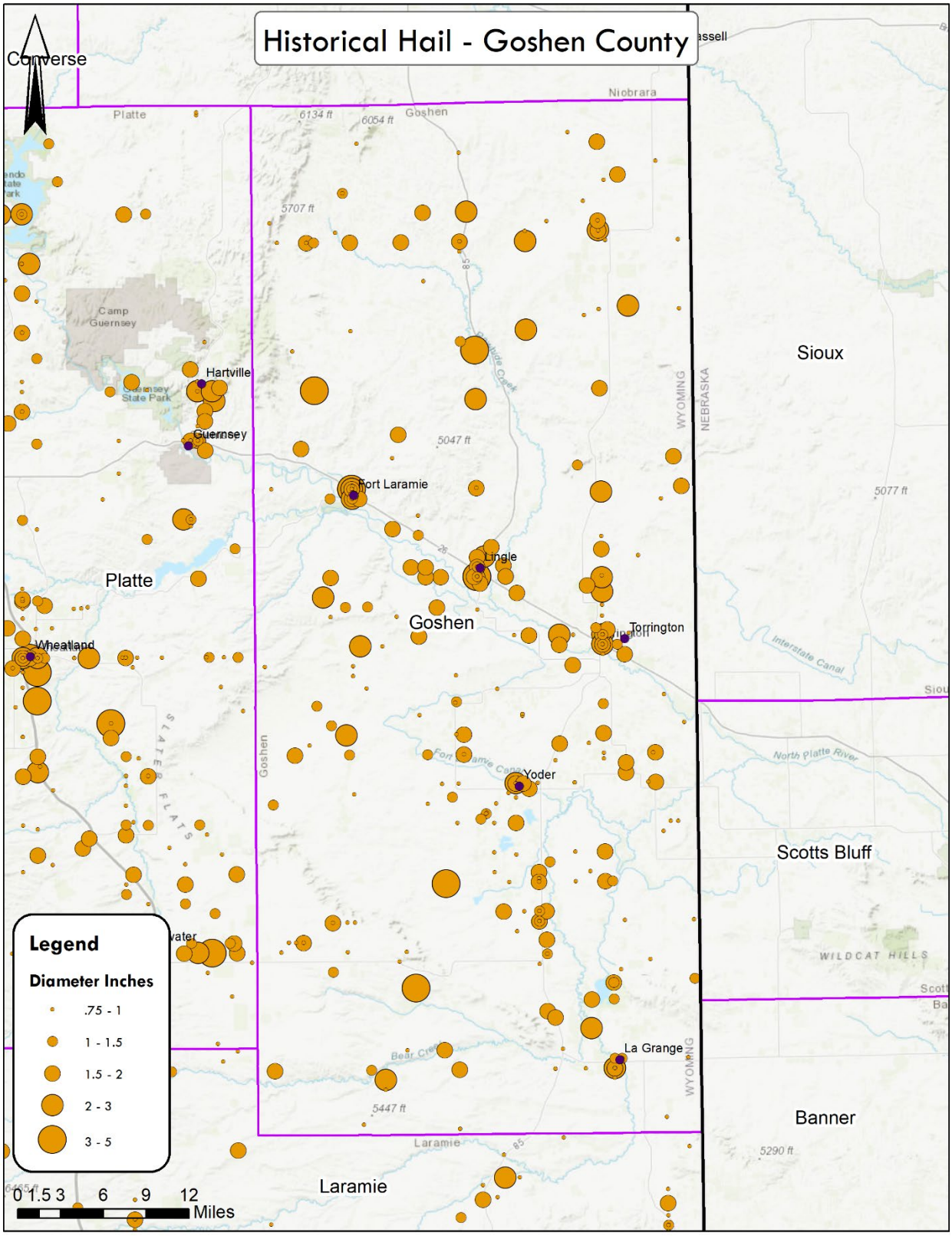
According to the NCEI database, 211 hail events have occurred in Goshen County between 1950 and 2021. These events resulted in over $1.8 million in property damage, and over $760,000 in crop damage. The Wyoming State Hazard Mitigation Plan (2021-2026) lists 81 hail storms as having occurred in Goshen County between 1960 and 2019. With these events combined, there was more than $3.2 million in property damage and more than $1.3 million in crop damage.

SHELDUS data shows 17 damaging events between 1961 and 2009, with a total of $3.4 million in property damage and $1.4 million in crop damage. No injuries or fatalities have been reported.

The largest reported hailstone, according to NCEI, was in Lingle in 2000 and measured 4.38 inches. The storm that produced that hail stone caused $100,000 in property damage.

Historical hail events for the county are illustrated in Figure 3.9, as well as the diameter of hailstones reported. It is worth noting reports of hail are typically higher near populations centers, which can be seen in the clustering of events near the jurisdictions, shown on the map. Based on this trend, it is likely that many hail events go unreported and records of events may be considerably lower than what is actually occurring in the county.

Figure 3.9 Hail Hazard, Goshen County



The following table summarizes hail impacts in Goshen County in the form of damage, injury, or loss of life since 1955. This data was derived from monthly storm data reported, generated, and released by NCEI. Other sources include; local resident and news accounts, unpublished reports from the Wyoming Office of Homeland Security (WOHS), newspaper accounts, and periodicals from public libraries.

Table 3.12 Damaging Hail Storms

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Torrington, Platte River	**7/30/1961**	**0**	**0**	**$27,500**	**-**
High intensity rain showers with some 0.5- to 1-inch diameter hail caused flash flooding with damage to homes, streets, crops, and farm land.					
LaGrange 4 W	**5/31/1962**	**0**	**0**	**$27,500**	**-**
Severe thunderstorms with considerable small hail caused flash flooding along Bear Creek, damaging property, livestock, roads, and bridges. Flood waters piled hail into 8 to10 foot drifts.					
LaGrange 4 W	**6/1/1962**	**0**	**0**	**$275,000**	**-**
Severe thunderstorms with heavy rain and 4 to 6 inches of small hail caused damage and flash flooding to the area along Bear Creek and some along Horse Creek.					
Torrington	**6/28/1962**	**0**	**0**	**$27,500**	**-**
Heavy thundershowers and hail did considerable damage to 1300 acres of crop land, mostly sugar beets in an area just south of Torrington.					
Hawk Springs	**8/1/1962**	**0**	**0**	**$0**	**$27,500**
Hail, from 4 miles north to 1 mile south of Hawk Springs, did severe damage to crops.					
Yoder	**7/23/1969**	**0**	**0**	**$0**	**$27,500**
Hail up to 1.5 inches in diameter and a tornado did crop damage from Yoder eastward for about 10 miles.					
Huntley	**6/2/1971**	**0**	**0**	**$0**	**$27,500**
Hail up to 0.75 inches in diameter caused crop damage in the Huntley area.					
Veteran	**6/11/1977**	**0**	**0**	**$275,000**	**-**
Hail up to 2 inches in diameter destroyed many crops north and east of Veteran in the early evening. Damage also to cars, houses, etc.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Southeast ¾ of Laramie County and Southern ½ Platte/ Goshen Counties	**6/18/1975**	**0**	**0**	**$2,750,000**	**-**
Scattered thunderstorms, some severe, developed near the Laramie Mountains and moved east-northeastward. Hailstones up to 2 inches in diameter coupled with hard rains caused considerable tree and roof damage in Cheyenne between 1700 and 1730 MST; much of the damage was in the northern part of the city. Hail also caused considerable property damage in Hawk Springs, in southern Goshen County. Widely scattered crop losses were reported in Laramie and Goshen Counties.					
S. Goshen, NE Laramie Counties	**6/18/1977**	**0**	**0**	**$27,500**	**-**
Hail up to 1.75 inches fell around 2100 MST doing damage to crops, pastures, houses, cars, etc.					
Torrington	**6/16/1978**	**0**	**0**	**-**	**-**
Heavy thunderstorm passed through Torrington dropping marble-to golf ball-sized hail and causing light damages to public property and crops in nearby areas.					
Goshen County	**7/20/1978**	**0**	**0**	**$27,500**	**-**
Evening thunderstorms dumped golf ball-sized hail on a portion of northeastern Goshen County. Some vehicles and homes were damaged as well as crops in the area.					
Fort Laramie	**6/28/1979**	**0**	**0**	**$2,750,000**	**-**
Heavy damages were reported in Fort Laramie as well as nearby ranches from the severe thunderstorm that reportedly had four tornadoes as well as golf ball-sized hail. Numerous buildings and crops (corn, sugar beets and grain) were damaged, mostly by the hail and gusty winds.					
Fort Laramie	**7/19/1979**	**0**	**0**	**$275,000**	**-**
A severe thunderstorm dumped baseball-to softball-sized hail in Fort Laramie, doing extensive damage to vehicles and buildings in the town and to surrounding wheat fields.					
Yoder and Hawk Springs	**8/22/1982**	**0**	**0**	**$0**	**-**
A hail storm raked a 4-square-mile area between Yoder and Hawk Springs with marble-sized hail 6 to 10 inches deep. The hail stripped the foliage from the area's corn, bean, and sugar beet crops.					
Lingle	**6/20/1983**	**0**	**0**	**$2,750**	**-**
Hail up to the size of softballs fell just south and east of Lingle causing minor damage to cars and crops.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Hawk Springs	**6/13/1984**	**0**	**0**	**$275**	**$2,750**
Hail up to the size of golf balls fell over a small strip centered on Hawk Springs. Most of the damage was to grain crops near the town, with some cars receiving window damage.					
Torrington	**6/22/1984**	**0**	**0**	**$2,750,000**	**$275,000**
All of the damage occurred due to the heavy fall of up to 1.5-inch-diameter hail. Extensive damage to cars and buildings occurred, and 10,000 acres of crops were severely smashed. A weak tornado formed as the storm went northeast of the city, briefly touching down outside town and then dissipating.					
Jay Em	**8/5/1985**	**0**	**0**	**$2,750**	**$0**
Hail up to 1 inch in diameter was reported 13 miles east-northeast of Jay Em.					
1N Lingle to Torrington	**9/5/1986**	**0**	**0**	**$1,000,000**	**$2,750,000**
A swath of golf ball-sized hail from just north of Lingle to Torrington did more than $1 million damage to farms in the area and devastated crops and pastureland. Winds up to 50 MPH and heavy rain also accompanied the storm.					
Yoder	**7/7/1987**	**0**	**0**	**$0**	**$2,750**
Strong thunderstorms from south Platte County moved through south Goshen and northeast Laramie Counties. These storms pelted crops with 0.5-inch-diameter hail from Yoder south to Albin. Also, Yoder reported some heavy rain totaling over 0.67 inch.					
7W Jay Em	**8/3/1987**	**0**	**0**	**$27,500**	**$27,500**
At 2120 MST a severe thunderstorm pelted Orin Junction in extreme southeast Converse County with 0.75-inch-diameter hail. Later, this severe thunderstorm moved into northwest Platte County near Glendo Reservoir where 70 MPH wind gusts were recorded. This severe thunderstorm provided a combination of heavy rain, hail, and damaging winds which wracked the Jay Em area in northern Goshen County about 2140 MST. Ranchers west of Jay Em experienced about 1 inch of heavy rain, 1.75-inch-diameter hail, and wind gusts over 60 MPH. The hail storm, which covered a strip about 5 miles wide by 25 miles long about 7 miles west of Jay Em, leveled oats and hay crops in its path. The severe storm damaged or shattered numerous windows in ranch houses, garages, barns, and pickup trucks. Siding damage was observed on many ranch buildings.					
8N and 3N Hawk Springs, Huntley, Yoder	**9/4/1987**	**0**	**0**	**$2,750**	**$27,500**
Severe thunderstorms pummeled the south section of Goshen County with 0.5- to 1.75-inch-diameter hail. The hail storm broke all windows on the west side of Huntley Elementary School. Windows were also broken in homes and damage was done to roofs and car tops between Yoder and Huntley. About 2500 acres of sugar beets were badly damaged due to the hail between Yoder and Huntley. Crops of corn and beans were also reduced to stubble due to the hail. Military personnel about 8 miles north of Hawk Springs reported 0.75-inch-diameter hail, which accumulated to a depth of about 2 inches.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Hawk Springs 15 W to Hawk Springs 5 East	**5/30/1996**	**0**	**0**	**$10,000**	**$10,000**
Golf ball-sized hail fell from west to southeast of Hawk Springs. Some farms in the area had roof damage and windows blown out. The hail fell in a 1 mile wide path. Crops were also damaged in the area by hail.					
15 S Torrington	**8/14/1996**	**0**	**0**	**$10,000**	**-**
Yoder	**8/14/1996**	**0**	**0**	**$10,000**	**-**
The large hail broke car windshields.					
LaGrange	**6/26/1999**	**0**	**0**	**$100,000**	**-**
Yoder	**6/26/1999**	**0**	**0**	**$1,200,000**	**$500,000**
LaGrange	**6/26/1999**	**0**	**0**	**$250,000**	**$250,000**
A severe hail storm caused considerable damage to crops and property over a large part of central and eastern Goshen County, particularly between Yoder and Torrington, Wyoming.					
Torrington	**6/27/1999**	**0**	**0**	**$75,000**	**-**
Lingle	**5/6/2000**	**0**	**0**	**$100,000**	**-**
29 N Torrington	**5/16/2000**	**0**	**0**	**$20,000**	**-**
6 SW Lingle	**5/16/2000**	**0**	**0**	**$50,000**	**-**
Hail and gusty winds occurred just south and west of Lingle, damaging two grain bins, and breaking some windows.					
Torrington	**5/21/2014**	**-**	**-**	**-**	**-**
Hail and Flash Flood Storm: Large, widespread, hail damage and flash flooding affecting homes located in and near Torrington.					
Fort Laramie	**6/12/2017**	**-**	**-**	**-**	**-**
Tornado/Hail Damage: Hit the Lay Ranch, several outbuildings were totally destroyed, the house sustained severe damage but was eventually repaired, roof and windows replaced. Several prize horses were killed, farm and ranch implements were totaled to include ranch vehicles, corrals twisted, irrigated pipe destroyed, horse trailers tossed and totaled. No accurate cost estimates yet exist. Softball size hail hit the town and area around Fort Laramie.					

3.9.2 Inventory Exposed

Goshen County has the fourth highest number of loss-causing hail storm events across the state, per the Wyoming State Hazard Mitigation Plan (2021-2026). The entire county is exposed to hail events, as they are regional and travel. All structures, infrastructure, property, people, crops, and livestock could be damaged or harmed by a hail storm.

3.9.3 Probability of Future Occurrences

The frequency of previously reported hail events in Goshen County provides an acceptable framework for determining the probability of future hail storm occurrence in the area. The probability that the county will experience a damaging hail event can be difficult to predict or quantify, but it is expected that hail events will be experienced yearly and may result in damage. Severe hail storms have the potential to inflict significant damage to people and property in the county. Mitigating damage requires that communities remain diligent about building structures that meet current building codes in order to be able to withstand damage.

3.9.4 Future Development Trends

Although Goshen County is not currently experiencing major growth, the risk and impacts of a hail event are still prevalent to existing infrastructure. All structures in Goshen County will likely be exposed to hail storm events. Because these events are not typically isolated to one geographical area, the location does not increase or reduce the risk necessarily. Goshen County should adhere to building codes and development should be built to current standards in case of adverse weather.

3.9.5 Climate Change Impacts

As humidity is lowered, due to rising temperatures, extended drought, and extreme heat events, convective instability increases. The movement of dry air into thunderstorms can increase the likelihood and size of hail due to evaporate cooling which lowers the elevation of the freezing level in thunderstorm clouds. This creates an opportunity for hailstones to grow larger and become more dangerous, as well as appear in areas where hail was uncommon previously, due to unpredictable weather patterns.

3.10 Hazardous Material Release

3.10.1 Previous Occurrences

Hazardous materials incidents have the potential to occur in Goshen County each year, due in part to the transportation routes for both railroad and highways that traverse the county. The U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) records hazardous material transportation incidents based on reports submitted by businesses and responders. Between 1990 and 2020, there have been 5 transportation incidents reported in the county. Total damages for these incidents are approximately $30,000, which includes the cost of the material lost, carrier damage, property damage, response costs, and remediation clean-up costs. All of these incidents were due to loose closures, overfilling, or mishandling.

According to the PHMSA, two of these incidents were ‘serious’ due to bulk release. PHMSA defines a ‘serious’ incident as those that involve at least one of the following: a fatality or major injury caused by the release of a hazardous material, the evacuation of 25 or more employees or responders or any number of the general public due to release or exposure to fire, a release or exposure to fire resulting in the closure of a major transportation artery, and the release of a bulk quantity (over 119 gallons or 882 pounds) of a hazardous material.

The two incidents involved the release of 1,023 gallons of diesel fuel and 608 gallons of fuel oil. There have been no reported fatalities as a result of a hazardous material incident in the county.

3.10.2 Inventory Exposed

A significant portion of the county is affected by hazardous materials risk. Most communities and some unincorporated areas of Goshen County are exposed to potential hazardous material release incidents due to proximity to major roadway transportation corridors, such as Interstates 26 and 85. Union Pacific Railroad and Burlington Northern Santa Fe (BNSF) both have railroad lines that run through the county, which also provides risk for communities located near the tracks.

A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a single location. Fixed facilities include companies that store hazardous waste at their facility and also all hazardous waste sites. Some of these facilities contain extremely hazardous substances. Those are the facilities that are required to generate Risk Management Plans (RMP). An accident resulting in the release of chemicals from those facilities could pose a significant problem to Goshen County.

The hazardous materials release exposure data was calculated based using a 1-mile buffer from major highways and rail. This captures the infrastructure along transportation routes throughout the county that are exposed to and could be impacted by a transportation related hazardous materials release.

While communications equipment is located within the buffer zone analyzed, it is not likely to be greatly impacted by a hazardous materials release, despite a large count being exposed. Whereas the consequences for the lifelines of safety and security, health and medical as well as food, water and shelter could be much greater if an incident occurs.

All lifeline infrastructure has high exposure in the county. As infrastructure is typically located in populated areas, the large percentages of exposure are reasonable and with the majority of infrastructure is exposed it is important to acknowledge that hazardous materials release incidents vary drastically in severity and impacts. For example, high exposure to communication infrastructure has much less consequence than exposure to health and medical or food, water, and shelter. The data in Table 3.13 illustrates the importance of public education regarding hazardous materials release incident risks and how widespread the effects could be.

Table 3.13 Lifeline Exposure to Hazardous Materials Transportation Routes

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	225	166	74 %
Energy	56	47	84 %
Food, Water, & Shelter	48	46	96 %
Health & Medical	12	9	75 %
Safety & Security	16	14	88 %
Transportation	185	132	71 %

The hazardous materials release vulnerability concern detailed by the participating irrigation districts is the potential contamination if the release occurs in canals or upstream of diversion structures.

3.10.3 Probability of Future Occurrences

Predicting hazardous material release incidents in Goshen County is difficult due to the numerous variables of any given event, such as location, weather conditions, type and amount of chemical, quantity released, and whether the incident happens in transit or stationary. Based on those variables, the potential impacts and losses that could be incurred are extremely varied.

There is potential for an incident to occur, however with the low number of previous occurrences over approximately two decades the probability is likely low. It should be noted that even a single event could have devastating effects and possible consequences to life safety. Any possible future occurrences will be minimized through proper supervision, protocols, inspections, and procedures.

3.10.4 Future Development Trends

Although Goshen County is not currently experiencing large growth, the risk and impacts of a hazardous materials incident are still prevalent to existing infrastructure. All structures located near identified hazardous material sites or major transportation corridors within Goshen County have the highest probability of being impacted should a hazardous material incident occur.

3.10.5 Climate Change Impacts

Climate change effects on transport and handling of hazardous materials could manifest in multiple ways. The U.S. DOT Climate Action Plan published in 2021, explains the effects of climate change are increasing over time and this climate variability and change pose threats to transportation systems. Highlights in the report of potential notable impacts include increased risk of vehicle crashes in severe weather, increased temperatures damaging infrastructure (asphalt degradation, expansion of paved surfaces, and railroad tracks buckling), and more frequent / severe flooding due to more intense precipitation damaging drainage infrastructure.

In 2022, the U.S. Government Accountability Office (GAO) released a report informing the U.S. Environmental Protection Agency (EPA) of the importance for the Risk Management Plan (RMP) rule to receive an update to include the consideration of facility risks due to climate change and natural hazards. The GAO report concluded:

> Climate change may exacerbate natural hazards, such as flooding, storm surge, and wildfires, which could potentially lead to accidental releases at RMP facilities. EPA has the opportunity to reduce the risk of accidental releases and minimize the consequences of such releases by ensuring that RMP facilities are managing risks from natural hazards and climate change.

Many hazardous materials are unsafe if not within specific temperature ranges. Extreme temperatures can therefore pose a risk during transport and handling.

3.11 Landslide

3.11.1 Previous Occurrences

Landslides in Goshen County have potentially occurred, however there are no recorded incidents. Landslides often happen in unpopulated areas and therefore go unnoticed.

3.11.2 Inventory Exposed

Exposure in a landslide incident is localized and the risk to life safety and property is dependent on the proximity of people, structures, and infrastructure to an event. Landslides have the potential to be very large and a large landslide near a populated area or near Lifeline infrastructure, such as transportation, power, or communications, could cause significant economic losses, damages, injuries, and deaths. Rockfalls are also localized and present a risk primarily to those on transportation corridors, as a rockfall could harm motorists, economic impacts from closed roads, or in some cases cause extended damage to the roadway.

Debris flows are less localized and capable of moving trees and boulders considerable differences. The rapid nature and immediate impacts of a debris flow create considerable risk to public safety and any property in its path. Lifelines have the potential to be affected if a debris flow damages roads or bridges, and power or communications systems. Water quality and delivery systems could be impacted by a debris flow, blocking canals and causing overtopping of banks and breach. This is the largest vulnerability concern detailed by the participating irrigation districts.

Table 3.14 accounts for the exposure of parcels to the highest landslide susceptibility areas (highest 30% of risk statewide). These areas are where landslides are most likely to happen and therefore pose the highest risk to people and property. The parcels exposed to the highest risk are worth more than $3.2 million and all but one are residential parcels.

Table 3.14 Parcel Exposure to Landslide Susceptible Areas

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Unincorporated	23	22	3,140,228	1	173,147
County Total	**23**	**22**	**3,140,228**	**1**	**173,147**

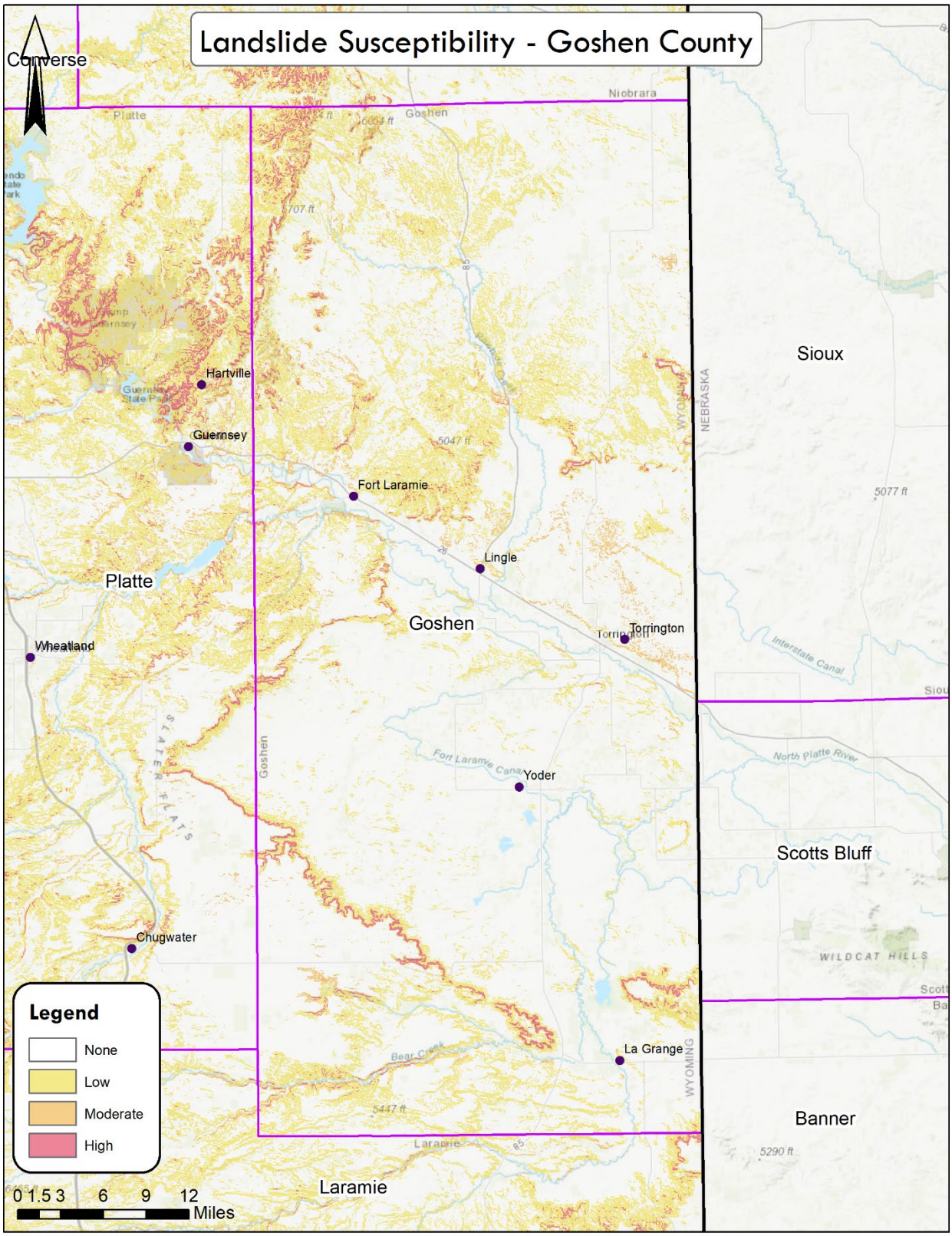
Lifeline exposure to landslide susceptible areas is minimal in Goshen County. The only reported exposure for infrastructure is for the communication and energy lifelines. With 2% of communication infrastructure exposed and less than 1% of energy infrastructure miles in areas of landslide susceptibility, landslides do not pose a serious risk to lifeline infrastructure.

Table 3.15 Lifeline Exposure to Landslide Susceptible Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	225	5	2 %
Energy (miles)	575	3	0.5 %

Figure 3.10 shows all areas of landslide susceptibility across Goshen County. Note that the high susceptibility areas in the county are primarily away from municipalities and transportation routes.

Figure 3.10 Landslide Susceptibility, Goshen County



3.11.3 Probability of Future Occurrences

Landslides occur often, however the majority are not witnessed and therefore not reported. Landslides are most common in areas with previous landslide activity.

3.11.4 Future Development Trends

Development should be monitored to ensure no construction is occurring in potential landslide areas.

3.11.5 Climate Change Impacts

The conditions required for landslides and debris flows are greatly affected by climate, including the melt speed and level of snowpack, rapid temperature fluctuations, and erratic amounts of precipitation. The integrity of the soil and rock is affected with each freeze and thaw cycle, which are occurring more often and more rapidly due to unseasonable temperature swings. As landslides are more likely to occur after heavy precipitation and rapid snowpack melt, the unpredictable weather leads to dangerous conditions more frequently. The increased climate variability being experienced is expected to continue and with that the trend toward landslide and debris flow conducive situations will also.

3.12 Lightning

3.12.1 Previous Occurrences

The Wyoming State Hazard Mitigation Plan (2021-2026), based on NCEI data, recorded five damaging lightning events in Goshen County from 1960 to 2019. These events combined caused more than $23,000 in property damage, and there have been two fatalities reported due to lightning.

Based on SHELDUS data, there have been three damaging lightning events reported in the county. In 1961, two fatalities were reported as a result of lightning. Between 1961 to 1997 more than $69,000 (2019 USD) in property damages has been reported.

These databases obtain data from various sources and the best available data may not include all lightning specific damage causing events. Some events may not be reported, and some damages may be underestimated, however events occurring near populated areas are more likely to be recorded.

Community members of Goshen County will likely say that a number of major lightning events happen each year. Thunderstorm wind events records from NCEI were also reviewed to give a better picture of potential lightning events. According to NCEI, 64 thunderstorm wind events have occurred within Goshen County between 1950 and 2021 causing approximately $21,500 in property damage and two injuries. While the damages for these events may be related to wind, thunderstorms often cause lightning events and are not reported as separate events.

3.12.2 Inventory Exposed

Property, structures, crops, people, and livestock outside during a thunderstorm is at risk of being struck by lightning. The unpredictability of lightning and the recorded instances of lightning strikes occurring miles away from an active thunderstorm illustrate the risk this hazard poses indiscriminately across the county. Lightning has the potential to cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It can also cause forest, brush, and structural fires. Damage from lightning typically occurs in four ways:

- Electrocution, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
- Power surges that can damage electrical and electronic equipment

The lightning vulnerability concern detailed by the participating irrigation districts is the potential damage to SCADA systems.

3.12.3 Probability of Future Occurrences

Past events in Goshen County indicate that the potential magnitude of lightning events will likely be limited but may occur often with thunderstorm and wind events. Previous thunderstorm records show that 63 events occurred over a 67 year period (1950-2017). Based on these records, it is likely that future events will occur in any given year. While losses are dependent on each particular incident, damage to structures and potential loss of life and injury may occur. Also, adverse effects due to lightning, such as wildfires, have the potential to occur within Goshen County in the future. Wildfire impacts to Goshen County are described in further detail in the Wildfire profile section.

3.12.4 Future Development Trends

Although Goshen County is not currently experiencing major growth, the risk and impacts of a lightning event are still prevalent to existing infrastructure. All structures are at risk should a lightning event occur. Because these events cannot be predicted, it is hard to determine which particular structures and areas will be impacted. Goshen County should adhere to building codes and development to mitigate future damage to structures should a lightning event occur.

3.12.5 Climate Change Impacts

The effects of climate change are seen across many hazards and lightning is not an exception. The unpredictable number of storms and their characteristics indicate the amount of lightning they bring could change significantly. With the changing weather patterns, the potential increase in thunderstorms events can result in increased lightning occurrences.

3.13 Public Health Hazards

3.13.1 Previous Occurrences

The first case of COVID in Goshen County was identified on March 26th, 2020. The County, at the time of this plan's writing, had more than 3,200 cases and 57 deaths.

The County also had H1N1 cases in 2009, however records differ as to the number. Statewide Wyoming had more than 700 cases.

3.13.2 Inventory Exposed

The whole population of Goshen County is at risk to public health hazards, especially those with chronic health conditions or other risk factors including access and functional needs. The residents are exposed to public health hazards in multiple ways, whether it is illness through contagious pathogens, harm from poor air quality, or the dangers of poor water quality.

Mental and behavioral health are critical to include when discussing public health hazards and the whole population can be affected by an event.

See Table 2.1 and Table 2.2 for the demographics and health indicators of the population of Goshen County, which help to keep a holistic view of needs in the communities when planning for potential events.

3.13.3 Probability of Future Occurrences

Goshen County will likely have a public health hazard incident in the future, whether it is water quality, potential disease transmission, or the occurrence of a traumatic event in the community. Air quality is also an example of a prevalent hazard, as wildfire smoke can travel great distances and affect large populations.

The potential for an epidemic or pandemic outbreak is probable, as more novel pathogens are discovered around the world and infectious diseases evolve rapidly. Climate change can contribute to the spread of illness

as the increased number of disaster events leads to more mass evacuations and the need for more disaster sheltering, increasing person-to-person interactions.

Mental and behavioral health will continue to be impacted after an incident and as a result of any future incidents. The assistance and support should not stop once the response or even recovery from an incident is over but should considered for the community consistently going forward.

3.13.4 Future Development Trends

Future planning for land use and development should include review of water and sewer systems with public health partners in addition to typical entities. This ensures that should a water quality or environmental safety issue arise all partners are informed and prepared to address the issue.

Consideration of shelters is important when thinking of public health hazards and prioritizing access and functional needs populations is critical. Developing adequate sheltering where residents can be healthy and have hygienic accommodations can assist in slowing the effects of a public health hazard.

3.13.5 Climate Change Impacts

Climate change has affected disease transmission globally, according to the World Health Organization. Temperature fluctuations and extreme weather events create conducive conditions for diseases to manifest and spread. Around the world the movement of people out of cities, heat centers, into the rural areas leads to more interactions between humans and animals. These interactions will lead to the continued discovery of never-before-seen disease and will continue to be a concern. Climate change can also contribute to an increase of person-to-person interactions, as the increased number of disaster events leads to more mass evacuations and need for more disaster sheltering.

The impacts of climate change on wildfire and drought create indirect public health issues related to air and water quality. Research has shown exposure to wildfire smoke, even from great distances, has a long-term effect on people's health and drought can contribute to heavy metal concentration increases in water sources. The indirect impacts of climate change on public health are being studied around the world and as climate change continues, the negative effects on public health will likely increase rapidly.

3.14 Tornado

3.14.1 Previous Occurrences

According to SHELDUS data, there have been 17 reported damaging tornado events between 1960 and 2017. Due to these events, more than $2.1 million in property damage and approximately $18,000 in crop damage were incurred. One of these events, in 2017, resulted in an injury.

NCEI records for Goshen County include a total of 74 tornado events from 1960 to 2021. The damaging tornado events are detailed in Table 3.16, including a tornado in 1926 reported to have caused 26 injuries[1]. The damages from these events total more than $6.4 million and resulted in 28 injuries. According to NCEI, the two most devastating tornadoes in Goshen County occurred on June 28, 1979, and June 22, 1984. Each event caused $2.5 million in property damages. No one was reported injured for the F1 and F0 (respectively) magnitude tornadoes.

The HMPC detailed a tornado event in October of 2019, which touched down between Lingle and Fort Laramie in a rural area. The tornado resulted in property damages, as well as injuries to livestock and wildlife. The exact damages are unknown for this event.

Tornadoes are an important example of best available data constraints, as multiple databases have highly differing information due to a lack of centralized, standardized reporting. Goshen County is located near

[1] Wyoming Climate Atlas: Severe Weather

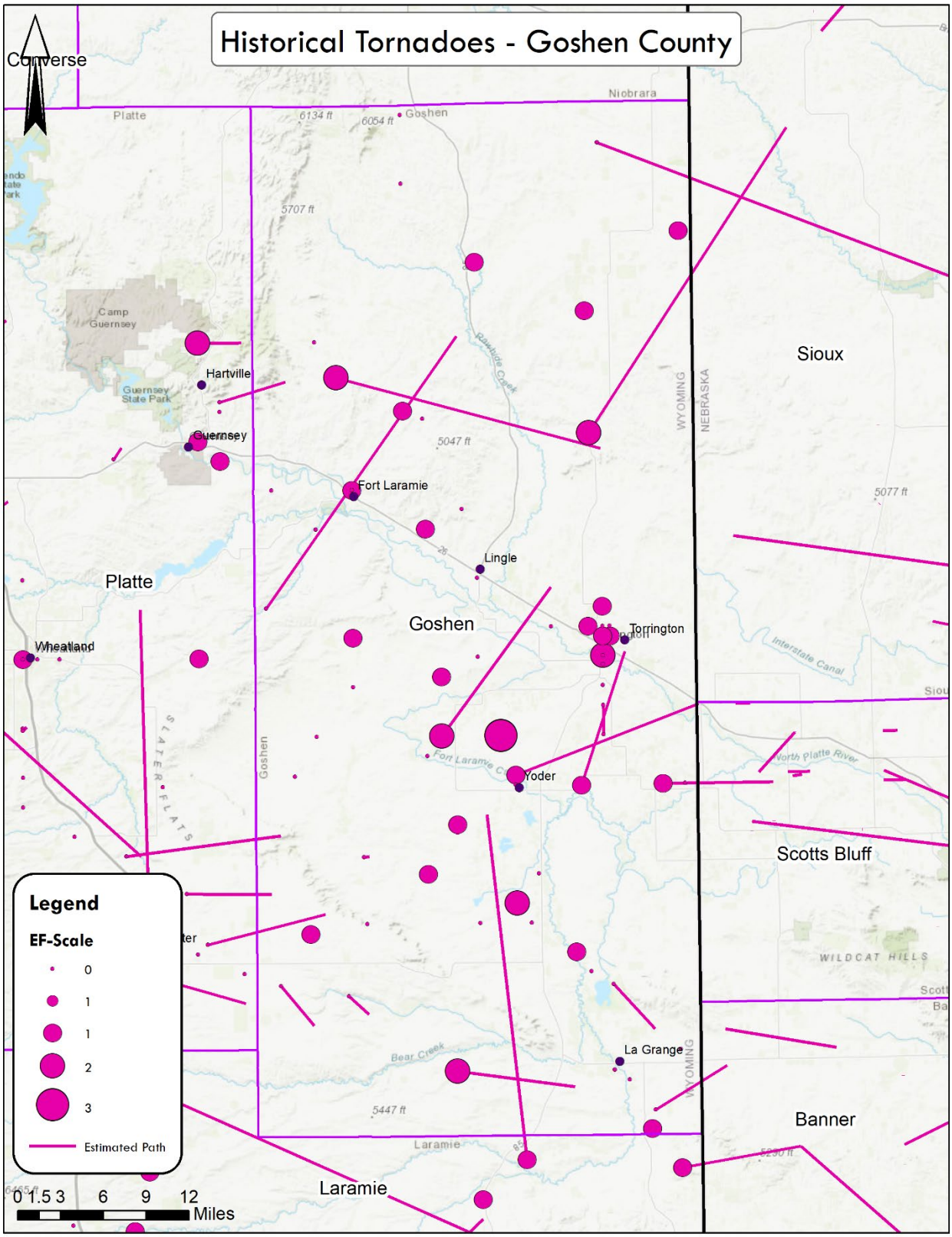
"tornado alley" making tornadoes an understandable risk, with any number of tornadoes posing significant hazard to the public and property. Figure 3.11 shows the identified historical tornadoes in the county.

Table 3.16 Damaging Tornado Events, 1926-2017

Date	Scale	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
6/15/1926	F3	0	26	0	0
5/22/1954	F1	0	0	2,500	0
7/21/1954	F1	0	0	25,000	0
6/26/1955	F3	0	0	30	0
5/24/1957	F1	0	0	30	0
7/20/1957	F0	0	0	30	0
6/8/1958	F1	0	0	25,000	0
7/30/1958	F1	0	0	30	0
8/21/1960	F2	0	0	250	0
6/12/1962	F0	0	0	2,500	0
6/14/1963	F2	0	0	25,000	0
5/23/1965	F1	0	0	25,000	0
4/12/1967	F2	0	0	25,000	0
6/5/1968	F1	0	0	250	0
5/5/1969	-	0	1	250,000	0
7/23/1969	F1	0	0	25,000	0
10/7/1969	-	0	0	250	0
4/18/1971	F1	0	0	2,500	0
6/12/1971	F1	0	0	2,500	0
7/1/1974	F1	0	0	25,000	0
6/20/1977	F1	0	0	30	0
7/28/1978	F2	0	0	250,000	0
6/28/1979	F1	0	0	2,500,000	0
6/28/1979	F1	0	0	25,000	0
6/22/1984	F0	0	0	2,500,000	0
5/12/1989	F1	0	0	25,000	0
5/18/1990	F0	0	0	2,500	0
7/30/1996	F1	0	0	70,000	0
5/23/2008	EF1	0	0	10,000	0
6/5/2009	EF2	0	0	10,000	0
6/12/2017	EF2	0	1	597,000	0

Date	Scale	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
	Total	0	28	$6,425,000	0

Figure 3.11 Historical Tornadoes, Goshen County



3.14.2 Inventory Exposed

Historically, most tornadoes in Goshen County between 1950 and 2020 were F0s or F1s with a handful of F2 and EF2s. A single reported F3 occurred in 1955.

Exposure to tornadoes is the same for the whole county, as tornadoes can touch down randomly throughout. Therefore, all assets are exposed but the potential damages are dependent on the characteristics of the tornado and its location as well as: the age and type of buildings, construction material used, and condition of the structure.

Lifelines could potentially be impacted based on the location of the tornado, including damage to infrastructure leading to power and communications disruption, water and fuel shortages, transportation issues and damage to services such as hospitals, water treatment, and wastewater facilities. For the districts, irrigation control systems could be damaged, disrupting the water delivery abilities of the irrigation districts in the county.

The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. The population needs to be aware of how to seek shelter during a tornado and avoid behaviors or decisions that place them in greater danger.

3.14.3 Probability of Future Occurrences

Although tornadoes are hard to predict, based on previous occurrences, Goshen County could anticipate significant property damages from a single tornado event in the future. Historical frequency suggests that there is a likely chance that a tornado could occur somewhere in the county each year.

The likelihood of a tornado occurring changes according to the time of year. Based on historical records, tornadoes occur most frequently in May and June with some occurring as early as April. Community members should maintain awareness of tornado watches and warnings throughout the year.

3.14.4 Future Development Trends

Although Goshen County is not currently experiencing major growth, the risk and impacts of a tornado event are still a concern for existing infrastructure. All existing structures built in Goshen County are potentially exposed to tornado and severe wind damage. Structures with limited foundations, such as mobile homes, are more at-risk than permanent structures. Goshen County should adhere to current building codes and facilitate new development that is built to the highest design standards to account for tornadoes and severe wind.

3.14.5 Climate Change Impacts

The effect of climate change on frequency and intensity of tornadoes is being studied by scientists across the country. Tornadoes last for short durations, seconds to hours, and have a relatively small footprint compared to other weather-related hazards, making it difficult to model them. Scientists are using predictions of weather components that contribute to tornado occurrence and as weather shifts they can see trends in these components. The changes in weather patterns include increases in warm, moist air and wind shear, as well as an unstable atmosphere which create more favorable environments for tornadoes. These trends can possibly increase future occurrences and as climate change effects continue that likelihood grows.

3.15 Wildfire

3.15.1 Previous Occurrences

The largest grass fire to occur in the county was in July 2016, when the Simmons Fire burned more than 21,000 acres across northern Goshen County into Nebraska. Previously the largest fire, the County Line fire burned almost 11,000 acres in September 2000 and began from a lightning strike. Grass fires have greatly affected

agriculture land by consuming acres of grazing land and burning through haystacks and fencing used by livestock.

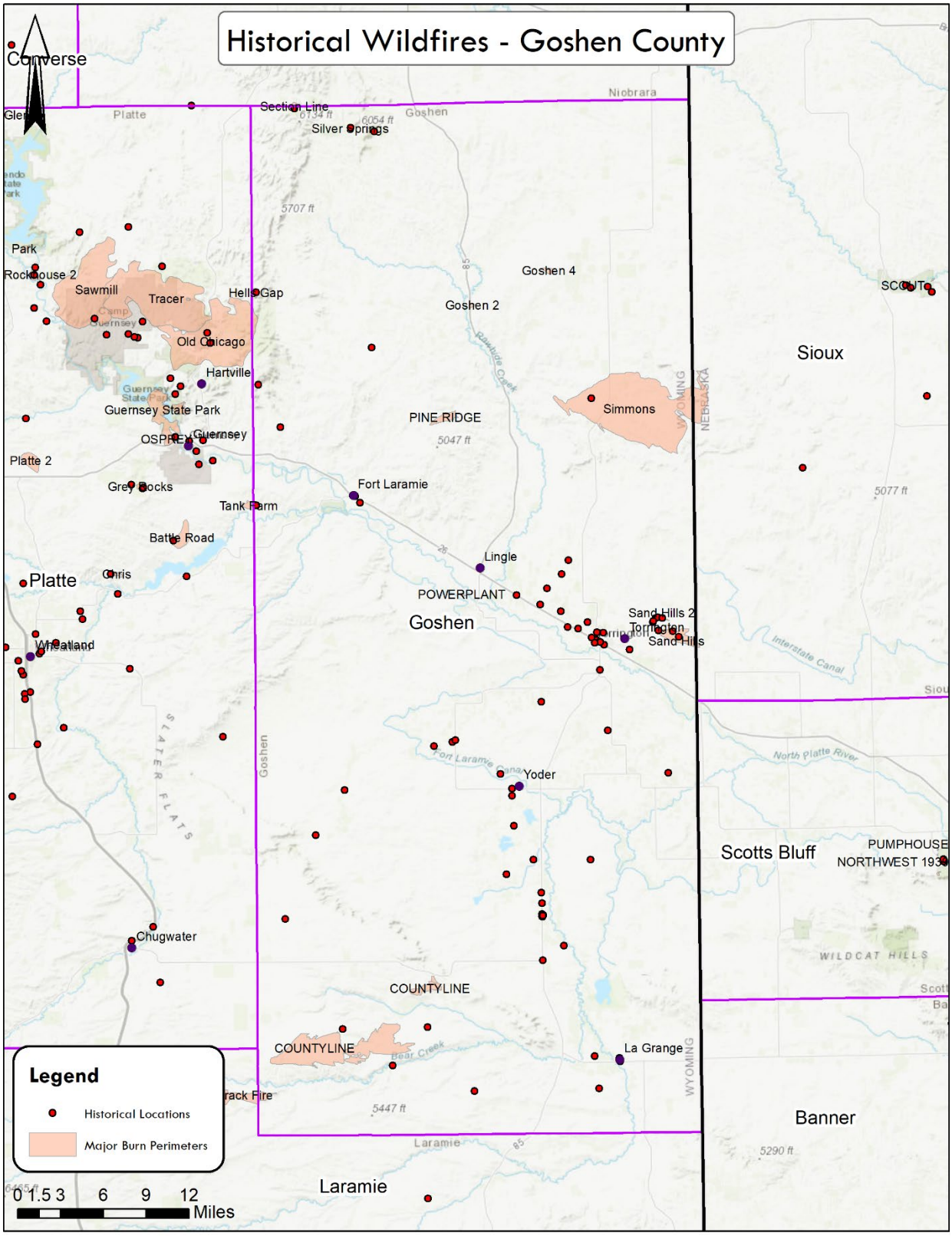
Table 3.17 Historical Fires in Goshen County

Year	Fire Name	Acres Burned
2021	313	3,735
2017	Sand Hills	1,149
2016	Simmons	21,099
2000	County Line	10,958
1985	Haystack	1,792

Source: Historic Fire Database, NASA RECOVER, FEMA

Other fires have occurred in the county, the list represents those that burned more than 1,000 acres. Figure 3.12 shows many of these smaller historical fires across Goshen County and the large burn perimeters.

Figure 3.12 Historical Wildfires, Goshen County



3.15.2 Inventory Exposed

All structures, infrastructure, people, and exposed utilities are potentially vulnerable to damages from a wildfire event. Figure 3.13 presents the wildfire risk across Goshen County. Structures that have not proactively mitigated wildfires are most at risk. Table 3.18 summarizes those parcels that are located within the highest (top 20% statewide). Readers are directed to the WY State Forestry Division's Wildfire Risk Assessment Portal to best review this information at a more user-friendly community scale.

Unincorporated areas of the county and all municipalities have some exposure to the highest wildfire risk areas. The unincorporated areas have the largest amount of parcels exposed, over half of the total in the county, and valued at more than $141.7 million. Residential parcels make up the vast majority of the total exposed parcels in Lingle and value at more than $14.1 million. Of the parcels exposed in Torrington, Fort Laramie, and Yoder, 85%, 93%, and 97% are residential, respectively. LaGrange has the highest number of commercial properties exposed, after the unincorporated areas, with a value more than $2.4 million. Within the county, commercial properties are approximately 9% of both the total value and total number of parcels exposed in the highest wildfire risk areas.

Table 3.18 Parcel Exposure to Areas with Highest Wildfire Risk

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Torrington	52	44	11,135,696	8	1,062,399
Fort Laramie	90	84	5,117,281	6	157,320
LaGrange	120	93	10,686,798	27	2,471,476
Lingle	136	127	14,145,600	9	1,124,511
Yoder	68	66	11,768,983	2	28,822
Unincorporated	583	542	76,439,123	41	7,585,108
County Total	**1049**	**956**	**129,293,481**	**93**	**12,429,636**

Approximately one third of health and medical lifeline infrastructure is at risk of wildfire. This followed by other lifelines with between 4% and 12% infrastructure exposure. Table 3.19 shows the details for these lifelines. No safety and security lifeline infrastructure is at risk of wildfire.

Table 3.19 Lifeline Exposure to Areas with Highest Wildfire Risk

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	225	28	12 %
Energy	56	6	11 %
Energy (miles)	575	21	4 %
Food, Water, & Shelter	48	5	10 %
Health & Medical	12	4	33 %
Transportation	185	22	12 %

There are currently no parcels of lifeline infrastructure exposed to the highest risk (top 33% statewide) Wildland Urban Interface (WUI) areas.

Figure 3.14 shows the areas covered by the Fire Protection Districts in Goshen County. There are eleven districts within the county: Chugwater, Fort Laramie, Hawk Springs, Jay Em, LaGrange, Lyman, Prairie Center, Rural Lingle, Rural Torrington, Rural Yoder, and Veteran.

Figure 3.13 Wildfire Risk, Goshen County

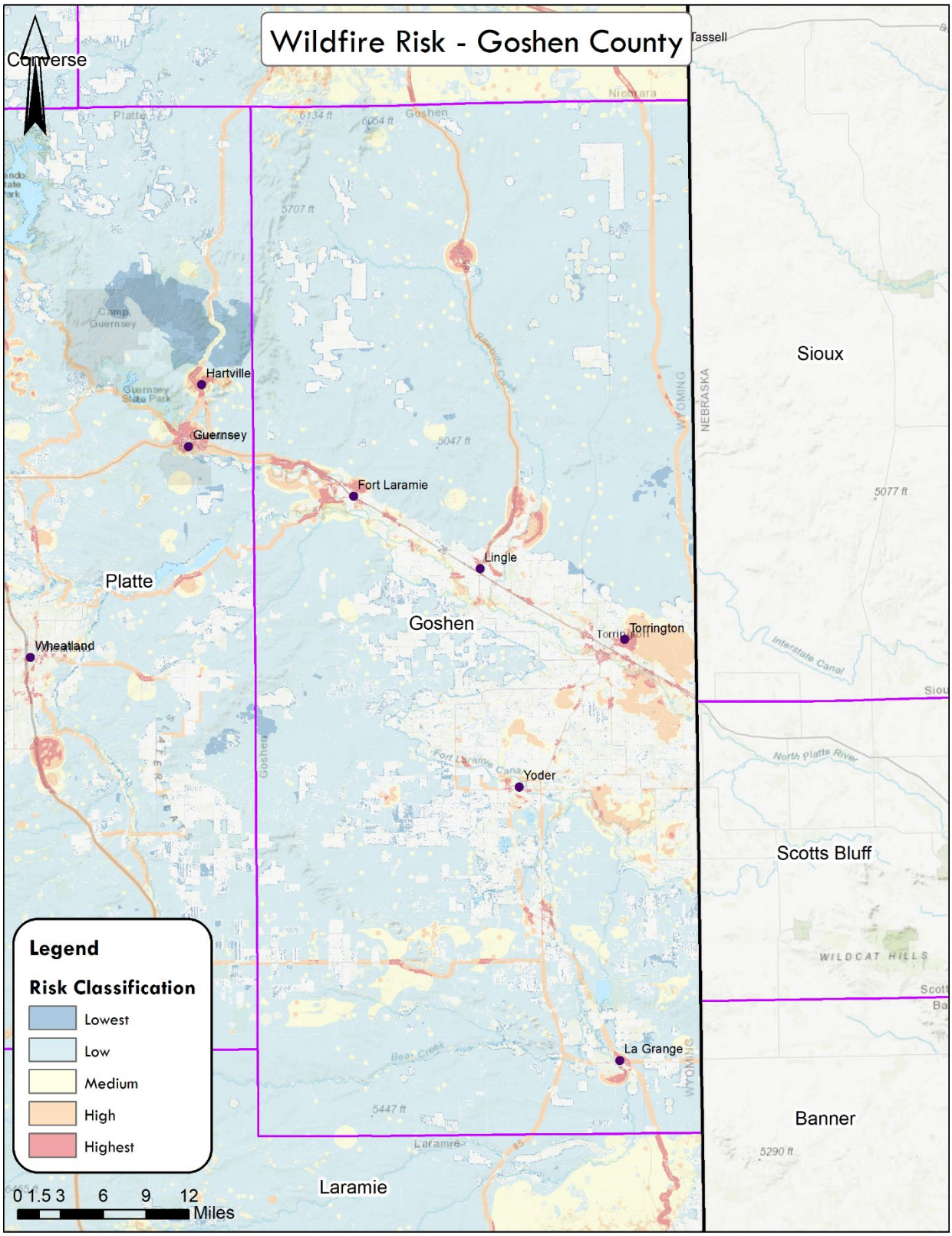
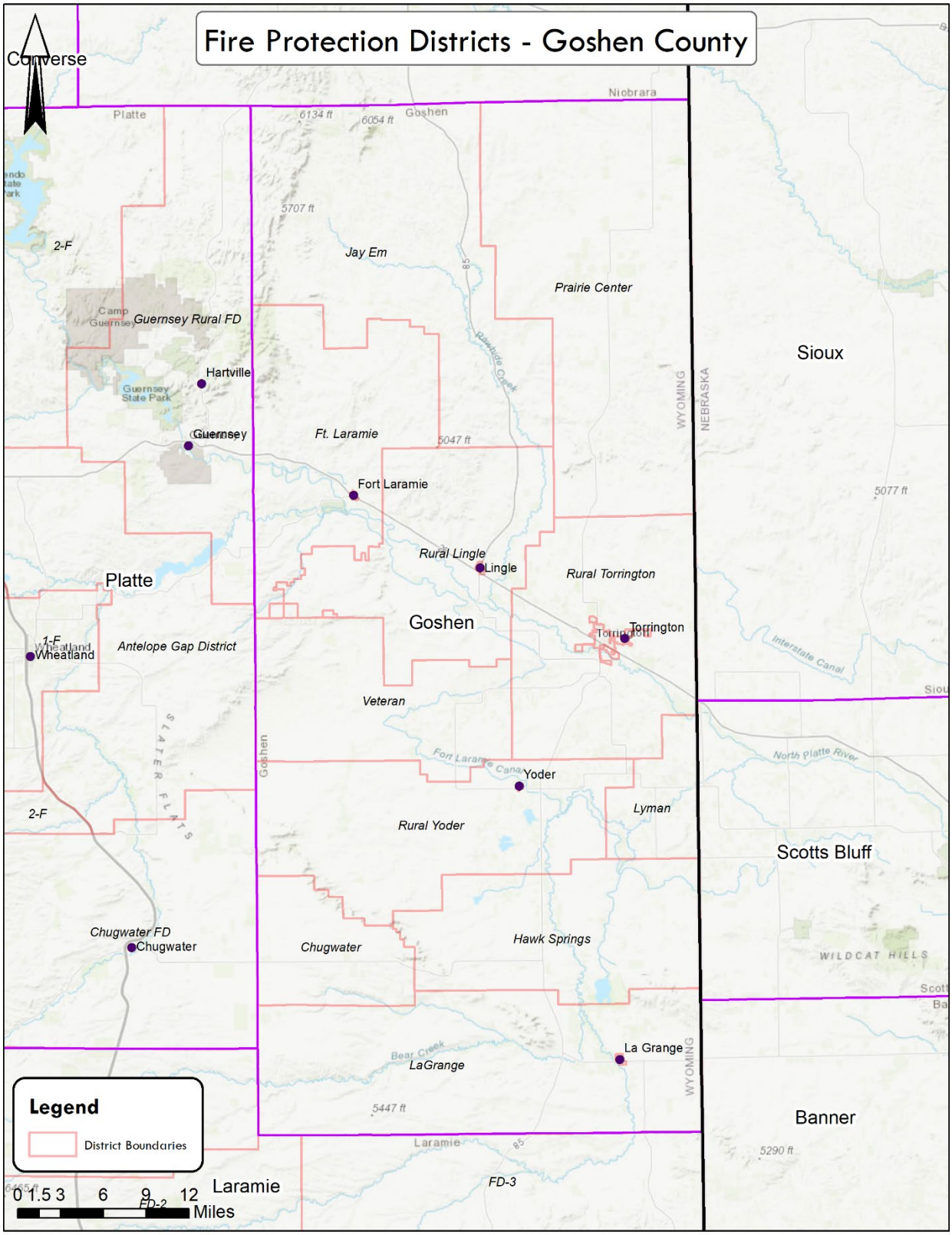


Figure 3.14 Fire Protection Districts, Goshen County



In Figure 3.15 and Figure 3.16, the United States Forest Service's (USFS) Wildfire Risk to Communities overview of risk to homes in Goshen County and its communities can be seen. The portal allows for a closer look down to the community level and comparison of risk against other counties or communities. The risk to homes in the county, which is determined based on the likelihood and consequences of wildfire is illustrated in the portal snapshot. According to the assessment of data in the portal the populated areas in Goshen County have, on average, a greater risk to homes than 14% of the counties in Wyoming.

Figure 3.15 Wildfire Risk to Communities Portal – Goshen County Level

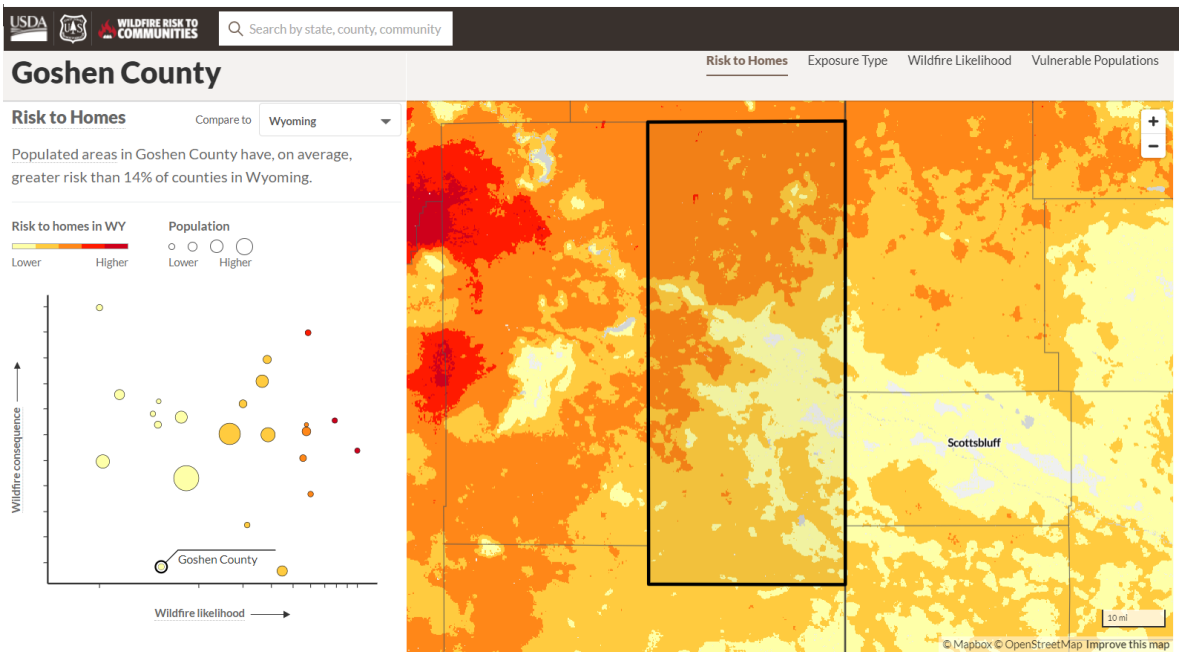
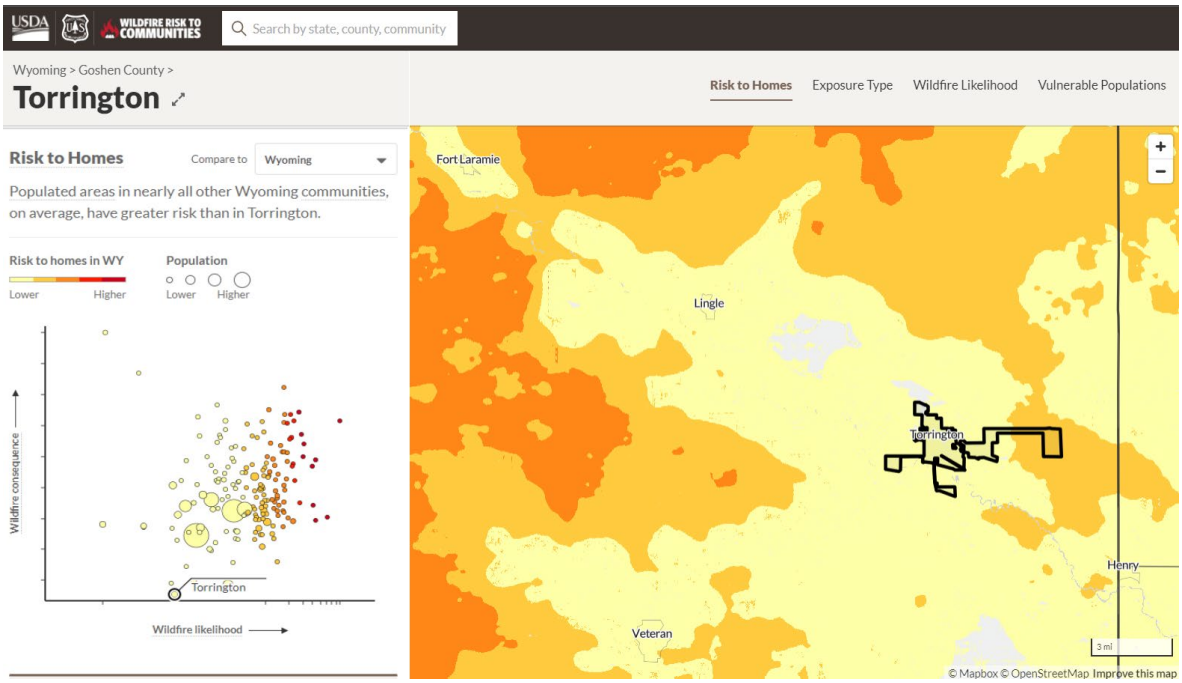


Figure 3.16 Wildfire Risk to Communities Portal – Community Level



3.15.3 Probability of Future Occurrences

Goshen County's records of wildfire occurrences illustrate the potential for large scale fires to occur. Wildfires can occur year-round and that the risk of wildfires occurring may increase during times of drought, especially prolonged droughts. Most events are quickly contained and do not burn a large number of acres.

According to research by the National Park Service, 85% of wildfires are human caused, primarily due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity.

3.15.4 Future Development Trends

Although Goshen County is not currently experiencing major growth, the risk and impacts of a wildfire event are still prevalent to existing infrastructure. Subdivisions and other high-density developments can create a situation where wildland fires can involve more buildings than any amount of fire equipment can possibly protect. By identifying areas of higher density in high-risk areas, communities can identify areas of mitigation interest and reduce hazard risks associated with increased exposure.

As development expands into these wildland areas, people and property are increasingly at risk from wildfire. Wildfire mitigation in the WUI has primarily been the responsibility of property owners who choose to build and live in vulnerable zones. In practice, successful wildfire mitigation strategies can be quite involved. The most important aspect of successful suppression is disruption of the continuity of fuels, achieved by creating breaks or defensible areas. For interface fires, where homes and other structures fill the space, fuel reduction is best accomplished before the fires begin. Some land use and building codes include and/or focus on mandatory mitigation measures. As a mitigation strategy, Goshen County and its jurisdictions can consider regulating building and future development in the WUI in order to mitigation against wildfire risk.

Safety zones can be created around structures by reducing or eliminating brush, trees, and vegetation around a home or facility. FEMA recommends using a 30-foot safety zone; including keeping grass below two feet tall and clearing all fallen leaves and branches promptly. Additionally, only fire-resistant or non-combustible materials should be used on roofs and exterior surfaces. Firebreaks-areas of inflammable materials that create a fuel break and reduce the ability for fires to spread and roads and pathways-can be planned and designed to serve as wildfire mitigation.

3.15.5 Climate Change Impacts

Climate change has steadily increased the frequency and intensity of wildfires around the nation. Continued unpredictable precipitation and weather patterns will lead to increased occurrence, extended durations, and magnified severity. The patterns of drought, brought by drier and hotter climate, create conditions that wildfires thrive in, and these fires have begun to consistently spread faster and farther. Wildfires will continue to thrive on the lack of humidity and dry vegetation created by drought, often perpetual. Hotter conditions fuel fires, the extreme temperature fluctuations and unseasonable increases in heat have and will continue to create a longer wildfire season.

3.16 Wind

3.16.1 Previous Occurrences

NCEI recorded 37 high wind events in Goshen County between 2010 up until 2021. Based on these events, no injuries or deaths have been reported. The only damages reported were from an event on January 13, 2021, when high winds of 58 mph and gusts between 80-90 mph caused $30,000 worth of damages in the City of Torrington. These damages included wind damage to 1000 feet of power line with several poles knocked over, in addition to downed trees on power lines and damage at the wastewater treatment plant. There were several

reports of blown over semi-trailers on Interstates 80 and 25, resulted in the roadway being closed for a period of time along with area restrictions for light, high profile vehicles.

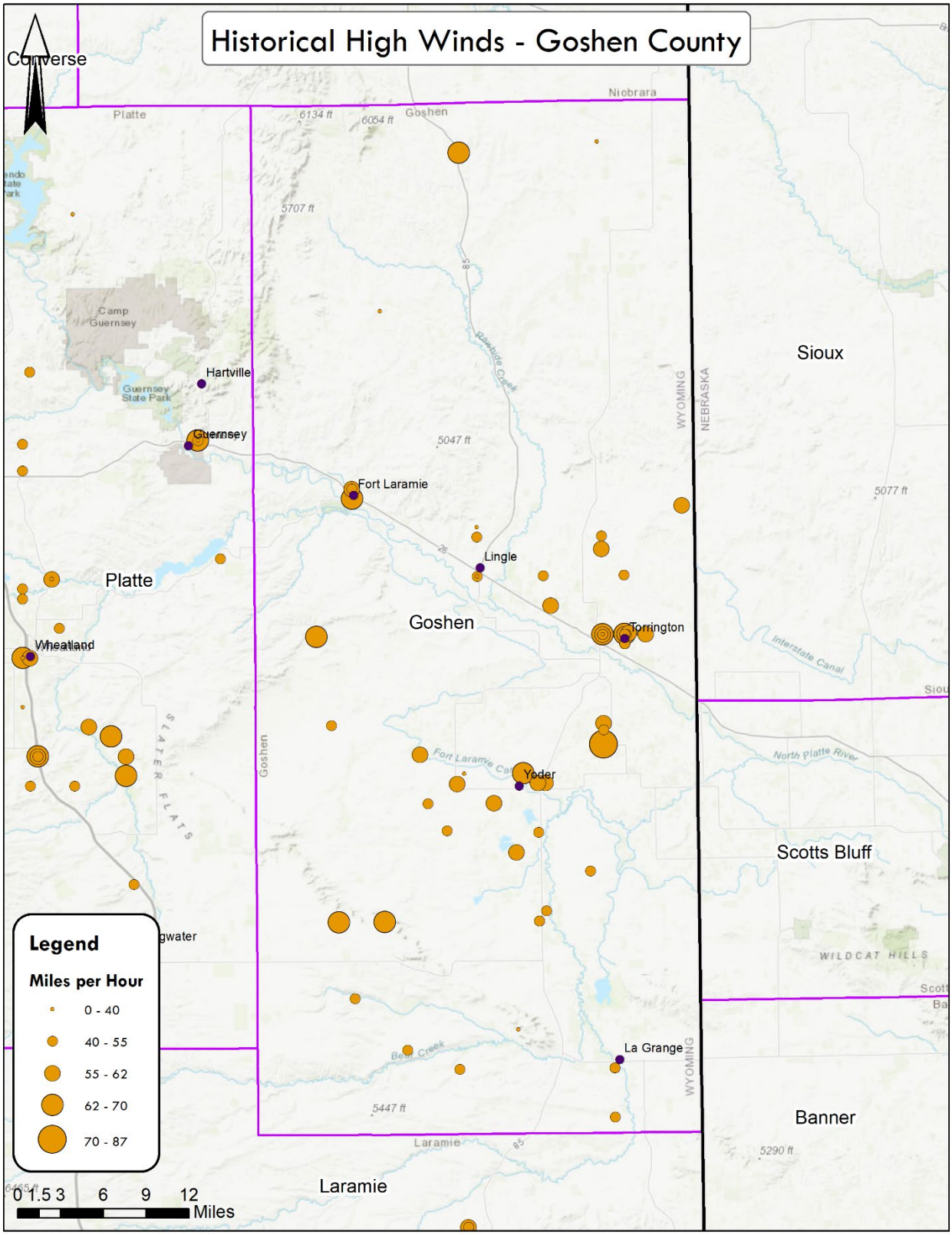
Data from SHELDUS shows 28 damaging events since 1961, adding up to more than $4.6 million in property damages and approximately $188,000 in crop damages. There are two injuries recorded in that time period.

Thunderstorm winds were also analyzed for high wind assessments, but it is important to note that impacts from these events may be due to hail or lightning and not wind in particular. From 1950 to 2021, 64 thunderstorm events were recorded in Goshen County. These events resulted in 2 injuries and $21,500 in property damage.

Figure 3.17 shows historical wind events across the county. Notable events with damages attributed to high winds are the downing of power lines, a carport damaged and two separate events of roofs blown off of buildings near Torrington, in one case by 70 mph winds.

Windblown deposits, also called loess, are common in some parts of Wyoming. There are no recorded events in Goshen County of windblown deposits causing structural damage, however it is possible such instances go unreported. Identified windblown deposit areas can be seen in Figure 3.18.

Figure 3.17 Historical High Wind Events, Goshen County



3.16.2 Inventory Exposed

Goshen County's topography can exacerbate high wind conditions. Goshen County lies in the eastern plains of Wyoming, marked by miles of prairie without natural windbreaks. High winds can speed across the plains without any obstacles, adding to the velocity and force of the wind. Wind speeds of 60 mph are not uncommon in the county. High winds that occur in combination with severe winter storms can be especially damaging.

All of Goshen County may be affected by high wind events and events could potentially impact Lifeline function, such as damaging power and communications infrastructure.

According to the Wyoming State Geological Survey, windblown deposits are considered a hazard because they may damage property. These deposits may also impact infrastructure, crops, and water supplies. Table 3.20 shows the parcel exposure of properties in areas identified as locations of windblown deposits.

Torrington is the only municipality within these identified windblown deposits areas. According to the 2020 U.S. Census, there are approximately 6,000 housing units in Goshen County. Approximately 37% of those housing units are located in an identified windblown deposit area. All of the properties exposed to these areas, both residential and commercial, have a total value of more than $467 million and residential properties approximately 90% of the total.

Table 3.20 Windblown Deposits Parcel Exposure

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Torrington	815	745	139,281,369	70	10,953,308
Unincorporated	1,433	1,340	278,573,623	93	38,209,233
County Total	**2,248**	**2,085**	**417,854,992**	**163**	**49,162,541**

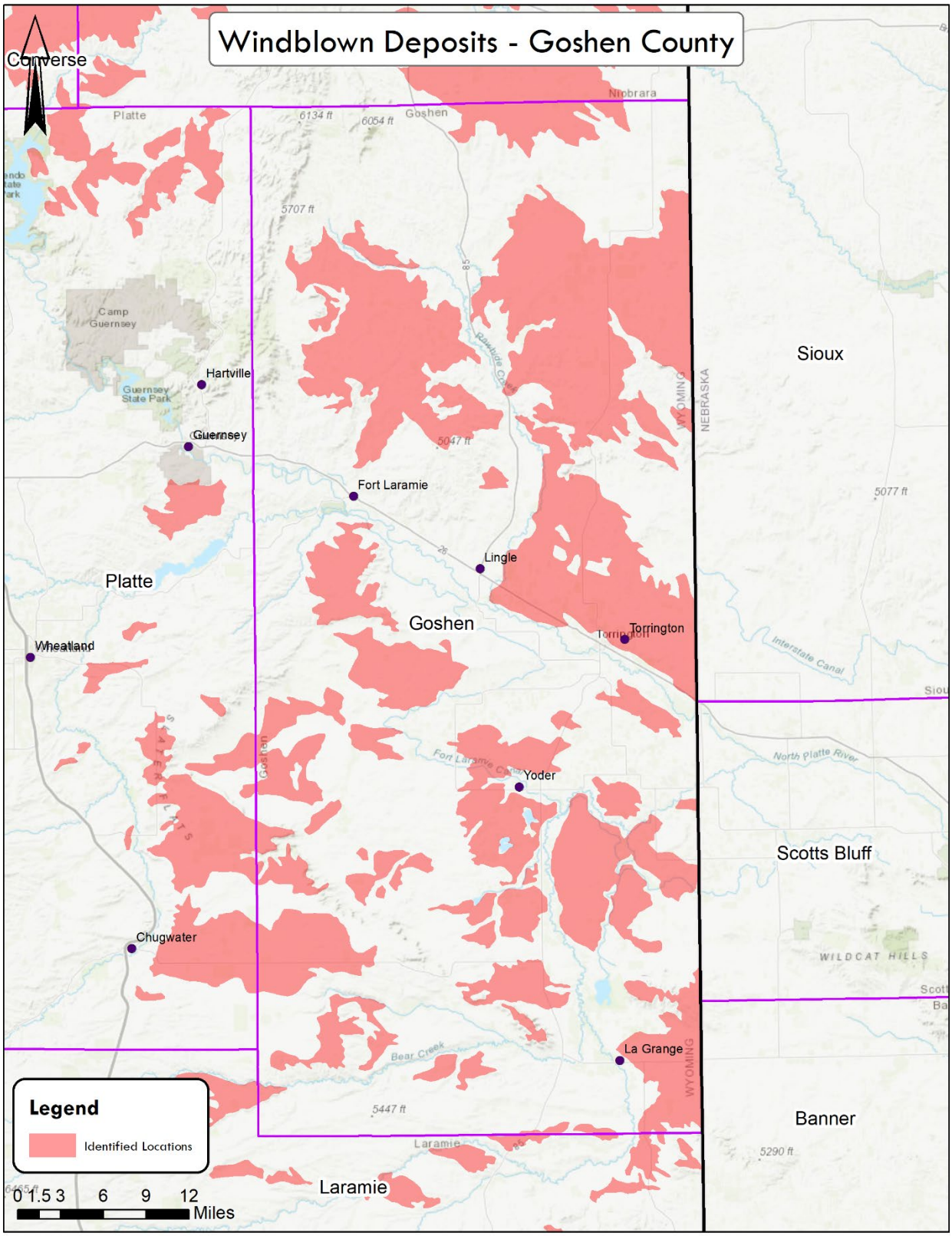
The communications and energy lifelines are the most exposed to windblown deposits areas, with about a third of communications infrastructure, as well as a third of energy infrastructure. Approximately 39% of the energy distribution miles are exposed to the windblown deposits areas, however the safety and security lifeline is not exposed. The other infrastructure exposed to windblown deposit areas are shown in Table 3.21

Table 3.21 Lifeline Exposure to Windblown Deposits Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	225	66	29 %
Energy	56	17	30 %
Energy (miles)	575	226	39 %
Food, Water, & Shelter	48	10	21 %
Health & Medical	12	2	17 %
Transportation	185	30	16 %

Figure 3.18 shows the areas identified as having windblown deposits. Goshen County holds a significant number of these areas identified across the state.

Figure 3.18 Windblown Deposits, Goshen County



3.16.3 Probability of Future Occurrences

Historical records and the frequency of previously reported high wind events in Goshen County indicate that high winds are likely to occur in any given year and have the potential to inflict costly damage to people and property. Mitigating damage requires that communities remain diligent about building structures that meet current building codes in order to be able to withstand damage.

Windblown deposits are consistently being carried to different areas and will likely continue for the foreseeable future.

3.16.4 Future Development Trends

Although Goshen County is not currently experiencing major growth, the risk and impacts of a wind storm are still prevalent to existing infrastructure. Because these events are not typically isolated to one geographical area, the location of structures does not increase or reduce the risk necessarily. Goshen County should adhere to building codes and development should be built to current standards in case of adverse weather.

Consideration of windblown deposit locations should be taken into account for any potential development sites. Destabilizing deposits can have longer term impacts on health, property, and infrastructure.

3.16.5 Climate Change Impacts

Climate change has increased global wind speeds according to a study in the journal Nature Climate Change. Analyzing data from 1978 to 2017 from more than 1,400 stations, revealed increasing wind speeds since 2010. This trend is expected to continue, as fluctuations in temperatures and unpredictable weather patterns will continue to alter the natural climate cycle. It is unknown whether this will impact the occurrence or severity of high wind events. It is unknown if climate change will affect windblown deposits.

3.17 Winter Storm

3.17.1 Previous Occurrences

According to NCEI storm events database, 64 blizzard/heavy snow/winter storm/winter weather/extreme cold events have occurred in Goshen County since records began in 2009 and continued through 2021. No deaths, injuries, property, or crop damage were reported due to these events.

The most significant blizzard in the state's history occurred in 1949 and included parts of Goshen County. In this event, snowfall measured up to 30 inches with drifts 20-30 feet high. Within 24 hours of the storm initiation, all bus, rail, and air traffic was halted. There were thousands of stranded motorists and rail passengers. Thirty-three hundred (3,300) miles of state highway lay in the storm area. Approximately 55,000 cattle and more than 105,000 sheep perished. This was an estimated 15% of the state's cattle. As the storm continued, many cities began to run out of food in the stores. It is estimated from reports that 4,194 people received aid through the U.S. Department of the Interior operations, and that help was given to 994 ranches. Seventeen people lost their lives during the storm, the greatest loss of life documented for a winter storm in the county. Total economic loss was estimated at more than $9 million. In 2019 dollars, this economic loss would be more than $93.8 million.

Another significant event occurred in 1978. This event was a late spring snowstorm and 15 to 32 inches of wet, heavy snow fell over much of central and eastern Wyoming; including Goshen County. Across the state extensive damage to crops and livestock was estimated at $11,743,890 in 1978 dollars, or approximately $47.5 million in 2019 dollars. Numerous local power outages were reported. Ice and extreme cold weather caused damage to water mains, roads, and structures. Numerous accidents occurred as a result of the storm and some county, state, and local roads closed due to this event.

When discussing winter storms and winter weather it is important to address extreme cold and wind chill events as well. According to NCEI storm events database, eight extreme cold or wind chill events have occurred in Goshen County between 2009 and 2021. Although these events take place as a result of winter weather, their

primary feature was extreme cold. No deaths, injuries, or damages were reported as a result of these events. While none of these events had reported consequences, the potential for human and livestock injury or death is high and should be considered when planning for winter weather.

Table 3.22 lists a detailed history of storms that caused damage, significant closure of highways, and/or impacts to the livestock industry.

Table 3.22 Goshen County Winter Storms

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Statewide	**1886**	**Several**	**Several**	**-**	**Loss of 50% of livestock operations**
The winter of 1886 to 1887 was the earliest severe economic disruption. The snow that winter came early and grew very deep. Then, a freak thaw turned much of this to water. As cold weather moved back in, this froze into a crust of ice, which prevented cattle getting through to the forage underneath. These conditions, accompanied by blizzard of unusual severity, caused a loss of more than 50% among the State's livestock operations. The snow was 6 feet deep on the level between Mountain Home and Woods Landing. On February 12, 1887, the storms were still raging over the state, and the snow was packed so hard that stage coaches could drive over it. Trains were stalled on their tracks. The winter sounded the death knell of the open range cattle business as it had been during previous years. The real disaster to cattlemen had been in the winter of 1886 which has been called "The Equalizer". One resident shared an account, “My father a boy of 8 at the time recalls the spring of 1887. In certain sheltered area he and companions amused themselves stepping from one carcass to another without ever setting foot to the ground.”					
Statewide	**1/11/1888**	**Great loss of life**	**-**	**-**	**-**
This blizzard covered a number of states. The combination of strong winds, snow and rapid temperature drops made it very dangerous. Loss of life was great and thousands of cattle died.					
Statewide	**3/25/1931**	**2**	**-**	**-**	**-**
This blizzard covered several states. Temperatures dropped rapidly. Strong winds drifted snow badly, blocking highways for several days. Two people died in Wyoming.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Laramie, Albany, Carbon, Campbell, Crook, Niobrara, Goshen, Weston, Platte, and Converse	**1/2/1949**	**17**	**-**	**$9,000,000**	**Livestock losses were great**
Most significant blizzard in state's history. Snowfall measured up to 30in, with drifts 20-30 feet high. Within 24 hours of the storm initiation, all bus, rail, and air traffic was halted stranding thousands of motorists and rail passengers. Seventeen people perished. Thirty-three hundred miles of state highway in the storm area, there was an estimated loss of 15% of the state's cattle, including 55,000 head of cattle and over 105,000 sheep. Cities began to run out of food in the stores as several other blizzards followed the first. "It is estimated that 4,194 people received aid through the Interior Department operations; 104,839 cattle and 421,479 sheep were relieved; and help was given to 994 ranches. A total of 12,894 miles of roads and feed lanes were opened; 1,457 tons of food, fuel and other supplies were hauled over opened roads along with 26,604 tons of feed. The total number of operated machine hours, for snow moving equipment was 18,310. Wind speeds were 30-78 mph with an average of 55 mph. Funding: $200,000 initial relief, an additional $500,000 later and federal government turned more than $125,000. Out of the $700,000 appropriated, more than $450,000 was returned. Damage and cost: Highway department normally spent $265,000 for snow removal, this storm generated costs of $618,029.50; Total economic loss is estimated at more than $9 million. Time spent: December through March snow removal equipment spent 139,000 hours. Man hours amounted to 201,000 hours. Cost of these operations to the government is estimated at $169,550.64, with a unit total cost of approximately $13.15 per mile of road opened and approximately $9.25 per operated hour of snow moving equipment.					
Statewide	**3/25/1950**	**1**	**-**	**-**	**-**
Heavy snow and strong winds covered much of several states, including WY. Snowfall up to 60 inches fell in the state. There was widespread damage to power lines and many cars and trains were stranded. Drifts were up to 16 feet and one person died in the state.					
Statewide	**2/18/1955**	**4**	**-**	**-**	**-**
This blizzard covered several states, including Wyoming. Up to 11 inches of snow fell with winds to 65 mph and temperatures below zero. There were four deaths in Wyoming.					
Statewide	**3/22/1957**	**-**	**-**	**-**	**-**
Heavy snow fell over several states, including Wyoming. Drifts were from 10 to 25 feet deep and many motorists were trapped in cars or snow bound in towns.					
Statewide	**10/28/1961**	**5**	**4**	**$27,500**	**$0**
Snow accompanied by high winds began early afternoon and continued through the evening. Three people were killed and four were injured in auto accidents caused by low visibility. Two hunters were lost and died in the storm.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Statewide	**9/15/1965**	**0**	**0**	**$2,750,000**	**-**
A cold wave moved over the state the evening of the 15th and caused considerable damage to crops, trees, power, and phone lines, stopped much of the transportation by closing roads, caused an estimated 5% shrinkage in marketable livestock and a few death losses in livestock. Temperature dropped quite low for so early in the season and the heavy (18"-22") band of snow from the southwest part of the state to the northeast part was by far the heaviest so early in the season.					
Niobrara, Platte, Carbon, Natrona, Sheridan, Albany, Laramie, Weston, Crook, Converse, Campbell, Goshen	**4/29/1967**	**0**	**0**	**$275,000**	**-**
Heavy snowstorm began early evening spreading over eastern Wyoming with strong winds. Considerable damage was done to power and phone lines. Highways were blocked with travel halted. Stockmen in northeast quarter of the state lost stock especially newborn calves and lambs.					
Statewide	**3/13/1973**	**0**	**0**	**$275,000**	**-**
Heavy snow and strong winds blanketed the state, with roads, streets, and farms and ranches blocked. There were numerous power and communications outages as well as livestock losses.					
Statewide	**3/27/1975**	**0**	**0**	**$2,750,000**	**-**
A severe blizzard with winds 40-50 mph and gusts to 75 mph, snow and temperatures down to 0 degrees started the morning of the 27th and continued to the evening of the 28th. Highways were blocked and some people stranded for varying times but all rescued. Some damage to signs, windows, trees, etc., but most damage to livestock, especially newborn, and to cows (udders frostbitten, etc.). The storm was most severe over the eastern half of the state and most of the damage was there also.					
Statewide	**12/31/1975**	**0**	**0**	**$275,000**	**$0**
Heavy snow with strong winds began early on December 31, 1975 **and** continued through most of the state through most of the storm. Livestock losses were minimal and most of the damage is attributed to loss of time, cars stuck, rescue missions and snow removal.					
Laramie, Albany, Platte, and Goshen	**3/10/1977**	**0**	**0**	**$275,000**	**-**
Blizzard got underway about noon and soon blocked traffic and high winds caused damage to trees, power lines, roofs and winds in Laramie, Albany, Platte, and Goshen counties.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Statewide	**11/16/1977**	**1**	**0**	**$275,000**	**$0**
Snow with large accumulations entered the state the afternoon on the 16th, accompanied by very cold temperatures. Blowing and drifting caused hazardous driving conditions in many areas. The snow ended by the morning of the 18th but was quickly followed by strong, gusty, westerly winds which moved the large amounts of loose snow into ground blizzards with severe problems on highways, ranches, etc. One man was killed at Rawlins as he tried to walk into town along the interstate from the west. Numerous people were stranded along the highways and in towns and ranches until the roads were opened.					
Statewide	**12/5/1978**	**0**	**0**	**$275,000**	**$0**
This very heavy snow storm dumped over a foot of snow across much of the state causing road and airport closures in many areas throughout the state. Winds gusting to 75 mph caused extensive blowing and drifting snow, stopping both local and interstate travel. This storm isolated livestock from ranchers, contributing to subsequent substantial losses of cattle and sheep in Wyoming.					
Statewide	**1/1/1979**	**0**	**0**	**$2,500,000**	**-**
Numerous heavy snows combined with prolonged extremely cold temperatures have caused widespread damage across much of Wyoming during the month of January. Estimated loss of 2700 sheep and 2000 cattle with projected losses of calves and lambs to 35,000 head are reported. Also, numerous towns and communities across the state have extensive damages to their water systems due to frozen water mains and sewer systems. Emergency Winter Storm Relief Aid of $2.5 million is currently being asked for by the state.					
Albany, Goshen, Laramie, and Platte	**11/19/1979**	**0**	**0**	**$275,000**	**$0**
Snow began falling at 1600 MST on the 19th, changing to blizzard conditions by mid-morning on the 20th. Roads were blocked, travelers stranded, schools closed, and business disrupted. A 26-inch snowfall at Cheyenne broke records for November. Some county roads were still not open by the end of the month. While there were no reported losses of livestock, hay was airlifted to some cattle that were without feed for about a week.					
Statewide	**1/10/1980**	**0**	**0**	**-**	**-**
Freak thunderstorms occurred in Casper, Riverton, and Lander areas. Roads were closed and some motorists stranded. I-25 from Laramie to the Utah state line was closed by winds approaching 80 mph in south-central Wyoming. An estimated 60 vehicles were in the ditch along I-80 west of Rawlins. Reported 90 mph winds in Medicine Bow blew out car and truck windows and a large window in a cafe. Many schools were closed.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Statewide	**1/25/1980**	**4**	**-**	**-**	**-**
Snow and blowing snow from the morning of the 25th to the evening of the 27th swept across Wyoming dumping a record 11in of snow on Cheyenne in a 12-hour period. Heavy snow and slick road surfaces due to bitter cold temperatures closed many highways and interstates, including I-80 from the Nebraska state line to Rock Springs. Near Bitter Creek Hill, 38 miles east of Rock Springs, 21 cars and trucks were involved in a pile-up on the afternoon of the 25th. Two men were killed at 1900 MST on the 26th, 9 miles east of Powell when the driver lost control, ejecting both men. One fatality occurred on the 27th on I-80 near Rock Springs when a car slowed down due to poor visibility and slick roads and the truck driver following failed to slow the truck in time crushing the back end of the victim's car. A man died about 1245 MST on the 27th when the flatbed truck he was driving 95 miles south of Gillette jack-knifed on a left-hand curve and rolled on its top. Schools in Cheyenne closed at noon on Friday and did not reopen until Wednesday. Most churches in Cheyenne remained closed on Sunday. Casper thermometers dipped to record lows of -27° on Saturday, -28° on Sunday night, and -32° Monday morning. Cheyenne reported temperatures at 0 or below zero for a period of 79 hours. Weather-related problems may have caused the derailment of 12 empty freight cars at Point of Rocks at 0645 MST on the 25th.					
Statewide	**10/14/1980**	**4**	**5**	**-**	**$0**
Snow beginning on the evening of the 14th moved across the state leaving 13 inches in Laramie and 11 inches in Rawlins. Most other areas received from 1-3 inches. Some highways were closed on the 16th, including I-80 between Cheyenne and Walcott Junction (100 miles). One person was killed, and three others injured in a storm-related two-vehicle accident southwest of Cody on the 15th. The storm apparently contributed to a light plane crash that killed one man near the airport at Rock Springs at 2110 MST on the 15th. Blizzard-like conditions were contributing factors when a freight train plowed into the caboose of a grain train 13 miles southeast of Laramie on the 16th, killing two crew members and injuring two others. Schools in Laramie, including the University of Wyoming, were closed on the 16th. Many hunters were stranded. Tree limbs snapped causing power outages in Rawlins and Sinclair.					
Crook, Weston, Campbell, Niobrara, Albany, Platte, Goshen, and Laramie	**10/8/1982**	**0**	**0**	**$100,000**	**$0**
An early fall storm swept across the mountains, and plains of Wyoming Friday night and Saturday. The storm buried the Bear Lodge Mountains and the Moskee area south and east of Sundance on Crook and Weston Counties with up to 5 feet of wet snow. An estimated 4,000 cattle still on summer ranges were stranded. Rescue efforts estimated at $100,000 lasted from Oct. 11 to the 17th. Elsewhere in the east plains, high winds with record peak gusts to 65 mph at Cheyenne, 54 mph at Sheridan, 53 mph at Laramie, and 50 mph at Gillette, caused blowing snow and reduced visibilities to zero in some areas.					
Fremont, Hot Springs, Carbon, Albany, Natrona, Converse, Sheridan, Johnson, Campbell, Platte, Goshen, Laramie, Niobrara	**12/1/1982**	**1**	**0**	**-**	**$0**
A major winter storm dumped heavy snow in the state Wednesday (12/1) and Thursday (12/2) morning. Casper was hit the hardest with 24 inches of snow, breaking the previous 24-hour total. The Wind River Canyon between Shoshoni and Thermopolis also reported 24 inches. Elsewhere in the basins and plains, amounts varied from 5 to 11 inches. Winds to 40 mph caused blizzard conditions in the central and northeast areas causing drifts of 5 to 8 ft deep. One death was attributed to this storm.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Fremont, Natrona, Converse, Albany, Platte, Goshen, Laramie	**12/23/1982**	**0**	**0**	**-**	**$0**
A major winter storm through central and southeast Wyoming packing strong winds and moderate to heavy snow. Shoshoni experienced winds that exceeded 60 mph causing over turned trailers and a boat in the Boysen Lake Marina. Casper saw a record 29 inches of snow from the storm. Lander and Cheyenne accumulated around 6 inches each. Strong winds gusting into the 40 mph range caused blizzard conditions which forced the closure of many highways in central and southeast areas stranding holiday travelers.					
Crook, Campbell, Weston, Natrona, Albany, Platte, Goshen, Laramie, Sweetwater, Lincoln, and Uinta	**3/5/1983**	**0**	**0**	**$2,750**	**$0**
A major winter storm deposited a blanket of snow varying from 4-16 inches over eastern and southern Wyoming stranding more than 250 travelers in Laramie alone. All roads in and out of Cheyenne and Laramie were closed with additional closures between Rawlins and Evanston. Winds averaging 25 mph and gusting to near 40 mph in many areas caused ground blizzards.					
Albany, Laramie, Platte, Goshen	**5/7/1983**	**0**	**0**	**-**	**$0**
Another spring snowstorm blanketed southeast Wyoming with 1 to 2 feet of snow. Strong winds gusting up to near 50 mph caused near blizzard conditions in the morning. All major roads in the area were closed for the day, and numerous traffic accidents were reported.					
Statewide	**12/20/1983**	**0**	**-**	**$2,750,000**	**$0**
The worst arctic outbreak ever in December hit Wyoming full force with most of the state remaining below zero for five days. Overnight lows in the 20-40 below 0 range were common, with quite a few towns setting record Dec lows. A malfunctioning transformer left the town of Lander without power for 12 hours, and numerous vehicles were damaged by the extreme temperatures. The greatest damage occurred to homes and businesses as hundreds of water pipes froze and burst. The State Capitol Building in Cheyenne, suffered almost $250,000 in damage due to burst water pipes.					
Albany, Laramie, Platte, Goshen	**4/20/1984**	**0**	**0**	**$2,750**	**$0**
A large spring storm dumped up to 2.5 feet of snow on southeast Wyoming. At Cheyenne a fall of 17 inches of snow in 24 hours set a new April record. All major highways around Cheyenne were closed for about 12 hours during the storm. Some livestock were lost in the snowstorm, and some winter wheat crops were damaged.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Carbon, Albany, Laramie, Platte, Goshen	**1/28/1987**	**1**	**0**	**-**	**$0**
Several gusts near 70 mph were observed at Vedauwoo along the Laramie Mountains near 1330 MST. Gusts from 60- 70 mph were logged at Cheyenne airport from 2200 MST on the 28th to 0205 MST on the 29th. Wind gusts to around 60 mph were common at other locations over the southeast. The strong winds, coupled with blowing and drifting snow, reduced visibilities to near zero mainly over the higher elevations from Rawlins to Cheyenne. These conditions contributed to a fatal car accident one mile west of Arlington along I-80 during the evening of the 28th. High winds caused power blackouts across Torrington for 3.5 hours.					
Platte, Goshen, and Laramie counties	**12/10/1987**	**0**	**0**	**$275,000**	**$2,750**
A vigorous cold front entered far west Wyoming on 12/9, swept through the state due to a strong upper level wind flow. Four to 6in of snow fell, 8in at higher elevations over northwestern Wyoming and the Wind River Mountains during early morning. Very strong wind gusts came with this cold front as it moved over Eastern WY. From 0300 to 0830 MST very strong wind gusts of 65-70 MPH were clocked. Wind gusts stretched from Sheridan airport to the Missouri Basin Power Plant. Platte and Goshen Counties were raked by wind gusts between 0830 and 1100 MST. Gusts were recorded between 75-80 mph, some estimated over 90 mph. Multiple semi-tractor trailers blew over from Douglas to Cheyenne. A 50-foot, four-legged microwave tower 13 miles east of Wheatland was blown down 1030 MST. Two legs were pulled completely out of the ground still in the concrete anchors. Damage to this tower was around $55,000. A house trailer being pulled on I-90 south Sheridan was completely destroyed. A few trees over 20-foot tall from Buffalo in the north to Pine Bluffs in the south were toppled. After 1130 MST sustained winds of 35 to 40 mph prevailed over southeast Wyoming with gusts of 60 to 65 mph until 1700 MST. A multitude of blown over roofs and power poles and downed fences were reported across much of eastern Wyoming.					
Albany, Laramie, Platte, Goshen, Niobrara, Carbon, Converse	**12/27/1987**	**0**	**0**	**-**	**$0**
A very strong upper level trough developed over Arizona on the 25th and moved into eastern Colorado on the morning of the 27th. This trough developed blizzard conditions over southeast Wyoming from 0700 to 1800 MST. Snowfall amounts varied from 6 to 20 inches. Wind speeds over southeast Wyoming were clocked at 25 to 35 mph with gusts to 45 mph. These strong winds combined with the heavy snow amounts frequently lowered visibilities below 0.25 mile. The winds also produced over 4-foot-tall snow drifts particularly over roadways. These included I-80 to the Nebraska border and I-25 from Douglas to the Colorado border. These roads stayed closed for much of the 27th to the morning of the 28th. This blizzard stranded more than 300 holiday travelers in the tiny town of Chugwater. Some particular snowfall totals associated with this blizzard are Albin: 14in; Carpenter: 8in; Chugwater: 10in; Double Four Ranch (Albany County), 16in; Encampment: 6in; LaGrange, 19in; Lusk: 6in; Pine Bluffs: 15in; Saratoga: 9in; Wheatland: 10in.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Niobrara, Platte, Carbon, Natrona, Sheridan, Albany, Laramie, Weston, Crook, Converse, Campbell, and Goshen	**1/23/1988**	**0**	**0**	**$0**	**$0**
A very strong upper level northwest flow of air over Wyoming mixed downward, accelerating surface winds to 30-45 mph with gusts 55-70 mph from north-central to southeast Wyoming. The most noticeable wind gusts were at Arlington, 65 mph; Casper, 70 mph; Cheyenne, 58 mph; and Sheridan, 71 mph. This strong northerly airflow helped to dump 5 inches of snow about 25 miles west of Laramie near Centennial. Most roads were closed over south-central and southeast WY and visibilities were reduced below 1 mile due to blowing and drifting snow.					
Sheridan, Campbell, Platte, Albany, Laramie, Carbon, Big Horn, Crook, Goshen counties	**1/24/1988**	**0**	**0**	**$0**	**$0**
Very strong upper level northerly flow of air continued to prevail over eastern Wyoming. This strong flow of air induced strong surface winds of 35-45 mph with gusts of 55-70 mph. Peak wind gusts of 72 mph from 0400-0600 MST on the 24th flipped mobile home over onto two cars in the Gillette area. The winds tore the roof off a house 4 miles west of Gillette. A power plant northeast of Wheatland clocked wind gusts of 70 mph from 0200-0630 MST on the 24th. From 2000 MST on the 24th to 1000 MST on the 25th sustained winds of 35-45 mph with gusts near 58 mph from Arlington to Cheyenne along I-80 over southern Wyoming. This storm dumped 10in of snow at Burgess Junction in the Big Horn Mountains and 5in over the Black Hills near Sundance. Strong winds produced snow drifts of 14-16 foot deep over the southeast. Numerous roads were closed over east Wyoming due to strong winds and the associated snow drifts. The National Guard had to dig out stranded ranch families in southern Goshen County.					
Niobrara, Platte, Carbon, Natrona, Sheridan, Albany, Laramie, Weston, Crook, Converse, Campbell, and Goshen counties	**3/10/1988**	**0**	**5**	**$275,000**	**$27,500**
A winter storm developed over Nevada on the 9th, on the 10th moved through Colorado and into Kansas on the 12th. This storm combined with good easterly flow over Wyoming first smashed into west and central Wyoming with 5-14 inches of new snow. The storm intensified through Colorado and produced blizzard conditions over much of eastern Wyoming from the 10th to the morning of the 12th. Six to 25 inches of new snow dumped on eastern Wyoming and there were sustained winds of 25-40 mph with gusts of 50-65 mph. This heavy snow and strong winds frequently kept visibilities below 0.25 mile and whipped snow drifts to a depth of 10-30 feet over eastern Wyoming. Most roads were closed at times due to the low visibilities and blowing and drifting snow. Numerous traffic accidents across the state, at least five people sustaining injuries. Travelers stranded throughout east WY with over 200 people stuck at the Snowy Range Ski Resort west of Laramie. The eastern plains were particularly hard hit by the blizzard from Douglas southeast to the LaGrange area. A few travelers in the eastern plains were trapped in their vehicles for 36-40 hours. Drifts ranging from 15-30 feet high were common around Lusk and some vehicles totally buried by the snow. Ranchers over the eastern plains in the midst of calving and lambing season lost about 15 to 35 head of calves. Notable snowfall totals: Albin: 18ins; Bates Creek: 13in; Burgess Junction: 20in; Douglas: 11in; Gillette: 12in; Keeline: 10 in; LaGrange: 21in; Lander: 10in; Laramie: 11 inches; Lusk: 20 inches; Rock Springs: 20 inches; Snowy Range: 14in					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Statewide	**2/2/1989**	**0**	**0**	**$0**	**$0**
Record cold temperatures gripped the state from the 2nd through the morning of the 6th, the coldest in at least 5 years. Many locations had at least 80-100 consecutive hours of subzero readings. Wind chills from 50°-90° below zero accompanied the cold. Most overnight lows between -20° and -40° with maximum temperatures struggling above 15° or 20° below zero. On the morning of the 3rd, Sheridan set a record low of minus 32°, eclipsing the old record of 24° below zero, set in 1985. Casper had a record low 27° below zero. The minimum at Cheyenne was -24°, one degree shy of the record low for the 3rd, dating back to 1883. Weston, located over far northern Wyoming, dropped to 47° below zero while locations in Yellowstone National Park dipped lower than -40°. These low temperatures, including several records, were typical through the 6th. The maximum temperature for Cheyenne on the 3rd was 18° below zero. Not only was that a record low maximum, but the second coldest in weather records, kept back more than 100 years. During the morning of the 6th, the temperature at the capitol city finally rose above zero. The record is 120 hours in December 1983. Due to this Arctic episode, this was the coldest February ever for Casper. It was also the worst cold spell for Gillette in a decade.					
Statewide	**12/21/1989**	**0**	**0**	**$0**	**$0**
As a result of the combination of calm winds, a bitterly cold arctic air mass and deep snow cover, extremely low minimum temperatures occurred across the cowboy state during the morning of the 22nd. Many of these temperatures were not only record lows for the date, but also the coldest ever for December. The lowest temperatures were generally over the Eastern two-thirds of Wyoming. Recluse, in the far Northeast corner, had a low of 50° below zero. Other lows included 47° below in Redbird, 40° below at Douglas, 35° below at both Sheridan and Gillette, 34° below zero in Laramie, 28° below at both Casper and Cheyenne, 23° below in Cody, 14° below at Farson and 13° below zero in Lander.					
Converse, Niobrara, Platte, Goshen, Laramie, Albany, Carbon, Natrona	**3/5/1990**	**0**	**0**	**$0**	**$0**
An intense and slow-moving storm system over the Southern Rockies caused a prolonged heavy snow event for roughly the southeastern quarter of the state. The storm lasted for about 54 hours, from the evening of the 5th through the early morning on the 8th. The heaviest snow occurred during the 6th, when 24-hour snow totals ranged from 6-8 inches. Total snow amounts for the event were from 1-4 feet. During the 6th and 7th, at least 300 miles of roads were closed. Nearly all travel to and from Cheyenne was halted. Additionally, there were power outages because of downed power lines due to the wet, heavy snow. Storm totals of 3-4 feet of snow were common at several locations in the Laramie Mountains. Some other reports included: 20in at Centennial; 19.2in in Cheyenne; 18in at Wheatland; 16in in Laramie; 15in at Douglas; and 7in for Casper. For Cheyenne, this was the greatest single snowfall event ever in March and the storm tied for ninth place on the list of biggest snowstorms.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Niobrara, Platte, Carbon, Natrona, Sheridan, Albany, Laramie, Weston, Crook, Converse, Campbell, and Goshen	**3/15/1990**	**0**	**0**	**$0**	**$0**
During much of the 15th, high winds blew across eastern Wyoming. Sustained winds of 40 to 55 mph were common. Some peak wind gusts were: 67 mph near Wheatland; 65 mph on the I-80 summit; 30 miles west of Cheyenne; 60 mph in Sheridan; and 58 mph at Gillette. These winds produced widespread blowing and drifting snow and ground blizzard conditions across the far southeastern part of the state. During most of the 15th, almost all roads to and from Cheyenne and Laramie were closed because of the blowing snow. It was not until the afternoon of the 16th that the roads were reopened for travel.					
Statewide	**12/18/1990**	**0**	**0**	**$27,500**	**$0**
A major winter storm followed by a bitterly cold Arctic outbreak, plagued most of Wyoming for about two to four days. Heavy snows with strong winds occurred on the 18th over the far western part of the state, with up to a foot in the mountains. Light snows of 2-6in occurred over the rest of the state, except in the far southwest where storm totals approached 15-20 inches by 1800 MST on the 19th. Arctic air started spilling into the state after 1200 MST on the 18th on brisk northern winds. On the 19th and 20th, wind chills dropped to -40° to -75° at times in many areas. The coldest temperatures occurred on the 21st and 22nd, with most areas from -25° to -45°. Minus 50° readings were reported at Worland and near Jackson. Casper set an all-time record-low of -41° on the 21st. Major roads affected by the snow and winds were confined to the far west and southwest. The worst conditions occurred along I-80 from Rock Springs to Rawlins on the night of the 19th and 20th where snow and strong winds closed the road, stranding many people. The bitter cold caused power outages in some places, most notably in Jackson. Schools and other events were widely canceled due to the cold weather.					
Converse, Natrona, Niobrara, Hot Springs, Johnson, Sheridan, Washakie, Campbell, Crook, Weston, Big Horn, Park, Teton, Carbon, Albany, Goshen, Laramie, Platte, Fremont, Sublette	**10/21/1995**	**0**	**0**	**$1,000,000**	**$0**
Heavy snow and strong winds caused blizzard conditions over much of WY. Snowfall amounts ranged from four inches at Rock Springs and Gillette to 17in at Casper Mountain. Snowfall of 6-10 inches was common. Winds gusted up to 55 mph causing blizzard conditions with drifts up to 5 feet deep. Reported drifts of 2-4 feet were common. Many roads were closed from the 22nd to the afternoon of the 23rd due to drifting and near-zero visibilities. Many travelers were stranded across the state until the 23rd and a number of hunters had to be rescued. Power was out for a time in various places, due to downed power lines from the heavy snow and strong winds.					
Platte, Goshen, and Laramie counties	**1/30/1996**	**0**	**0**	**$15,000**	**-**
Light snow and strong winds produced poor travel conditions and numerous accidents.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Natrona, Converse, Niobrara, Laramie, Platte, Goshen, Albany	**3/23/1996**	**0**	**0**	**-**	**-**
Snow and strong winds combined to produce blizzard conditions in east central and southeast WY. Visibilities were near zero and wind chill temperatures as low as 45° below zero. Three to six inches of snow were common in the area, with drifts up to 7 feet in the Cheyenne area. Many roads were closed during this time.					
Albany, Carbon, Converse, Goshen, Laramie, Niobrara, Platte	**4/4/1997**	**0**	**0**	**-**	**-**
Strong winds combined with snow amounts of 8-12 inches created widespread blizzard conditions in southeast Wyoming and the Nebraska panhandle. By 2045 MST on the 4th all roads had been closed in and out of Cheyenne, except for I-25. Closed and impassable roads became the norm from the evening of April 4 through April 6 due to blowing and drifting snow. Many automobile accidents occurred as due to the treacherous conditions, and many power lines were downed from the weight of snow. Many livestock were killed by the snow and accompanying cold temperatures because the storm occurred in the calving season. The highest snow amount was 12in at Albin and Lusk, and sustained winds were generally 40-50 mph through the event.					
Albany, Carbon, Converse, Goshen, Laramie, Niobrara, Platte	**10/25/1997**	**0**	**0**	**$100,000**	**$10,000**
An early season blizzard dumped up to 20 inches of snow in areas of southeastern Wyoming, downing power poles and lines and making many roads impassable. Wet, wind-driven snow damaged trees, unharvested milo, corn, and sunflower fields. Many motorists were stranded on impassable roads or when vehicles slid off roads. High School athletic events were postponed, and high school bands and athletic teams were stranded when their buses could continue no further. On the 24th, semi-tractor trucks with trailers tipped over after jackknifing on I-80 near Sinclair and at milepost 340; no damage estimates were available. The Wyoming Highway Patrol received 198 accident reports by 1645 MST, compared to the normal of 30 to 50. I-25 was closed from the Colorado border to Wheatland at approximately 1600 MST. I-80 was closed the entire length of Wyoming, from border to border, by late evening. On the 25th, I-80 remained closed from the Nebraska border to Rock Springs. A Wyoming DOT employee received minor injuries when the snow plow he was operating flipped over east of Cheyenne. Postal delivery service from Cheyenne was shut down for the first time in at least 15 years. Two hunters were rescued in the Snowy Range near Arlington after spending the previous night in the Medicine Bow National Forest; they had entered the Snowy Range north of Centennial the morning of the 24th, and became lost after the onset of the blizzard. The Wyoming Highway Patrol received 252 accident reports since 0800 MST on the 24th, several times the normal figure.					
Albany, Goshen, Laramie, Niobrara, Platte	**12/27/1997**	**0**	**0**	**$0**	**$0**
Ground blizzard conditions were created by strong winds blowing over freshly fallen snow. Near zero visibility was reported at Horse Creek at 1150 MST and on state Hwy-20 between Keeline and Lusk at 1815 MST. Vehicles were stranded around Lusk, and hotels and churches in Lusk were filling up with stranded travelers. Between 2130 and 2215 MST, area roads were closed by officials in Cheyenne, Laramie, Wheatland, and Torrington due to blowing and drifting snow coupled with poor visibilities. Sustained winds of 45 mph were recorded 32 miles northeast of Cheyenne between 2000 and midnight MST, and Cheyenne recorded a wind gust of 67 mph at 1056 MST.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Goshen	**6/6/1998**	**0**	**0**	**$0**	**$150,000**
Unseasonably cold temperatures occurred across Goshen County. Reports by the University of Wyoming Research Department said the temperature dropped down to 26 degrees. 400 acres of corn were lost around the Torrington area due to the extreme cold.					
Albany, Carbon, Converse, Goshen, Laramie, Platte	**4/21/2001**	**0**	**0**	**$100,000**	**-**
The second major winter storm in 10 days produced heavy snow over much of southeast Wyoming, with blizzard conditions in some spots. Twelve to sixteen inches recorded in Wheatland and Cheyenne. All roads out of Cheyenne were closed again, as was much of I-80. Power outages were reported in parts of Laramie County as winds gusted to around 40 mph.					
Albany, Carbon, Goshen, Laramie, Platte	**2/7/2002**	**0**	**0**	**-**	**-**
A strong winter storm brought high winds and snow to much of southeast Wyoming, producing blizzard-like conditions in many areas. Snowfall amounts were generally from 1-4 inches, but winds gusted over 50 mph in many areas, creating widespread blowing and drifting snow. Gusts as high as 74 mph were recorded at Warren AFB on the west side of Cheyenne with gusts to 73 mph near Arlington. I-80 was closed from Rawlins to the Nebraska border along with other roads over eastern Wyoming. Scattered power outages occurred in Cheyenne.					
Albany, Carbon, Converse, Goshen, Platte	**3/17/2003**	**0**	**0**	**$100,000**	**-**
A powerful winter storm produced heavy snow and blizzard conditions over much of southeast Wyoming over a 2.5 day period, closing most roads and isolating many areas. Snowfall of 2-3 feet were reported over the Laramie Mountains west of Cheyenne. Snowfall amounts from 12-20 inches were common over the adjacent plains from Douglas to Cheyenne, with Cheyenne recording just over 18 in. In addition, gusty winds from 30 to 45 mph combined with the snow to produce drifts from 6-10 feet in some areas.					
Goshen, Laramie, Platte	**3/12/2021**	**0**	**0**	**-**	**-**
The storm brought high snowfall totals, thundersnow, and increased windspeeds up to 55 mph. The windspeeds and intense snowfall led to snow drifts, up to three feet high, which closed roads for up to three days and segments of I-25 and I-80 were closed for extended periods over multiple days.					
Goshen, Laramie, Platte	**11/25/2022**	**0**	**0**	**-**	**-**
A regional storm began on 11/25 and continued to 12/1/2022. The storm brought heavy snowfall and high winds causing a long-term regional power outage that affected Goshen County and surrounding areas.					

3.17.2 Inventory Exposed

Winter storms can cover a large geographic area, as the event travels. Therefore, all of Goshen County is exposed to this hazard and could be impacted. However, the severity of these impacts on the people, property, crops, and livestock in the county is not uniform and is dependent upon numerous variables.

Damaged power lines and dangerous or impassable roadways may hinder the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or the provision of basic utilities, such as heat and running water.

Extreme cold poses a risk to all assets and the population located in Goshen County. Most structures should be able to provide adequate protection if an extreme cold event occurs. Extreme cold can disrupt communications facilities and utility transmission lines, as well as the potential for water pipes to freeze. Extreme cold has the ability to impact livestock and crops if the event occurs during certain times of the year.

3.17.3 Probability of Future Occurrences

Severe winter storms and blizzards can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter storms provide benchmarks for projecting similar conditions into the future. The probability that participating communities will experience a severe winter storm event, based on historical records and frequencies, is highly likely and expected to occur at least once every year.

The probability that Goshen County will experience another extreme cold event can be difficult to quantify. It is important to note that the limited amount of historical accounts for extreme cold temperatures does not necessarily indicate a low frequency of occurrence. Certain hazards occur more frequently in specific areas. Therefore, the residents of these areas are less likely to report events that seem commonplace, even though the events may be considered extreme in other locations.

3.17.4 Future Development Trends

Although Goshen County is not currently experiencing major growth, the risk and impacts of a winter storm or blizzard event are still prevalent to existing infrastructure. Since the previous statement is assumed to be uniform for the county, the location of structures does not increase or reduce the risk necessarily. Participating communities should adhere to building codes, and therefore, new development can be built to current standards to account for adverse weather. Additionally, as homes are built in more remote parts of the county, accessing those rural residents may become impossible should sheltering or emergency services be needed in an extreme event.

3.17.5 Climate Change Impacts

As climate change unpredictably affects weather patterns, the types and numbers of winter storms is being impacted. Research from the National Climatic Data Center (NCDC) snowstorm database has shown “winter storms have increased in frequency and intensity since the 1950s.” The impacts from climate change are likely to create more dangerous and damaging winter storms. The limited ability to consistently predict accurate conditions for winter storms can leave people exposed and infrastructure unprotected.

4 Plan Implementation and Maintenance

Having a plan for monitoring, evaluating, maintaining, and implementing this HMP is critical to maintaining its value and success. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continual basis.

4.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the HMPC will be tasked with the plan's implementation and maintenance and will be led by the Platte County Emergency Management Department. The HMPC will act as an advisory body. Its primary duties will be to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. With the adoption of this plan, the HMPC agrees to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision-making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the County Commissioners; and
- Inform and solicit input from the public.

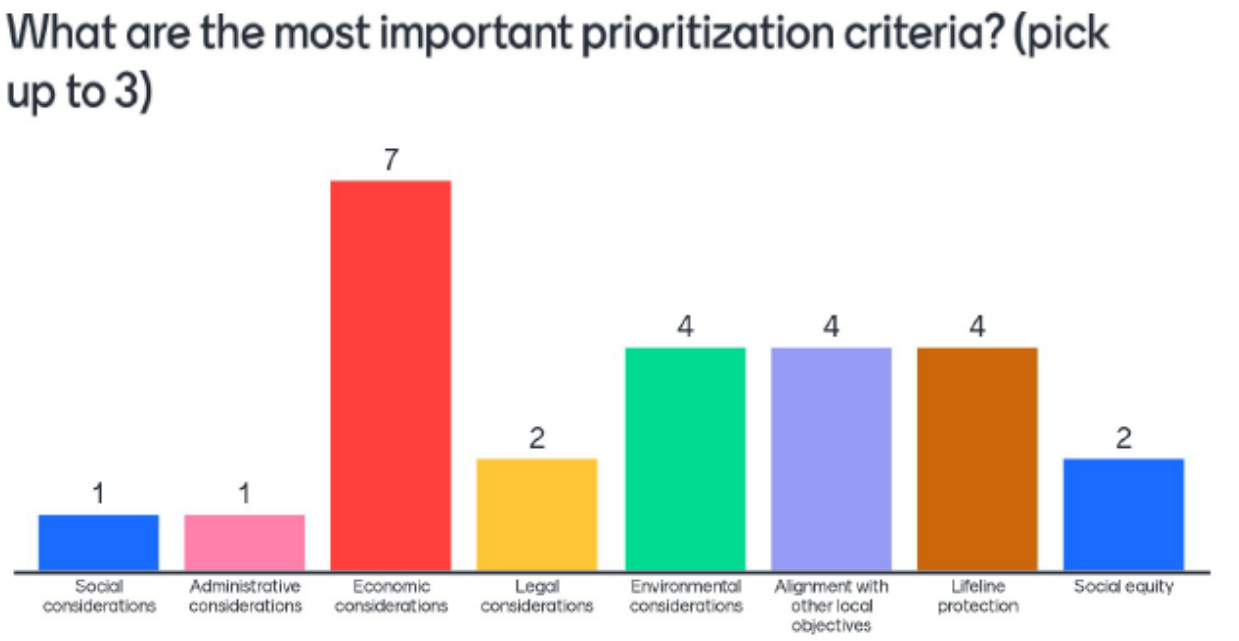
Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, coordinating with appropriate entities, and updating relevant information on the county's and Emergency Management Department's website, along with local newspapers and Emergency Management social media accounts.

4.2 Implementation

Upon updating and adopting this plan, it is intended to be implemented to reduce Goshen County's vulnerability to natural hazards over time. Implementation is informed by multiple factors, including funding, project schedule, available personnel, and priority of completion. Figure 4.1 illustrates the prioritization of criteria of a project based on HMPC polling responses. The criteria can greatly impact implementation and are deciding factors in the success of a project. Economic considerations are the priority category for the HMPC and does not only refer to implementation project costs, but the considerations of prior costs such as grant applications and project scoping.

In addition to economic considerations when trying to implement a feasible project, the HMPC also consider alignment with other local objectives, Lifeline protection, and environmental consideration to be the next most important criteria categories. Of those, environmental considerations can interfere with implementation to the point of shutting down a project.

Figure 4.1 Prioritization Criteria



Continuous, cooperative, and informed efforts to network and highlight the multi-objective benefits of each project to the community and its stakeholders is crucial to implementation. These efforts include the promotion of mitigation, collaboration, and the value to the community overall.

Simultaneous to these efforts, the HMPC will consistently monitor funding opportunities that could be leveraged to implement actions. Coordinating ahead of time on how to meet local match for grants, or to adapt projects to fit grant requirements are important proactive steps to obtain funding. When funding does become available, the HMPC will then be in a position to capitalize on the opportunity.

Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective projects.

While grant funding allows for many mitigation action projects to be funded, Goshen County intends to diversify funding opportunities in an effort to be less reliant on grant monies. This allows for greater flexibility in implementation of projects that are important to communities.

4.3 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

4.3.1 Maintenance Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration has occurred. The Emergency Management Department is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. The annual review is recommended to occur in the month of January.

This plan will be updated, approved, and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. The county will inquire with the Wyoming Office of Homeland Security

(WOHS) and FEMA for funds to assist with the update. Funding sources may include the Emergency Management Performance Grants, Hazard Mitigation Grant Program (if a presidential disaster has been declared), Building Resilient Infrastructure and Communities grants, and Flood Mitigation Assistance grant funds.

4.3.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Such changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Based on plan implementation, the HMPC will use the following process to evaluate progress, note changes in vulnerability, and consider changes in priorities:

- A representative from the responsible entity identified in each mitigation measure will track and report on project status to the HMPC annually. The representative will provide input on whether the project meets the defined goals and objectives and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals and objectives, the HMPC will select alternative projects for implementation.
- New projects identified will require that an individual be assigned as responsible for defining the scope, implementation, and monitoring success of the project.
- Projects not ranked high priority but were identified as potential mitigation strategies will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to accommodate for projects that have failed or are not considered feasible after review of the established criteria, the time frame, priorities, and/or funding resources.

Updates to this plan will follow the most current FEMA and WOHS planning guidance and will consider the following:

- Changes in vulnerability due to project implementation;
- Documentation of
    - success stories where mitigation efforts have proven effective;
    - areas where mitigation actions were not effective;
    - any new hazards that may arise or were previously overlooked;
    - hazard events and impacts that occurred within the five-year period;
    - continued public involvement;
    - changes to the planning process, which may include new or additional stakeholder involvement;
- Incorporation of
    - new data or studies on hazards and risks;
    - new capabilities or changes in capabilities;
    - growth and development-related changes to building inventories;
    - projected development that could be vulnerable to hazards;
    - new project recommendations or changes in project prioritization.
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to WOHS/FEMA; and
- Include re-adoption by all participating entities following WOHS/FEMA approval.

4.3.3 Plan Integration

Goshen County maintains a comprehensive set of emergency management plans, developed in a multidisciplinary environment where county departments, jurisdictional agencies and representatives, nonprofit and community organizations, and the private sector are included in the planning process. This set of plans

encompass all phases of emergency management and the work done on the Wyoming Region 7 HMP update will be integrated into these efforts moving forward.

By integrating the HMP with the county's comprehensive set of emergency management plans, a strong foundation for resilience can be set through smart emergency preparedness, mitigation, response, and recovery; before, during, and after an emergency or disaster event.

Additionally, considering hazard mitigation during all applicable future county, municipal, and regional planning efforts is crucial. Some of the larger opportunities for impactful integration involve comprehensive plans, transportation plans, building codes, community wildfire protection (and implementation) plans, and annual capital expenditure planning. The greater the investment of hazard mitigation planning into other plans, the more likely the success of implementation and achieving common goals across departments and jurisdictions.

HMPC members are responsible for promoting and advocating for integration of the findings and recommendations of this plan with other plans, policies, and studies, as appropriate. Due to the lack of available implementation resources in Goshen County, this plan will be considered a core document that will help provide a plan and process for the county to mitigate against future hazard events. This plan may also initiate more in-depth analysis and reports (i.e. Wildfire Study) should funding become available.

Plans are only as informed and stable as the energy and knowledge put into them, which is why plan integration involves an intersectional approach to be successful. Identifying relevant and relatable plans to integrate is the first step, however the right people need to come to the table to coordinate, problem solve for any possible issues, and most importantly celebrate the strengths and progress of each plan.

There are a number of other community plans that will benefit from strategies and content within this updated HMP. Integrating components of this plan across other community planning efforts will be an ongoing effort and will help to ensure no strategic conflicts are created through other planning processes, and most critically that areas of mutual interests are identified.

This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs. Wherever possible it is recommended that project implementation be achieved through collaborative and collectively beneficial work with other programs, planning, and policy development.

4.3.4 Continued Public Involvement

The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, Local Emergency Planning Committee (LEPC) meetings, web postings, and press releases to local media.

It is important to share success stories with the community as mitigation actions are completed, to ensure the public understands the value of the plan and their input going forward. Sharing the plan with the communities often and consistently, throughout the planning cycle, provides opportunities to seek additional public comment.

A public hearing(s) to receive comment on plan maintenance and updating from residents will be held during the maintenance period and information will be taken into account for formal updates. When the HMPC reconvenes for the plan update, they will coordinate with all stakeholders participating in the planning process. This includes those that joined the committee during the maintenance period, those that were a part of the last planning process, and those who are new additions to the roster, to update and revise the plan.

Public awareness of the plan was thoroughly discussed by the planning committee and it was determined that wildfire outreach could be occurring in multiple ways. There is an annual meeting of regional fire chiefs that coincides with annual operation plan updates, which provides an excellent opportunity to include the hazard mitigation plan alignment in the review. The potential HMP update of any events would keep the hazard risk assessment current and the plan could inform the fire chiefs of other projects that they may be able to be involved with.

The discussion of opening part of these meetings to the public, as well as the LEPC meetings was in depth. While the fire meetings are typically used to educate political leaders and other agencies, the potential of opening a portion to the public would create invaluable chances for the public to be involved. LEPC meeting are open to the public which would be better publicized during outreach.

Events including the county fair and other local community events were discussed in addition to other outreach methods including using news media along with social media and newsletters.

Further discussion involved how to leverage these existing community outreach methods for other hazards, and just as importantly education about the plan.

5 Earthquake Hazus Risk Report

Hazus: Earthquake Global Risk Report

Region Name: GoshenEQm5

Earthquake Scenario: GoshenEQm52500

Print Date: February 21, 2022

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

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

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Wyoming

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,231.57 square miles and contains 4 census tracts. There are over 5 thousand households in the region which has a total population of 13,249 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,203 (millions of dollars). Approximately 91.00 % of the buildings (and 75.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,076 and 983 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 6 thousand buildings in the region which have an aggregate total replacement value of 1,203 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 74% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 25 beds. There are 15 schools, 11 fire stations, 4 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 2 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 3,059.00 (millions of dollars). This inventory includes over 166.53 miles of highways, 104 bridges, 9,976.11 miles of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	104	137.3448
	Segments	23	1215.9310
	Tunnels	0	0.0000
		Subtotal	**1353.2758**
Railways	Bridges	78	345.2347
	Facilities	1	2.6630
	Segments	108	320.1532
	Tunnels	0	0.0000
		Subtotal	**668.0509**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	1	4.4260
	Runways	2	51.1106
		Subtotal	**55.5366**
		Total	**2,076.90**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	199.0663
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**199.0663**
Waste Water	Distribution Lines	NA	119.4398
	Facilities	4	506.3443
	Pipelines	0	0.0000
		Subtotal	**625.7841**
Natural Gas	Distribution Lines	NA	79.6265
	Facilities	0	0.0000
	Pipelines	5	78.7757
		Subtotal	**158.4022**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	2	0.1800
		Subtotal	**0.1800**
		Total	**983.40**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	GoshenEQm52500
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	5.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 174 buildings will be at least moderately damaged. This is over 3.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

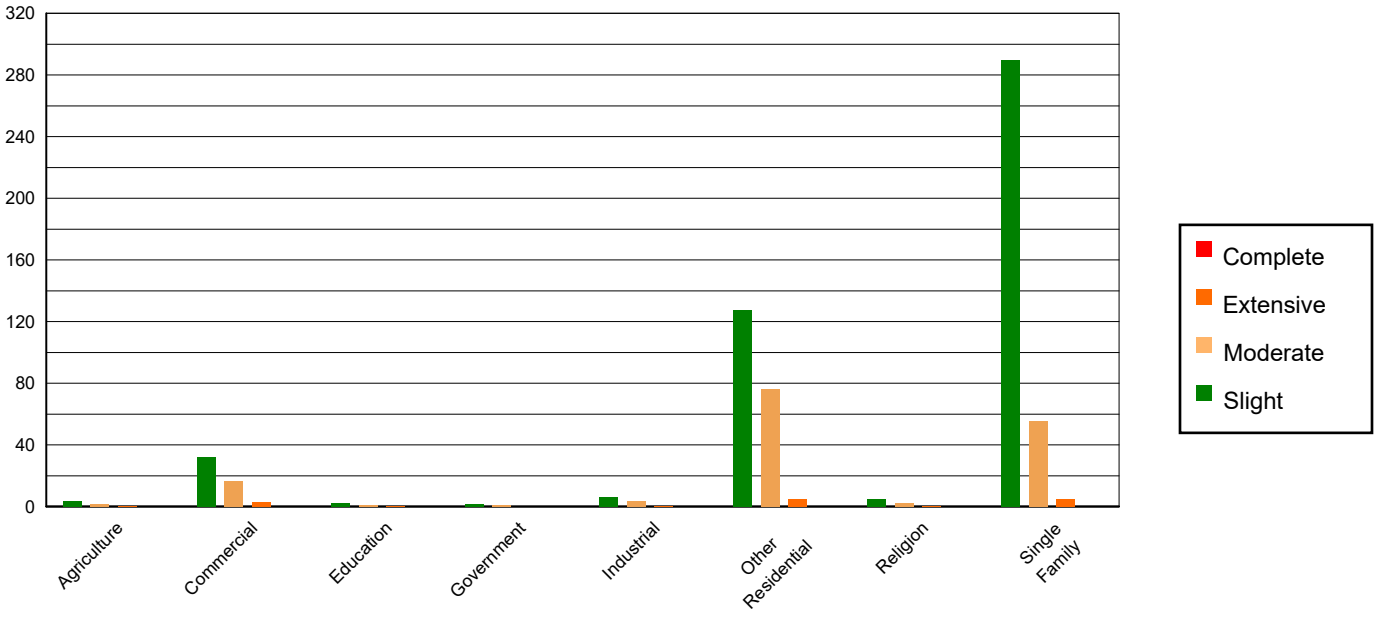


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	41.86	0.75	3.80	0.81	1.97	1.24	0.35	2.33	0.01	2.67
Commercial	290.84	5.19	32.04	6.84	16.87	10.59	3.12	20.60	0.13	30.36
Education	24.33	0.43	2.30	0.49	1.19	0.74	0.19	1.22	0.01	1.66
Government	20.95	0.37	1.98	0.42	0.94	0.59	0.13	0.84	0.00	1.12
Industrial	57.10	1.02	6.45	1.38	3.73	2.34	0.71	4.67	0.02	4.55
Other Residential	667.91	11.93	127.50	27.20	76.43	48.00	5.07	33.42	0.10	24.13
Religion	53.49	0.96	4.87	1.04	2.30	1.44	0.33	2.17	0.01	3.32
Single Family	4441.96	79.34	289.83	61.83	55.81	35.05	5.27	34.76	0.14	32.18
Total	**5,598**		**469**		**159**		**15**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4314.61	77.07	279.26	59.57	39.55	24.84	1.84	12.13	0.00	0.00
Steel	101.24	1.81	10.58	2.26	6.33	3.98	0.89	5.84	0.04	9.17
Concrete	92.94	1.66	10.76	2.30	4.81	3.02	0.50	3.32	0.01	1.41
Precast	79.53	1.42	8.91	1.90	7.47	4.69	1.91	12.58	0.02	5.68
RM	406.76	7.27	29.19	6.23	20.40	12.81	3.64	24.01	0.00	0.00
URM	62.44	1.12	12.45	2.66	7.32	4.60	1.79	11.78	0.27	64.55
MH	540.90	9.66	117.61	25.09	73.33	46.06	4.60	30.34	0.08	19.19
Total	**5,598**		**469**		**159**		**15**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 25 hospital beds available for use. On the day of the earthquake, the model estimates that only 20 hospital beds (82.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 97.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	2	0	0	2
Schools	15	0	0	15
EOCs	1	0	0	1
PoliceStations	4	0	0	4
FireStations	11	0	0	11

Transportation Lifeline Damage

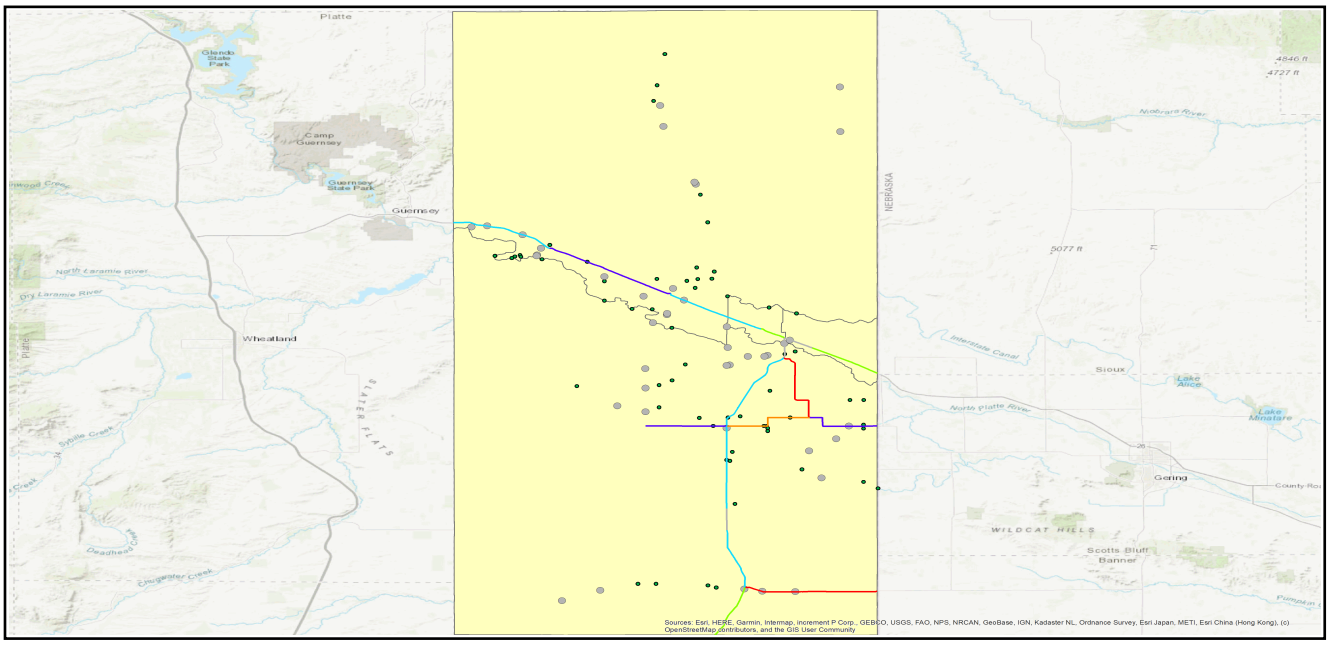


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	23	0	0	23	23
	Bridges	104	0	0	104	104
	Tunnels	0	0	0	0	0
Railways	Segments	108	0	0	108	108
	Bridges	78	0	0	78	78
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	0	0	1	1
	Runways	2	0	0	2	2

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	4	0	0	4	4
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	2	0	0	2	2

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	6,185	52	13
Waste Water	3,711	26	7
Natural Gas	81	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	5,311	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

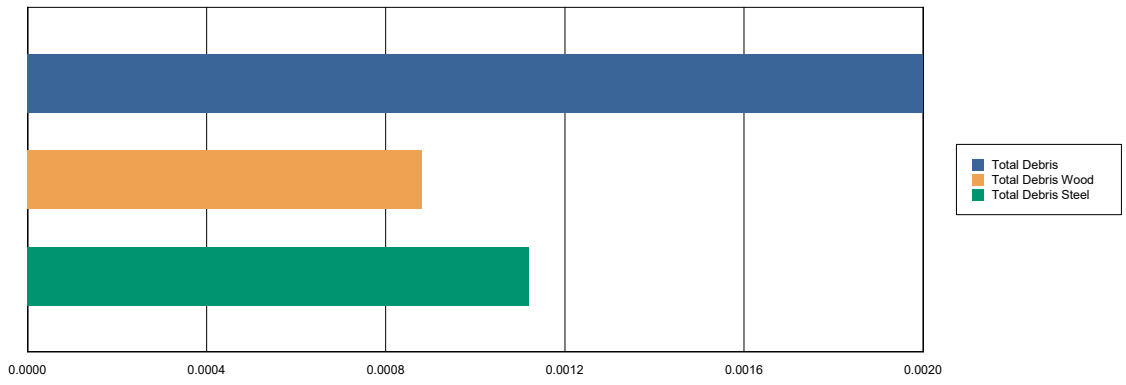
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 44.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 80 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



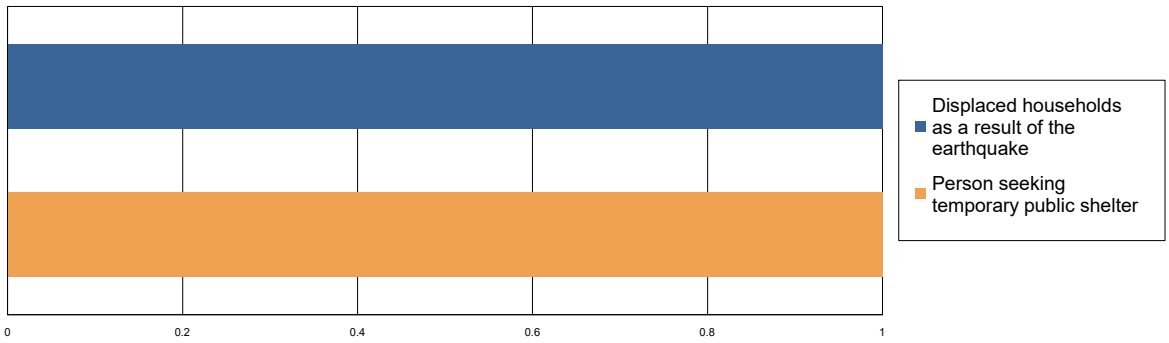
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	80 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 13,249) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
1	1

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.03	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.03	0.00	0.00	0.00
	Other-Residential	0.64	0.06	0.00	0.00
	Single Family	0.78	0.06	0.00	0.00
	Total	**1**	**0**	**0**	**0**
2 PM	Commercial	1.90	0.24	0.02	0.03
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.48	0.06	0.00	0.01
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.23	0.03	0.00	0.00
	Other-Residential	0.12	0.01	0.00	0.00
	Single Family	0.15	0.01	0.00	0.00
	Total	**3**	**0**	**0**	**0**
5 PM	Commercial	1.36	0.17	0.01	0.02
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.07	0.01	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.14	0.02	0.00	0.00
	Other-Residential	0.23	0.02	0.00	0.00
	Single Family	0.29	0.02	0.00	0.00
	Total	**2**	**0**	**0**	**0**

Economic Loss

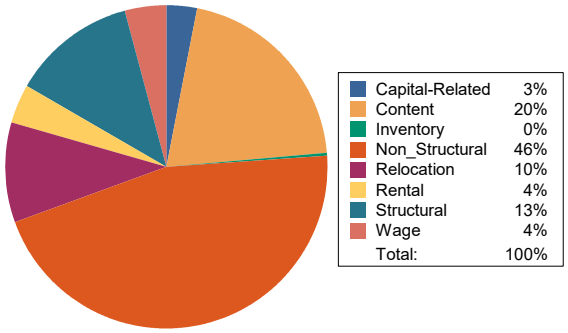
The total economic loss estimated for the earthquake is 28.66 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 11.64 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 54 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

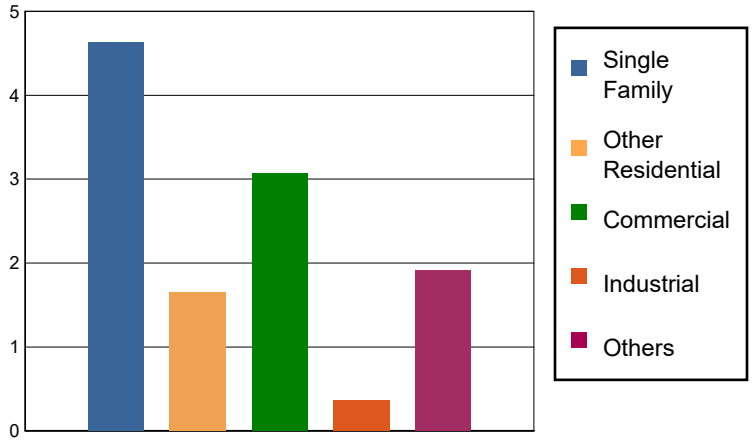


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0340	0.3624	0.0073	0.0873	0.4910
	Capital-Related	0.0000	0.0145	0.3132	0.0043	0.0235	0.3555
	Rental	0.1097	0.0964	0.2060	0.0031	0.0331	0.4483
	Relocation	0.3697	0.1461	0.3078	0.0239	0.3025	1.1500
	Subtotal	**0.4794**	**0.2910**	**1.1894**	**0.0386**	**0.4464**	**2.4448**
Capital Stock Losses							
	Structural	0.5210	0.2875	0.3675	0.0494	0.2326	1.4580
	Non_Structural	2.6344	0.8741	0.9403	0.1611	0.7011	5.3110
	Content	1.0008	0.2049	0.5572	0.1012	0.5176	2.3817
	Inventory	0.0000	0.0000	0.0186	0.0190	0.0093	0.0469
	Subtotal	**4.1562**	**1.3665**	**1.8836**	**0.3307**	**1.4606**	**9.1976**
	Total	**4.64**	**1.66**	**3.07**	**0.37**	**1.91**	**11.64**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1215.9310	0.0000	0.00
	Bridges	137.3448	0.0381	0.03
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**1353.2758**	**0.0381**	
Railways	Segments	320.1532	0.0000	0.00
	Bridges	345.2347	0.0008	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	2.6630	0.1505	5.65
	Subtotal	**668.0509**	**0.1513**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	4.4260	0.2952	6.67
	Runways	51.1106	0.0000	0.00
	Subtotal	**55.5366**	**0.2952**	
	Total	**2,076.86**	**0.48**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	199.0663	0.2356	0.12
	Subtotal	**199.0663**	**0.2356**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	506.3443	16.1334	3.19
	Distribution Lines	119.4398	0.1184	0.10
	Subtotal	**625.7841**	**16.2518**	
Natural Gas	Pipelines	78.7757	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	79.6265	0.0405	0.05
	Subtotal	**158.4022**	**0.0405**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.1800	0.0038	2.11
	Subtotal	**0.1800**	**0.0038**	
	Total	**983.43**	**16.53**	

Appendix A: County Listing for the Region

Goshen,WY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Wyoming					
	Goshen	13,249	903	300	1,203
Total Region		**13,249**	**903**	**300**	**1,203**

6 Meeting Agendas and Invites

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

HMP Kickoff Webinar

Tuesday, February 8, 2022 / 9:30-11:00 am:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 126 284 268#

Agenda:

1. Hazard Mitigation Overview
2. Project Scope & Schedule
3. Roles & Responsibilities
4. Public Involvement Strategy
5. 2018 HMP Input
6. Recent Community Planning
7. Hazards to Profile
8. Recent Hazard Events
9. Hazard & Risk Viewers
10. Mitigation Strategy
11. Lifelines
12. Mitigation Grant Funding
13. Mitigation Resources
14. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- 2017 Mitigation Action Reporting
- Best Available Hazard Data
- Recent Community Plans
- HMPC Roster Additions
- Help to Share Public Engagement Content
- Hazard / Disaster / Mitigation Photos

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

Mike Garner

From: Shelly Kirchhefer <skirchhefer@GoshenSheriff.org>
Sent: Tuesday, January 25, 2022 10:06 AM
To: _GC Commissioners; Kory Fleenor; Shelly Kirchhefer; Bill Law (County); Val Hankins; Ryan Schilreff (rschilreff@wyrulec.com); ryan.wunibald@wyo.gov; Kelly Beard; GOSHEN IRRIGATION DISTRICT; Calvin Goddard (Calvin.Goddard@wyo.gov); lance.green@wyo.gov; Ryan Kramer; Marci Cates (mcates@goshen1.org); Randy Adams (city); CityEMC; Matt Johnson; Tammy Cearns; Darin Yates; Albert Lira; Lance Petsch; jharkins@torringtgonwy.gov; lesley.travers@ewc.wy.edu; Bob Fenton (bob.fenton@tallgrassenergylp.com); George Siglin (gdsiglin@gmail.com); Endra Moen; (lazykranch.kb@gmail.com); yodertownhall; jharkins@torringtgonwy.gov; Justin Burkart Email; Jason Norris; lagrange@lagrangewyo.com; Tracy Pragnell Pager; Joyce Evans; Pete Howes EMAIL; rdalgam@conversecountyem.com; teetersr@hotmail.com; Linda Cockett (torwysfc@gmail.com); Doug DesEnfants EMAIL; 'Lou Hubbs (cmfi@wyobraska.com)'; Craig Gueswel Email; Huntington, Michael W; dcummingd@bepc.com; Jared Allen - NOAA Federal; Jeanine West; bharris@laramiecounty.com; Matthew Butler; 'Terry Stevenson (TStevenson@plattecountywyoming.com)'; James Santistevan (niobraracountyema@gmail.com); Tim Newman; Nan Gould; Bob Taylor
Cc: Mike Garner
Subject: RE: Region 7 Hazard Mitigation Plan Update 2022– Hazard Mitigation Planning Committee Invitation and Kickoff Meeting
Attachments: LifelinesFactSheetandPosterv2.pdf

Importance: High

Hello,
It's that time again…….
We will begin the process of updating the HMP for Region 7 .
You are invited to the first of three planning meetings to update the Wyoming Region 7 Hazard Multi-Jurisdictional Mitigation Plan. The current plan was developed in 2018 in accordance with the Disaster Mitigation Act of 2000, which requires all local governments to develop a plan to assess their risks to hazards and identify actions that can be taken in advance to reduce future losses. Hazard mitigation plans are to be updated every five years in order to maintain eligibility for Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) grants. The Region 7 Hazard Mitigation Plan includes Goshen, Laramie, and Platte Counties and their municipalities, in addition to any special districts that would like to participate.

The hazard mitigation planning process is heavily dependent on the participation of representatives from local government agencies and departments, the public, and other stakeholder groups. A Hazard Mitigation Planning Committee (HMPC) is being re-vitalized to support this project and will include representatives from the counties, incorporated cities and towns, and districts. Other interested stakeholders, including local and regional agencies involved in hazard mitigation activities or agencies that regulate development, are also invited. This includes private-non-profit entities, business partners, academic institutions, and other local, state, and federal agencies in the Region.

At the HMPC kickoff webinar, we will discuss the benefits of updating the hazard mitigation plan, the project schedule & scope, public engagement opportunities, and all of the hazards that affect the Region, such as wildfires, floods, winter storms, and more.

Appropriate persons to be a part of the HMPC include, but are not limited to: county and municipal planners, public works directors, floodplain managers, economic development directors, GIS staff, first responders, local government administration, elected officials, business partners, private-non-profit representatives, and special district

representatives. Each plan adopting entity must have at least one representative at all meetings to meet FEMA participation requirements. We request your assistance in forwarding this invitation to others in your organization, as needed. There will be 3 total HMPC meetings held during the update process over the next 6 months, with submittal of the updated plan for State and FEMA review late in 2022.

As the County Emergency Management Coordinator, I will be taking the lead in coordinating the update of this plan. The Wyoming Office of Homeland Security has hired a consultant, Synergy Disaster Recovery, to manage this planning project. Synergy will facilitate the planning process, collect the necessary data, and perform other technical services, including updating the risk assessment and plan document. However, to successfully complete this project and ensure your organization is eligible for FEMA HMA funding, we need your participation and input.

A meeting invitation/calendar item for the webinar will be shared soon. I look forward to your input and participation during the process.

Region 7 Multi-jurisdictional Hazard Mitigation Plan Update
HMPC Kickoff Webinar
Date: 2/8/2022
Time: 9:30-11:00 am
Webinar link:

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting (https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTY3ZGRiYzMtNDlhMi00NzBiLWE0OTEtMTUzN2U1Mzg3MGYx%40thread.v2/0?context=%7b%22Tid%22%3a%2293508cfd-0e9e-4186-bbc9-15f48c5d31aa%22%2c%22Oid%22%3a%22e2a7596a-fe00-4ee4-9d18-d68d9e2ce0f4%22%7d)

Or call in (audio only)

+1 872-242-8065,,126284268# United States, Chicago

Phone Conference ID: 126 284 268#

Find a local number | Reset PIN

Shelly Kirchhefer

Goshen County Emergency Management
P.O. Box 160
Torrington, WY. 82240
Office-307-532-7039
Cell-307-575-2223
skirchhefer@goshensheriff.org

February 8, 2022 Kick Off WY Region 7

GID (Guest)9:37 AM

goshen irrigation district

Chuck Kenyon (Guest)9:37 AM

Jeff Harkens, Director of Public Works, City of Torrington

Ritch (Guest)9:38 AM

Ritch Reyes, Town of Lingle

Laramie River Station (Guest)9:38 AM

Levi Mickelsen Plant Manager at the Laramie River station Wheatland WY

Caitlin Langmead9:38 AM

1681 4126
www.menti.com

Brislawn, Jeff P (External)9:39 AM

Jeff Brislawn, Hazard Mitigation Lead, Wood Environment & Infrastructure Solutions, Inc

Shelly Kirchhefer (Guest)9:39 AM

Shelly Kirchhefer Goshen Emergency Management

Wesley Bay (External)9:39 AM

Wes Bay, Deputy City Engineer, City of Cheyenne

Jeanine West (External)9:48 AM

The Teams link is not working for some

Caitlin Langmead9:49 AM

Thank you, let me see what I can do.

Wesley Bay (External)9:49 AM

What was the code for the website again?

Caitlin Langmead9:49 AM

1681 4126

Caitlin Langmead9:51 AM

Jeanine can you share this link, it's the same but not with a hyperlink https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTY3ZGRiYzMtNDlhMi00NzBiLWE0OTEtMTUzN2U1Mzg3MGYx%40thread.v2/0?context=%7b%22Tid%22%3a%2293508cfd-0e9e-4186-bbc9-15f48c5d31aa%22%2c%22Oid%22%3a%22e2a7596a-fe00-4ee4-9d18-d68d9e2ce0f4%22%7d

Caitlin Langmead9:54 AM

They may need to copy and paste into web address bar and not click the link.

Jeanine West (External)9:55 AM

Thank you

Ritch (Guest)10:00 AM

town website and facebook

Shamika McDonald, Wy SHMO (Guest)10:25 AM

Please feel free to contact me on current funding available through FEMA or any grant questions . 307.777.4914 or shamika.mcdonald1@wyo.gov

Thank you all for being here!

Val Hankins (Guest)10:42 AM

Val Hankins, Goshen County Road & Bridge

Planner (External)10:43 AM

Amy Clark - Planner for the Town of Wheatland and Platte County

Matt Butler CLCEMA (Guest)10:43 AM

Matt Butler, LCEMA

GID (Guest)10:43 AM

Tyson Gladson, Linda Keeran, Ryan Allen GID

Ryan (Guest)10:43 AM

Thanks for all of the information! Ryan Wunibald PHRC Goshen County

Chris Hilker (Guest)10:43 AM

Chris Hilker - 153d Air Wing

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

Goshen County Risk Assessment Webinar

Wednesday, April 20, 2022 / 9:00-11:00 am:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 915 551 723#

Agenda:

1. Project Overview & Updates
2. Public Involvement Strategy
3. Risk Assessment Summary
4. Mitigation Strategy
5. Mitigation Grant Funding
6. Mitigation Resources
7. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- Mitigation Capabilities Assessment (outstanding)
- Review draft HIRA
- Organizational Hazard Ranking Survey
- Help to Share Public Engagement Content (including survey)
- Hazard / Disaster / Mitigation Photos

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

4/20/2022 Goshen County Risk Assessment Workshop

Shelly Kirchhefer (Guest) has joined the chat.

Chuck Kenyon (Guest)9:08 AM

I'm on without a mic by Chuck Kenyon (Guest)

Chuck Kenyon (Guest)9:09 AM

Randy Adams, Mayor and Jeff Harkins DPW here also

Chuck Kenyon (Guest)9:17 AM

please send the media packet to me at cityemc@torringtonwy.gov

Chuck Kenyon (Guest)9:18 AM

I will try to get it on the city web page, and then link to Facebook on our pages. Thanks.

Caitlin Langmead9:18 AM

We will do that following the meeting, thanks Chuck

Chuck Kenyon (Guest)9:38 AM

Is a parcel a census parcel or individually owned parcel?

Chuck Kenyon (Guest)10:20 AM

bullet 2 should include municipal systems

Chuck Kenyon (Guest)10:44 AM

ethanol plant to fertilizer plant

WY R7 HMP - Goshen County Risk Assessment Webinar	
Meeting Start Time	4/20/2022, 8:45:31 AM
Meeting End Time	4/20/2022, 10:49:20 AM
Full Name	Join Time
Caitlin Langmead	4/20/2022, 8:45:31 AM
Mike Garner	4/20/2022, 8:45:45 AM
Shelly Kirchhefer	4/20/2022, 8:57:19 AM
307-532-5458	4/20/2022, 8:59:41 AM
Chuck Kenyon (Guest)	4/20/2022, 9:07:56 AM

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

Goshen County Mitigation Strategy Webinar

Tuesday, July 26, 2022 / 1:00-3:00 pm:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 976 314 592#

Agenda:

1. Project Overview & Updates
2. Local Government Participation
3. Plan Integration / Implementation
4. Past Mitigation Action Progress
5. Updated Mitigation Strategy
6. Mitigation Grant Funding
7. Mitigation Resources
8. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- New Mitigation Action Development
- Hazard Ranking Survey (outstanding)

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

Goshen County LEPC All Hazards Meeting
Sign in sheet
July 26, 2022 1:00 pm
EOC
Includes R7 HMP and THIRA

Name	Agency
Sheny Kirchhoff	LEPC Chair, EMA
Michael Doan	Fort Laramie EMS
Enden Nelson	Plains Pipeline
BOB Fenton	TALLGRASS Energy
Darin Yates	Torrington EMS.
Chuck Kenyon	City of Torrington
Justin Burhart	Yoder EMA
Doug DesEnfants	Prairie Center FD
ENDRA ANDREW	LINGLE PD.
Michael Huntington	Banner Health
Linda Cockett	Senior Friendship Center
BILL LAW	G.C. FIRE WARDEN
Lance Petsch	TVFD
Ryan Wreibold	Public Health

7/26/2022 Goshen Mitigation Strategy HMPC Workshop

Mike Garner12:56 PM

For those online, please type in your name and organization that you represent. thanks

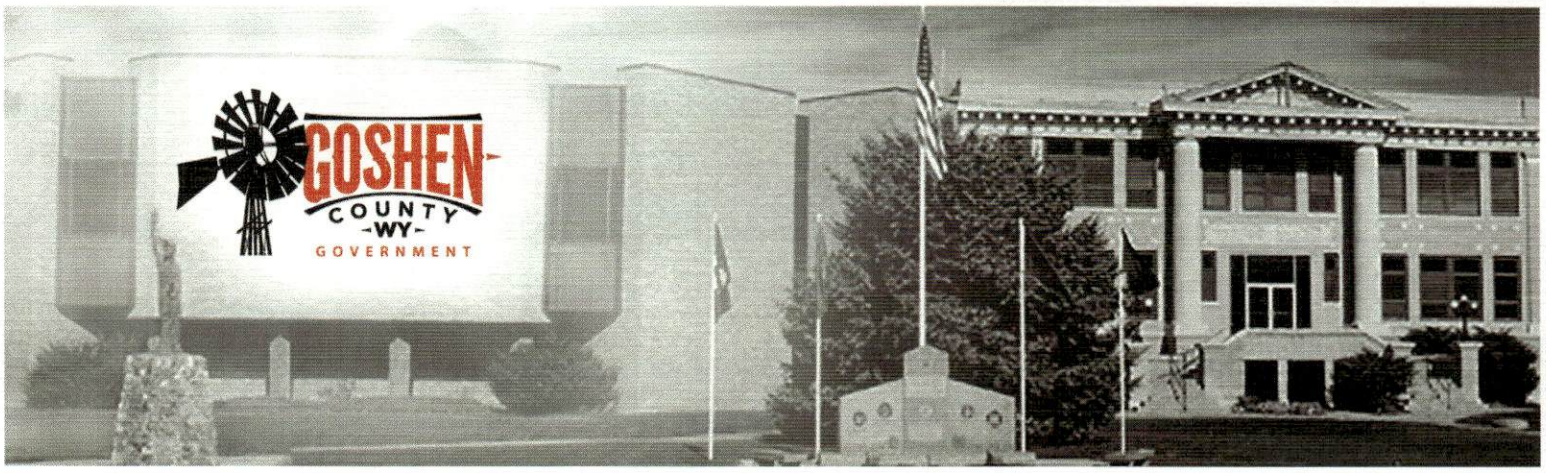
Ryan (Guest)12:58 PM

Ryan Wunibald PHRC Goshen County Public Health is here

Ted Church MD Goshen County (Guest)1:03 PM

Ted Church MD Goshen County Health Officer

7 Adoptions



P.O. Box 160 • Torrington, WY 82240 • Phone (307) 532-4051 • Fax (307) 532-7375

STATE OF WYOMING
GOSHEN COUNTY
RESOLUTION # 2023-2
A RESOLUTION ADOPTING THE REGION 7 HAZARD MITIGATION PLAN 2023 UPDATE

WHEREAS, *Goshen County,* with the assistance from *Wyoming Office of Homeland Security* has gathered information and prepared the Wyoming *Region 7 Hazard Mitigation Plan 2023 Update*; and,

WHEREAS, the Wyoming *Region 7 Hazard Mitigation Plan 2023 Update* has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, *Goshen County* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *Goshen County Commissioners* have reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by *the Goshen County Commissioners* that *Goshen County* adopts the *Region 7 Hazard Mitigation Plan 2023 Update* as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

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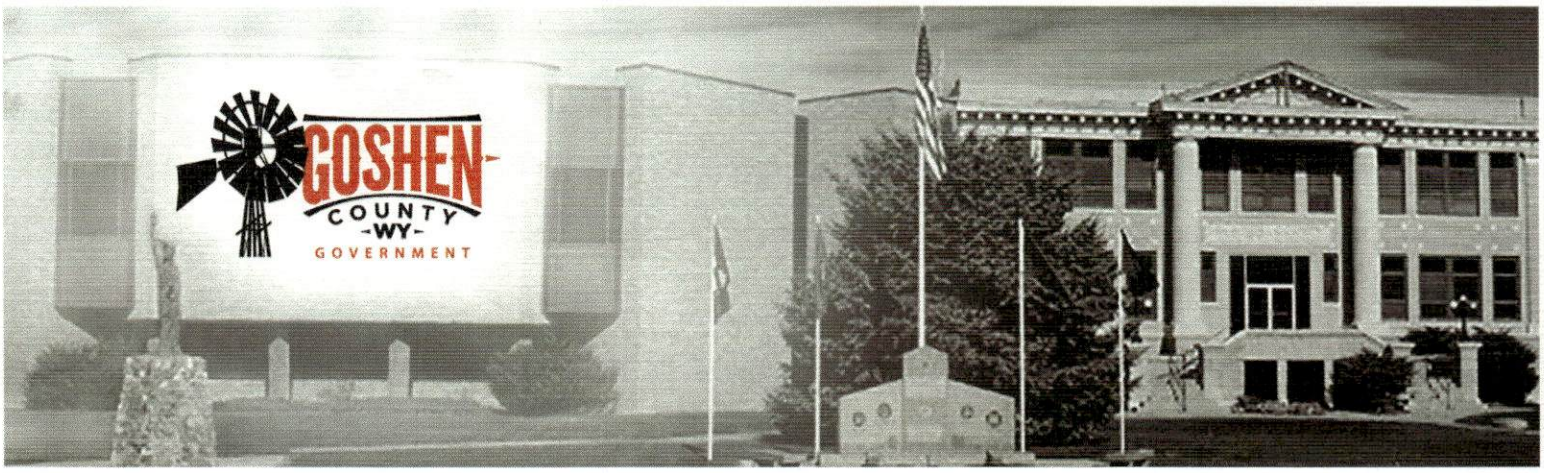


P.O. Box 160 • Torrington, WY 82240 • Phone (307) 532-4051 • Fax (307) 532-7375

DONE IN OPEN MEETING this 21st day of March, 2023.

Michael McNamee
Chairman, Goshen County Commission

Justin Burkhart
Goshen County Commissioner

Aaron Walsh
Goshen County Commissioner

STATE OF WYOMING
COUNTY SEAL CLERK
GOSHEN COUNTY

(Seal)

ATTEST:

Mary B. Feagler, County Clerk

RESOLUTION NO. 2023-7

WHEREAS, the City of Torrington, with the assistance from Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update; and

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and

WHEREAS, the City of Torrington is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the City of Torrington has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY of the City of Torrington that the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been adopted as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

PASSED, APPROVED AND ADOPTED THIS 8th day of March, 2023.

By: _____
Herb Doby, Mayor

ATTEST:

_____
Lynette Strecker, Clerk/Treasurer

Town of Fort Laramie
Town Council
PO BOX 177
Fort Laramie, WY 82212

RESOLUTION

WHEREAS, *The Town of Fort Laramie*, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, *The Town of Fort Laramie* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *the Town Council of Fort Laramie* has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by The Town Council of Fort Laramie that *Fort Laramie* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and
resolves to execute the actions in the Plan.

ADOPTED this 8th day of February, 2023 at the meeting of the Town Council of Fort Laramie.

Insert appropriate signature lines and dates

Joyce Evans , Secretary

(Mayor, Village Clerk, County Board Chair, Tribal Council, etc.)

SEAL

ATTEST:

Sondra Ellis Clerk/Treasurer

Joyce Evans Mayor

Laura Curtsinger – Mayor Pro Tem

Kelly Loveland Councilmember

Mike Doan Councilmember

Ryon Brown Councilmember

Town of LaGrange
LaGrange Town Council
200 C Street, LaGrange Wy. 82221

RESOLUTION

WHEREAS, *the LaGrange Town Council*, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, *the LaGrange Town Council* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *the LaGrange Town Council* has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the LaGrange Town Council that *the Town of LaGrange* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 9th day of Feb, 2023 at the meeting of the *LaGrange Town Council.*

Insert appropriate signature lines and dates

Mayor Mark Marshall

RESOLUTION NO. 138

A RESOLUTION AUTHORIZING THE TOWN OF LINGLE TO ADOPT THE WYOMING REGION 7 HAZARD MITIGATION PLAN 2023 UPDATE

WITNESSETH

WHEREAS, the Town of Lingle, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Lingle is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Lingle Town Council has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the Lingle Town Council that the Town of Lingle adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 8th day of March, 2023 at the meeting of the Lingle Town Council.

PASSED, APPROVED AND ADOPTED THIS 8th day of March 2023.

Mayor, Al Unverzagt

Council Member, Brandie Cook

Council Member, Micah Foster

Council Member, A.J. Lambert

Council Member, Kathy Wilhelm

SEAL: TOWN OF LINGLE, WYOMING CORPORATE SEAL

ATTEST:

Richard Reyes, Clerk/Treasurer

TOWN OF YODER

P.O. Box 158 • Yoder, Wyoming 82244 • 307-532-4304

RESOLUTION
2023-2

WHEREAS, *Town of Yoder* with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, *Town of Yoder* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *Town of Yoder* has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by *Town of Yoder* that *Town of Yoder* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 13th day of January 2023 at the meeting of the *Town of Yoder.*

Mayor Norman P. Feagler

Goshen Irrigation District

"Serving Southeastern Wyoming"
North Platte River Project

Telephone (307) 532-7031
Fax (307) 532-3919

P.O. Box 717
Torrington, Wyoming 82240
Email: gosheniir@embarqmail.com

RESOLUTION

WHEREAS, Goshen Irrigation District with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, Goshen Irrigation District is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, Goshen Irrigation District has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by Goshen Irrigation District that Goshen Irrigation District adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 16th day of February 2023 at the meeting of the Goshen Irrigation District

FOR THE BOARD OF COMMISSIONERS

Shawn Booth, President

ATTEST: Linda S. Keeran
Linda S. Keeran, Secretary

Horse Creek Conservation District
Board of Commissioners
P.O. Box 68
Hawk Springs, Wyoming 82217

RESOLUTION

WHEREAS, Horse Creek Conservation District, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, The *Board of Commissioners* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *The Board of Commissioners* has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by *The Board of Commissioners* that *Horse Creek Conservation District* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 9th day of February, 2023 at the meeting of the *Board of Commissioners.*

Horse Creek Conservation District Board President

PATHFINDER IRRIGATION DISTRICT

P. O. Box 338
Mitchell, Nebr. 69357
(308) 623-1022
FAX (308) 623-2028

RESOLUTION

WHEREAS, *(Insert name of Jurisdiction)*, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, *(Insert name of Jurisdiction)* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *(Insert the name of the governing body)* has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by *(Insert the name of the governing body)* that *(Insert name of Jurisdiction)* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 4 day of April, 2023 at the meeting of the *(Insert the name of the governing body).*

Insert appropriate signature lines and dates

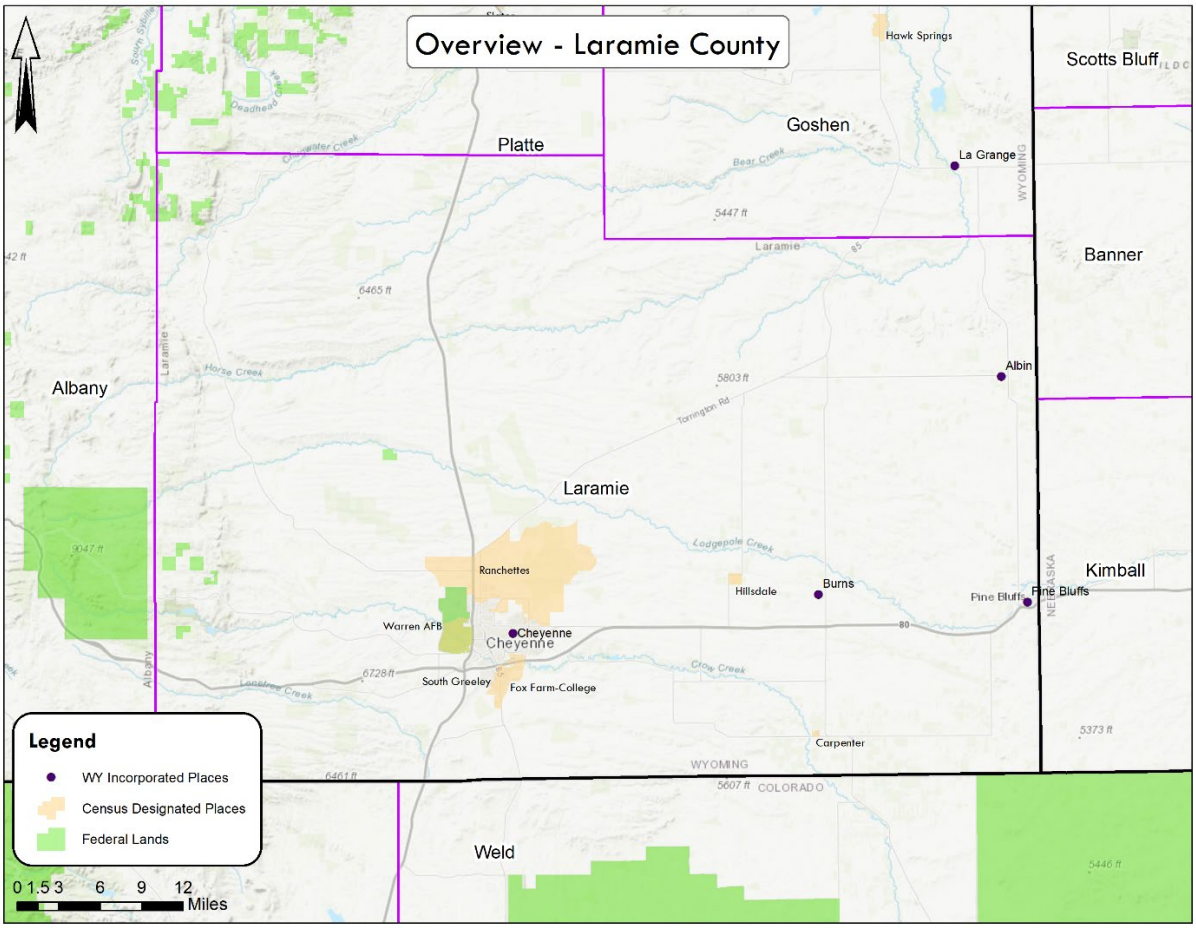
_____

(Mayor, Village Clerk, County Board Chair, Tribal Council, etc.)

Appendix B: Laramie County

Wyoming Region 7 Hazard Mitigation Plan

Laramie County Annex - 2023 Update



THE GREAT SEAL OF LARAMIE COUNTY
1867
WYOMING

Contents

Professional planning services for this plan update provided by:

SYNERGY DISASTER RECOVERY

1 Mitigation Strategy

1.1 Overview

The intent of the Mitigation Strategy is to help organizations identify implementable mitigation actions that will guide future mitigation policy and project administration. The Mitigation Strategy includes a list of proposed actions deemed necessary to meet those mitigation goals and objectives identified in the updated Hazard Mitigation Plan (HMP) and reduce the impact of hazards. The actions identified in this Appendix are specific to Laramie County and its participating organizations.

1.2 Mitigation Action Plan

1.2.1 Progress on Previous Mitigation Actions

As part of the 2023 HMP planning process, Laramie County and participating jurisdictions were tasked with reviewing mitigation projects that were identified in the existing Region 7 Hazard Mitigation Plan. Each jurisdiction reviewed their individual actions and reported on the status of those actions, shown in Table 1.1 Mitigation actions that have not yet been completed at the time of this plan's writing are listed as 'On-Going,' 'In Progress,' or 'No Progress – Continue Action.' Those actions identified as either 'In Progress' or 'No Progress – Continue Action' will be tracked and reported on, along with new actions, as part of future plan maintenance activities.

Recognition of mitigation successes when reviewing the status of the last plan's actions is important for continued progress. In Laramie County, there have been multiple successes moving projects forward. This includes:

- Laramie County
  - secured funding to expand and update the emergency communication systems.
- The City of Cheyenne
  - working on a Master Drainage Plan,
  - constructing a berm to reduce flooding,
  - increasing water detention storage through community partnership,
  - beginning construction on the 26th Street Storm Sewer Interceptor Project,
  - beginning construction on a hydroelectric power generator project.
  - Submission of numerous NOIs to WOHS for assistance in scoping multiple projects.
- The Town of Pine Bluffs
  - partnering with the Laramie County School District to develop community wildfire protections plans.
  - installed a 2nd community alert alarm system and is developing education for the community about hazards.
  - received design approval through working with WYDOT and Union Pacific for the relocation of a railroad crossing and construction of an under / over pass to prevent future accidents.

Table 1.1 2017 Mitigation Action Status

ID	Lead Jurisdiction	Title	Description	2022 Status	2022 Notes
2017-Laramie County-1	Laramie County	All-Hazards Public Education	Prepare and educate residents and businesses on hazards to improve life safety and minimize property damage.	On-Going	
2017-Laramie County-2	Laramie County	Emergency Communication Systems	Expand current systems, adapting and blending with new systems purposed by the federal government.	In-Progress	Received Funding via 6th Special Purpose Tax for maintenance and new additions
2017-Laramie County-3	Laramie County	Development of Community Wildfire Protection Plan (CWPP)	Complete CWPP for Eastern portion of County	No Progress - Continue Action	Waiting on grant funding to arrive
2017-Laramie County-4	Laramie County	Critical Infrastructure Protection	Complete Risk Assessments and Action Plans to prevent loss of life and mitigate damages	On-Going	
2017-Laramie County-5	Laramie County	Oil & Gas Safe Development Plan	Develop a plan for prevention and mitigation of loss of life and damages to property	On-Going	
2017-Cheyenne-1	Cheyenne	Development of Belvoir Groundwater Pipeline	Develop pipeline that would provide additional water resources to the City of Cheyenne during times of drought.	No Progress - Continue Action	Budgeting for FY23
2017-Cheyenne-2	Cheyenne	Expansion of Reservoir Storage/ Collection Capabilities	Expand and increase storage capacity to minimize short-term drought impacts	No Progress - No Longer a Mitigation Priority	Study determined that this is not need at this time
2017-Cheyenne-3	Cheyenne	Reduce Flood Damage Potential in Clear Creek Basin	Implement measures to reduce flood damage	No Progress - No Longer a Mitigation Priority	Study determined that this is not need at this time

ID	Lead Jurisdiction	Title	Description	2022 Status	2022 Notes
2017-Cheyenne-4	Cheyenne	Reduce Flood Damage Potential in Crow Creek Basin	Implement measures to reduce flood damage	On-Going	An NOI for project scoping for a flood control has been submitted to Homeland Security and has been selected for further review.
2017-Cheyenne-5	Cheyenne	Reduce Flood Damage Potential in Dry Creek Basin	Implement measures to reduce flood damage	On-Going	An NOI for project scoping for a flood control has been submitted to Homeland Security and has been selected for further review.
2017-Cheyenne-6	Cheyenne	Reduce Flood Damage Potential in Henderson and E. Lincoln Basin	Implement measures to reduce flood damage	In-Progress	A grant was award to the City of Cheyenne for an update to the Master Drainage Plan. A consultant has been selected and contracts are being processed.
2017-Cheyenne-7	Cheyenne	Reduce Flood Damage Potential in Holliday Basin	Implement measures to reduce flood damage	On-Going	We have partnered with Laramie County School District No. 1 to increase detention storage near the headwaters of the Henderson Basin.
2017-Cheyenne-8	Cheyenne	Reduce Flood Damage Potential in Upper & Lower Capitol Basin	Implement measures to reduce flood damage	On-Going	We reduced the flood hazard by the reconstruction of a berm.
2017-Cheyenne-9	Cheyenne	Adoption of Mutual Aid Agreements/Participation in WYOWARN	Enhance response capabilities for water and wastewater utilities during disasters.	In-Progress	Submitted an NOI to Homeland Security for project scoping of the 18th Street Storm Sewer Interceptor. Construction of the 26th Street Storm Sewer Interceptor Project is under construction and is expected to be completed in July, 2022.

ID	Lead Jurisdiction	Title	Description	2022 Status	2022 Notes
2017-Cheyenne-10	Cheyenne	Development of Hydroelectric Power Generation	Develop hydroelectric power generation to decrease operating costs, reliance on external power sources; and reduce disruption costs during power outages.	On-Going	Under Construction
2017-Albin-1	Albin	Fencing And Security for Water Wells and Lagoon	Install fencing and security measures to protect wells and lagoons from contamination	No Progress - No Longer a Mitigation Priority	No longer a needed project
2017-Albin-2	Albin	Tornado Shelters	Build local tornado shelters for life safety and hazard awareness	No Progress - Continue Action	No funding available
2017-Albin-3	Albin	Improve Communication Systems	Update communications system to improve safety and security for community members, and efficiency for emergency response personnel.	No Progress - No Longer a Mitigation Priority	No longer a needed project
2017-Burns-1	Burns	Stormwater Drainage Plan	Develop stormwater drainage plan	On-Going	Still working on plan development
2017-Burns-2	Burns	Hazardous Materials Plan	Development of hazardous materials plan	On Going	
2017-Pine Bluffs-1	Pine Bluffs	Wildfire Protection Plan & Clean-up Plan (Bluffs)	Create a plan to identify fire-break locations and tree removal needs.	On-Going	New administration will develop plan in partnership with LCFD #5
2017-Pine Bluffs-2	Pine Bluffs	Increased Notification & Education	Improve community education about hazards, including awareness and notifications	On-Going	Second warning alarm installed by Laramie County; education plan in development. Education is ongoing
2017-Pine Bluffs-3	Pine Bluffs	Storm / Tornado Shelter	Establish a shelter to reduce loss of life or injuries	On-Going	Seeking grant funds

ID	Lead Jurisdiction	Title	Description	2022 Status	2022 Notes
2017-Pine Bluffs-4	Pine Bluffs	Up Railroad Crossing Relocation / Over Underpass Construction	Implement measures to prevent future accidents/train collision and possible damages along the tracks and loss of life if chemical spill.	In-Progress	Partnered with WYDOT and the UPRR; engineering designs are approved. Crossing scheduled for relocation in the spring/summer of 2023

1.2.2 Continued Compliance with National Flood Insurance Program (NFIP)

Given the importance of the NFIP in mitigating flood losses and the degree of flood risk in certain parts of Region 7, an emphasis will be placed on continued compliance with the NFIP by participating communities (Laramie County, City of Cheyenne, and the Towns of Burns and Pine Bluffs). As NFIP participants, the county and participating jurisdictions have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining the floodplain zoning ordinance.

1.2.3 Updated Mitigation Action Plan

Laramie County and participating jurisdictions selected and completed worksheets for a number of mitigation actions for this 2023 HMP. Each action worksheet was completed by a jurisdictional representative, and includes the following information:

- Project ID
- Local Government
- Project Title
- Issue / Background
- Benefits (Losses Avoided by Implementing Action)
- Priority
- Goals Met
- Lead and Support Organization(s)
- Hazard(s) Mitigated
- Potential Funding Source
- Expected Completion Year

Table 1.2 presents a summary of these new mitigation actions, in addition to the 2017 continued actions in Table 1.1, that were identified to be included in this updated HMP.

Table 1.2 2023 Mitigation Actions

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- L Multi-01	Laramie County Albin	Wind Mitigation	Assess waste, wastewater, and electric systems to determine those most at risk from wind losses and mitigate the risk to those most vulnerable components.	M	1, 2	Ft Laramie EM, La Grange	Wind	Unknown	Town Budget, FEMA HMA Grants	2027
2023- Laramie County-01	Laramie County	National Flood Insurance Program (NFIP) - Community Rating System (CRS)	Improved community outreach and education events regarding hazards associated with severe precipitation events including implementation of programs that facilitate advanced warning signage in hazard areas	M	1	Laramie County Planning and Development	Flood, Severe Weather	Unknown	County Budget	2024
2023- Laramie County-02	Laramie County	Emergency Communications Systems	Upgrade current systems to Improve local notifications to hazardous weather, emergencies, and disasters	H	1,2,3	Laramie County EM & Combined Communi-cations Center	All Hazards	Unknown (System Dependent)	County Budget, Special Purpose Tax, FEMA Grants	Continuous
2023- Laramie County-03	Laramie County	Wildland Fire	Complete CWPP for the remaining portion of the county for use as educational tools for creating a more prepared community.	H	1,2,3	Laramie County EMA, Laramie County Fire Warden, Laramie County Fire Districts	Wildfire	$100,000	FEMA/ Forestry Grants, County Budget, Fire Wise Program	Continuous

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- Laramie County-04	Laramie County	Public Education for Critical Infrastructure Protection, Cyber & COOP Hazards	Increased education for the public and local businesses will assist with prevention and mitigation of loss of life and damages to property & infrastructure	H	1,2,3	Laramie County, Cheyenne, Burns, Albin and Pine Bluffs	Cyber Hazards	Unknown	County/ Local Funds, FEMA Grants	2028
2023- Albin-01	Town of Albin	Sewer Holding Ponds	Add additional lagoon to ensure EPA requirements are being met and testing is up to current standards. This will protect the environment and provide proper services for more growth	H	1,2,3	Town of Albin, EPA, DEQ, Laramie County	Public Health Hazards, Hazardous Materials Release	$300,000	Town Budget, Special Purpose Tax	2025
2023- Burns-01	Town of Burns	Stormwater Drainage	Develop stormwater drainage plan	M	1,2,3	Town of Burns	Flood	Unknown	Sixth Penny, SLIB	On-Going
2023- Burns-02	Town of Burns	Hazardous Materials	Develop hazardous materials plan	M	1,2,3	Town of Burns	Hazardous Materials Release, Public Health Hazards	Unknown	General fund`	On-Going
2023- Burns-03	Town of Burns	Shelter Backup Generation	Install generator at town facility and emergency shelter to provide services for continuity of government	H	1,2,3	Town of Burn, Laramie County EMA	All Hazards	Unknown	Sixth Penny, FEMA Funding, Some general fund	2028

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-Cheyenne-01	City of Cheyenne	Community Rating System (CRS) Tracking Software	Improve efficiency, transparency, and create redundancy in tracking and logging of CRS activities.	M	1,2,3	Laramie County EM	Flood	$1,200,000	City Budget/ ARPA Federal Funding	2028
2023-Cheyenne-02	City of Cheyenne	Storm Water Management Plan Update	Required update to Storm Water Management Plan (SWMP) for MS4 Permit renewal and Municipal Code revisions & amendments	H	1,2,3	Laramie County EM	Flood	$20,000	City Budget/ ARPA Federal Funding	2028
2023-Cheyenne-03	City of Cheyenne	Storm Water Utility Fee Municipal Code Section	Develop and Implement a Storm Water Utility Fee Municipal code section for adoption.	H	1,2, 3	Laramie County EM	Flood	Unknown	City Budget/ User Fees	2023
2023-Cheyenne-04	City of Cheyenne	Upper Dry Creek Storm Water Basin Flood Control	Mitigation and attenuation to reduce peak discharge and protect public and private property	H	1,2, 3	Laramie County EM	Flood	Unknown	Local, FEMA	2023
2023- Pine Bluffs-01	Town of Pine Bluffs	Critical Infrastructure Protection / Cyber Security Assessment	Assess risks and develop action plan to avoid potential damage / disruption to town electric, water, and wastewater systems. Determine cyber risks around data breach, supervisory control and data acquisition (SCADA) systems, and meter functions	M	1,2,3	Town of Pine Bluffs, Laramie County	Cyber-security	Unknown	Homeland Security; Depart-ment of Energy	2028

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- Pine Bluffs-02	Town of Pine Bluffs	Generator for Community Center	Equip community center / shelter with generator	H	1,3	Town of Pine Bluffs, Laramie County	Winter Storm, Severe Weather, Fire, Tornado, Lightning	$150,000	Homeland Security; Capital Improve-ments	2024-2028
2023- Pine Bluffs-03	Town of Pine Bluffs	Backup Generator for Water Systems	Install generators to keep continuity of potable water system and use of lift stations for wastewater services in power outage event	H	1,2,3	Town of Pine Bluffs, Laramie County	Winter Storm, Severe Weather, Fire, Tornado, Lightning	$1,350,000	Homeland Security; Capital Improve-ments	2024-2028
2023- Pine Bluffs-04	Town of Pine Bluffs	Groundwater Management Plan	Create a groundwater model and groundwater management plan using data that would be collected using airborne geophysics equipment. Project will be a "Pilot " program for larger groundwater characterization projects in Laramie, Platte and Goshen Counties.	M	1,2,3	Town of Pine Bluffs, Cheyenne Board of Public Utilities	Drought	Unknown	Homeland Security; Capital Improve-ments, FEMA HMA	2027
2023- Eastern Laramie County Sanitation District-01	Eastern Laramie County Sanitation District	New Dumping Facility	New facility for dumping and compacting inside, mitigates windblown debris	M	2,3	Eastern Laramie County Sanitation District (ELC Landfill)	Public Health Hazards, Hazardous Materials Release, Wind	$3,000,000	State Funding, Agency Budget, Local Tax Levi funding	2024

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- Eastern Laramie County Sanitation District-02	Eastern Laramie County Sanitation District	Water Cistern	Addition of a cistern to increase internal fire suppression capabilities and provide water resource for local districts	H	1,2, 3	ELC Landfill, Laramie County Fire District #6, Laramie County EMA/Fire Warden	Public Health Hazards, Hazardous Materials Release, Wildfire	$500,000	State Funding, Agency Budget, Local Tax Levi funding, LCFD#6 Support	2024
2023- Eastern Laramie County Sanitation District-03	Eastern Laramie County Sanitation District	Property Fencing	Replace aging fencing around the property to protect against flying debris	M	1,2, 3	ELC Landfill, Laramie County Fire District #6, Laramie County EMA/Fire Warden	Public Health Hazards, Hazardous Materials Release, Wind	$50,000	State Funding, Agency Budget, Local Tax Levi funding	2025
2023- Eastern Laramie County Sanitation District-04	Eastern Laramie County Sanitation District	Fire Suppression System	Install a fire suppression system to help mitigate the risk of facility fires	H	2,3	ELC Landfill, Laramie County Fire District #6, Laramie County EMA/Fire Warden	All Hazards	$250,000	State Funding, Agency Budget, Local Tax Levi funding	2024

1.3 Mitigation Capabilities Assessment

As part of the plan update, the county and its jurisdictions conducted a mitigation capability assessment. Capabilities are those plans, policies, and procedures currently in place that contribute to reducing hazard losses. There are multiple categories of capabilities and all of them are powerful tools for implementing hazard mitigation. It is crucial that these tools are reviewed regularly and opportunities for further risk reduction efforts are identified.

By collecting information about each jurisdiction's capabilities, the strengths, weaknesses, and resources of each jurisdiction are identified.

Planning and regulatory capabilities are foundational to an informed mitigation strategy and successful implementation of actions. Table 1.3 shows those mitigation capabilities specific to planning and regulatory tools across the county.

Table 1.3 Planning & Regulatory Capabilities

Mitigation Capability	Laramie County	Town of Albin	Town of Burns	City of Cheyenne	Town of Pine Bluffs
Comprehensive, Master, or General Plan	X	X		X	
Capital Improvement Program or Plan (CIP)	X			X	
Floodplain Management Plan	X			X	
Stormwater Program / Plan	X			DEQ-SWPPP	
Community Wildfire Protection Plan (CWPP)	X	X		X	X
Erosion / Sediment Control Program	X			DEQ-SWPPP	
Economic Development Plan	X				
Other: Required Permits					
Building Codes (Year)	2021 IBC			2018 (New in fall)	
Site Plan Review Requirements	X	X			
Other:					
Zoning Ordinance (Land Use)	X			X	
Subdivision Ordinance	X			X	
National Flood Insurance Program (NFIP) Participant	X			X	
Flood Insurance Study / Flood Insurance Rate Map / DFIRM	X			X	
Floodplain Ordinance	X			X	
Elevation Certificates for Floodplain Development	X				
Community Rating System (CRS) Participant	X				

Mitigation Capability	Laramie County	Town of Albin	Town of Burns	City of Cheyenne	Town of Pine Bluffs
Open Space / Conservation Program	X			X	
Growth Management Ordinance	X				
Stormwater Ordinance	X				
Other Hazard Ordinance (steep slope, wildfire, snow loads, etc.)	X				
Other:					

Administrative and technical capabilities are all vital for a community to be able to implement hazard mitigation. Table 1.4 provides an overview of these capabilities across the county.

Table 1.4 Administrative & Technical Capabilities

Mitigation Capability	Laramie County	Town of Albin	Town of Burns	City of Cheyenne	Town of Pine Bluffs
Planning Commission	X			X	
Mitigation Planning Committee	X	X	X	X	X
Maintenance Programs (tree trimming, clearing drainage, etc.)	X	X	X	X	
Emergency Manager	X	X	X	X	X
Building Official	X			X	
Floodplain Administrator	X			X	
Community Planner	X			X	
Transportation Planner	X			X	
Civil Engineer	X			X	
GIS Capability	X			X	
Other:					
Warning Systems / Services (flood)	X	X	X	X	X
Warning Systems / Services (other / multi hazard)	X	X	X	X	X
Grant Writing / Management	X	X	X	X	X
Other:					

The ability of a community to implement a comprehensive mitigation strategy is largely dependent on available funding. These related municipal capabilities are outlined in Table 1.5 and show that the county and jurisdictions utilize a number of these financial tools that can support mitigation activities.

Table 1.5 Financial Capabilities

Mitigation Capability	Laramie County	Town of Albin	Town of Burns	City of Cheyenne	Town of Pine Bluffs
Levy for Specific Purposes with Voter Approval	X	X	X	(5th & 6th Penny)	X
Utilities Fees	X	X		X	
System Development / Impact Development Fee	X			X	
General Obligation Bonds to Incur Debt	X	X		X	
Special Tax Bonds to Incur Debt	X	X			
Open Space / Conservation Fund					
Stormwater Utility Fees					
Capital Improvement Project Funding	X	X		X	
Community Development Block Grants (CDBG)		X		X	
Other:					

Education and outreach are important capabilities that allow a community to continue the conversation with their public regarding hazard risk and opportunities to mitigate. Table 1.6 shows that communities leverage these capabilities for their public engagement.

Table 1.6 Education & Outreach Capabilities

Mitigation Capability	Laramie County	Town of Albin	Town of Burns	City of Cheyenne	Town of Pine Bluffs
Public Hazard Education / Outreach Program	X	X		X	X
Local Citizen Groups That Communicate Hazard Risks	X	X		X	X
Firewise	X	X		X	X
StormReady	X	X		X	X
Other:					

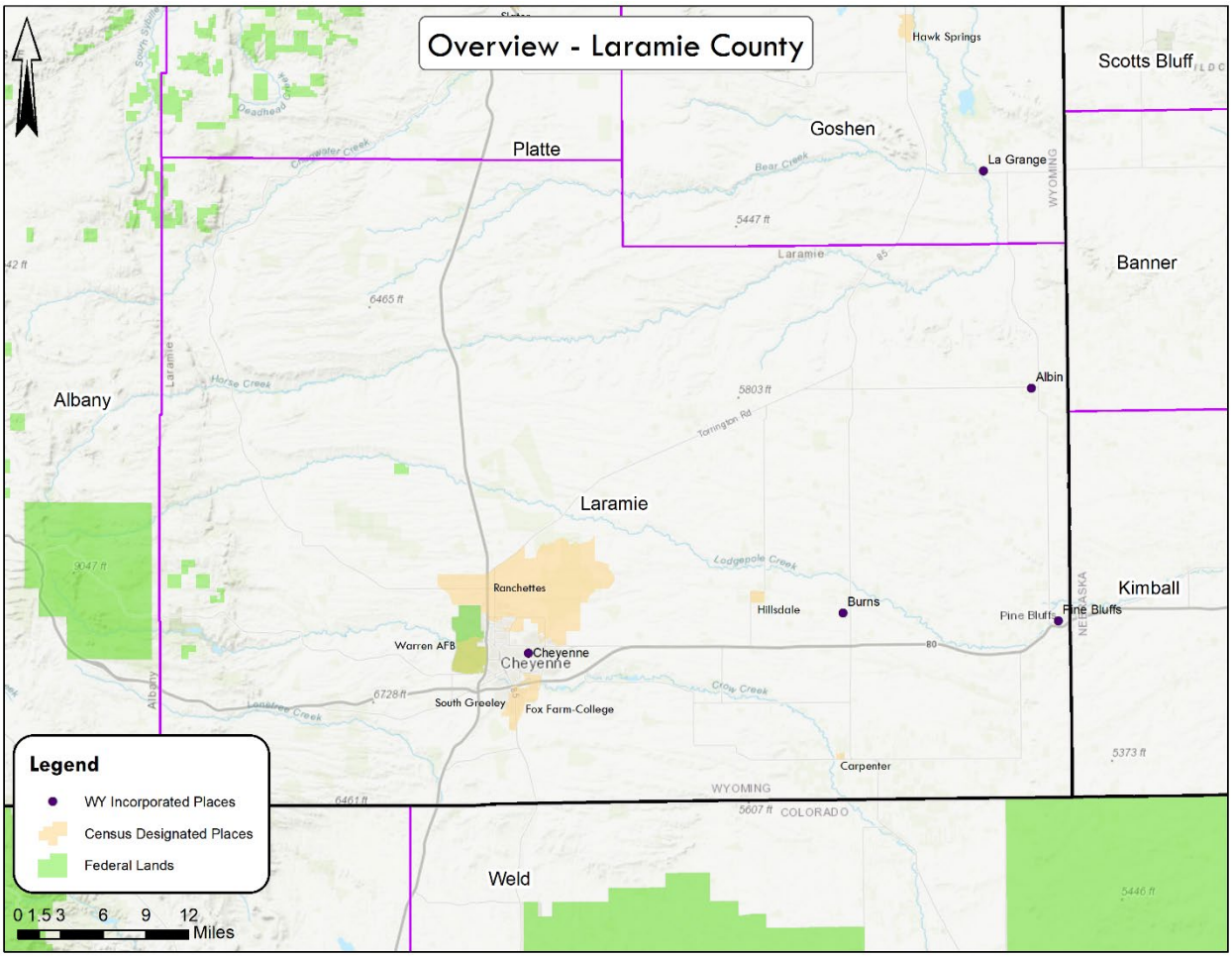
The Eastern Laramie County (ELC) Sanitation District requires different capabilities than those of a jurisdiction or municipality. Depending on the type of service a district represents, some capabilities, tools, or plans may not be practical to develop and maintain. The following capabilities were identified by the ELC Sanitation District.

- Stormwater Program / Plan
- Community Wildfire Protection Plan (CWPP)
- Erosion / Sediment Control Program
- Site Plan Review Requirements
- Maintenance Programs (tree trimming, clearing drainage, etc.)
- Emergency Manager
- Civil Engineer
- GIS Capability
- Grant Writing / Management
- Public Hazard Education / Outreach Program
- Local Citizen Groups That Communicate Hazard Risks
- Firewise

2 County Profile

Laramie County is comprised primarily of private land, with approximately 0.9% Federal lands.

Figure 2.1 County Overview



2.1 Population

2.1.1 Projections

According to the 2021 Headwaters Economics Profile, which looks at demographics, economics, and social characteristics of communities, Laramie County grew more than 10% in population between 2010 and 2019. The population of the county, as of the 2020 Census, is 100,512 people.

A 2019 report from the Wyoming Department of Administration & Information, Economic Analysis Division (EAD), shows population projections for all counties and jurisdictions through 2040. The county population projection for 2040 is an almost 12% growth to 112,500 people. Cheyenne will see approximately the same percentage of growth, from the current census of 65,312 people to a projected 72,900. U.S. Census data is not available for the other jurisdictions, as the populations are below the counting threshold of 2,500 people. However, the EAD projected population growth for Albin (11.6%), Burns (11.8%), and Pine Bluffs (11.5%) between 2020 and 2040.

2.1.2 Demographics

The composition of a community is critical information when identifying risks and understanding the demographics creates more holistic planning. Table 2.1 illustrates a high-level overview of some of the characteristics of Laramie County and City of Cheyenne residents. Data for the other municipalities is not available from the U.S. Census Bureau due to collection thresholds.

Table 2.1 is a snapshot of some key demographics in the county and Cheyenne, as well as the state. While most statistics are similar across the board, a demographic to note is the higher percentage of people living in poverty in Cheyenne, 10.4%, than in the county overall, 7.4 %, or in the state, 9.2%. This is an important demographic to be aware of as those with limited financial means are disproportionately affected by disaster. Utilizing data to create an overall understanding of the population and its characteristics is critical to a comprehensive community planning approach, referred to as community inclusion.

Recognition of the differences in demographics across the county allows resources to be directed to the residents with highest need, such as the elderly, children, and those with access and functional needs. Populations vary greatly in communication abilities, financial means to respond on their own, and resource needs.

Table 2.1 Demographic Snapshot

Demographic	Cheyenne	Laramie County	Wyoming
Population (April 2020)	65,132	100,512	576,851
Persons under 5 years of age	6.1%	6.3%	6.0%
Persons under 18 years of age	22.3%	23.0%	23.1%
Persons 65 years of age and older	16.7%	16.5%	17.1%
Persons with a disability, under age 65 years	8.6%	8.9%	8.9%
Persons with a disability	13.4%	12.8%	13.4%
Language other than English spoken at home	5.8%	6.5%	7.4%
Median Household Income	$64,598	$66,910	$64,049
Persons living in poverty	10.4%	7.4%	9.2%

Source: 2019 ACS 5-Year Estimates

2.1.3 Health

Similar to the demographics snapshot, an understanding of the health of communities can inform preparedness and response actions. For example, in Laramie County and Cheyenne, of those who identified as having a disability, the highest percentages of people have ambulatory, hearing, and independent living difficulties. Responders may need training to better assist residents in an event and the public should be educated on what would happen during a potential disaster event, to minimize any additional fears during a stressful situation.

Chronic illness and health condition data may seem unnecessary, but awareness of a community's overall health is important, especially considering potential public health hazards. For example, beyond the risk of pandemics, wildfire smoke can worsen asthma conditions for children and adults, and if sheltering is needed during an event diabetics will likely need insulin provided onsite. Laramie County and Cheyenne have notably higher percentages of those with coronary heart disease than the state, however the majority of other health indicators for the populations align closely to state reporting.

Table 2.2 Health Indicators

Demographic	Cheyenne	Laramie County	Wyoming
Adults with Asthma, over age 18	9%	8.9%	9.2%
Adults with Coronary Heart Disease, over age 18	6.2%	5.5%	3.9%
Adults with Diagnosed Diabetes, over age 18	9.6%	9%	9.1%
Adults with Obesity, over age 18	30.1%	29.9%	30.7%
Disability Type			
Hearing Difficulty	5.1%	5.4%	8.8%
Vision Difficulty	1.8%	1.9%	4.2%
Cognitive Difficulty	4.8%	4.4%	10.1%
Ambulatory Difficulty	6.9%	6.4%	11.3%
Self-care Difficulty	1.7%	1.6%	2.8%
Independent Living Difficulty	5.1%	4.6%	6.2%

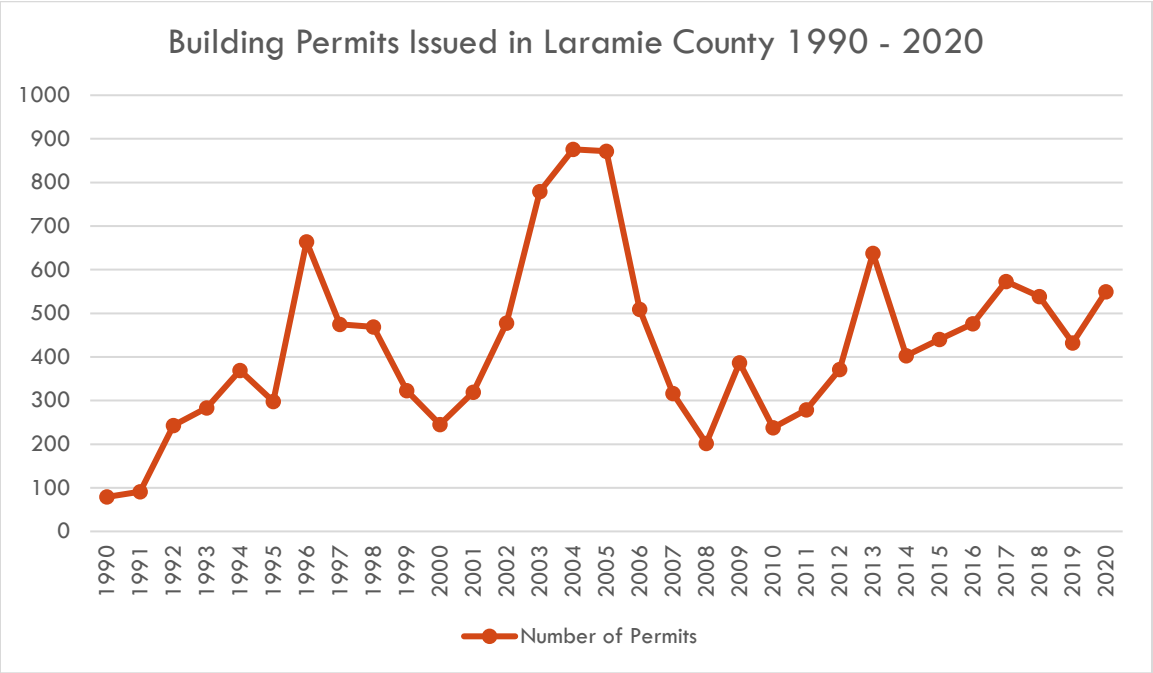
*Source: CDC 2018-2021, Behavioral Risk Factor Surveillance System (BRFSS), 2019 American Community Survey (ACS) *Data unavailable*

2.2 Development

2.2.1 Land

Laramie County has seen fluctuating periods of growth and development. According to the U.S. Census Bureau between 1990 and 2020, more than 13,000 new private housing structure building permits were issued. The years with the most permits issued were 2004 with 876 and 2005 with 872, while the year with the least number of permits issued was 1990 with 79 permits. Overall, the number of permits issued each year has had a positive trend.

Figure 2.2 Laramie County Building Permits 1990-2020



2.2.2 Economic Overview

According to data from the U.S. Bureau of Economic Analysis, Laramie County's highest gross domestic product since 2000, was in 2019 and was more than $6.1 billion.

The unemployment rate, as of February 2022, was 3.7%. More than 8,000 jobs were added between 2010 and 2020, a quarter of which are in the finance and insurance sector. Of the almost 70,000 jobs in Laramie County, approximately 37,000 are in the services industry followed by roughly 17,000 in the government sector. The table below shows the industries that hold the highest number of total jobs and the change in growth in number of jobs between 2010 and 2020.

Table 2.3 Top 5 Industries by Number of Jobs

Industry	Number of Jobs (2020)	Change 2010-2020
Government	17,682	1%
Retail Trade	6,387	-4%
Finance and Insurance	5,933	73%
Health Care and Social Assistance	5,280	11%
Construction	4,508	27%

U.S. Department of Commerce. 2021. Bureau of Economic Analysis

3 Hazard Identification and Risk Assessment

3.1 Hazard Ranking

As discussed in Section 3.1.1 in the main body of the HMP, Laramie County conducted a risk ranking exercise. Meeting participants ranked the identified hazards risk to property / environment, people, and the economy, as well as the probability of future damaging events on a scale of high, medium, or low. The table below shows the results of this exercise with a breakdown by community of the perceived level of risk for each identified hazard. It can be seen that Cyber Hazards and Wind scored the highest whereas Landslide and Earthquake scored the lowest.

Table 3.1 Hazard Ranking Exercise Results

Hazard	Laramie County	Albin	Burns	Cheyenne	Pine Bluffs	ELC* Sanitation District
Cyber Hazards	High	High	Low	Medium	Medium	Low
Dam/Levee Incident	Medium	Medium	Low	Medium	Low	Low
Drought	Medium	Medium	Low	High	High	Low
Earthquake	Low	Low	Low	Low	Low	Low
Flood	Medium	Medium	Low	Medium	Medium	Low
Hail	Medium	Medium	Medium	Medium	Medium	Medium
Hazardous Materials	Medium	Medium	Low	Medium	Medium	Low
Landslide	Low	Low	Low	Low	Low	Low
Lightning	Medium	Medium	Low	Low	Medium	Low
Public Health Hazards	Medium	Medium	Low	Low	Medium	High
Tornado	Medium	Medium	Low	Low	Medium	Low
Wildfire	Medium	Medium	Low	Low	Medium	Medium
Wind	High	High	Low	Low	Medium	Medium
Winter Storm	Medium	Medium	Low	Low	Medium	Low

* Eastern Laramie County Sanitation District

The following county-specific hazard profiles each include five subsections that cover; previous occurrences, inventory exposed, potential impacts, probability of future occurrences, and land use and development. The following hazard profiles are specific to Laramie County and their participating communities.

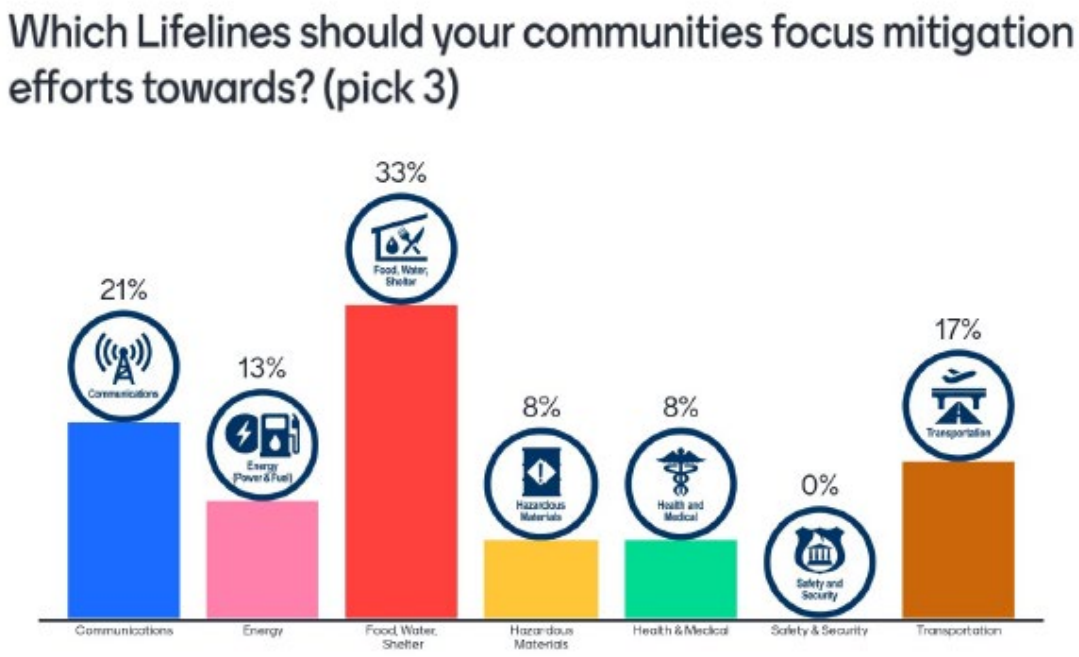
3.2 Lifelines

The Lifelines framework is used in this plan as a base for emergency management planning, preparedness education, and mitigation planning. It is important to consider cascading effects when Lifelines are affected and how those effects will impact the community and other Lifelines. The Lifelines are shown in the following graphic.

Lifelines are essential to a community's long-term disaster resilience, each one providing diverse critical services and resources. As part of the HMP planning process, the Hazard Mitigation Planning Committee identified Lifelines utilizing the best available data, supplemented by Laramie County geographic information system (GIS) data for the region. Within each hazard profile the specific Lifeline exposure data for Laramie County infrastructure is highlighted, as applicable.

The HMPC was surveyed to determine which Lifelines communities should focus mitigation efforts towards. Figure 3.1 illustrates the results of this poll, showing Food, Water, and Shelter as the priority for mitigation. This is followed by Communications and Transportation.

Figure 3.1 Lifeline Mitigation Efforts



3.3 Hazard Viewers

The rapid evolution of hazards data creates the need for tools which present the most recent data in a useful way. The maps included in this plan are helpful to serve as an overview of the various hazard and risk information, but ultimately are static snapshots of the best available data at the time of this plan's writing. Additionally, the large size of Region 7's counties make it difficult to present many of the maps at a scale useful to the local communities.

With these disclaimers noted and as hazard and risk data is constantly evolving, it is important to utilize the latest and greatest hazard data available. Fortunately, the State of Wyoming and federal government have recently developed a number of hazard data viewers that present much of the same information contained in this plan. When possible, this plan directs readers to these online resources to ensure the most accurate information is being referenced and utilized.

Hazard Data Viewers:

- FEMA's National Risk Index for Natural Hazards
- FEMA's Resilience Analysis and Planning Tool
- WY State Geological Survey's Wyoming Geologic Hazards Map
- WY State Forestry Division's Wildfire Risk Assessment Portal
- United States Forest Service's Wildfire Risk to Communities Portal

3.4 Cyber Hazards

3.4.1 Previous Occurrences

In April 2019, Cheyenne Regional Medical Center was compromised through a phishing attack, where a malicious link is used to gain access to a system using unintentionally shared credentials. This phishing attack resulted in a security breach of more than 17,500 patients information. It took eight months, until November 2019, to obtain the list of patient names to notify them of the breach.

According to the 2020 FBI Internet Crime Complaint Center (IC3) crime report, Wyoming residents were victim to more than $5 million in losses through a variety of cyber crime techniques. The majority of which was lost to victims over the age of 60.

3.4.2 Inventory Exposed

All systems, people, and entities are exposed to cyber hazards, including individuals, small businesses, healthcare facilities, local governments, schools, and large infrastructure. Those perpetrating these attacks are indiscriminate and will take control of whatever they are able to. Those organizations with older technology, hardware or software, and minimal or no information technology (IT) support are especially at risk.

3.4.3 Probability of Future Occurrences

It is possible that Laramie County technology operations may be compromised and community members could fall victims to malicious acts. The majority of technology users, including individuals, businesses, and organizations are using inadequate cyber security and this creates a large pool of potential victims.

3.4.4 Future Development Trends

Cyber hazards are unlikely to affect land use and development.

3.4.5 Climate Change Impacts

Cyber hazards are not likely to be immediately impacted by climate change.

3.5 Dam / Levee Incident

3.5.1 Previous Occurrences

Dam incidents have occurred in the past, in Laramie County, and are detailed below:

- In August 2008, seven miles southeast of Cheyenne, the Hereford Ranch Reservoir No. 2 dam failed due to structural failure. The event did not result in any property damage, but the cost to repair the dam was estimated at $100,000.

- On May 19, 2010, the Hereford Ranch Reservoir No. 1 failed due to outlet structure and pipe failure. No property damage was recorded for this event.
- According to the Laramie County Flood Insurance Study (2007) these same dams also failed during the 1929 flood. Reservoir No. 1 was subsequently rebuilt and raised during the 1930s.
- On April 30, 1999, waters from Crow Creek overtopped the North Crow Diversion Dam at roughly a foot deep and residents of the Table Mountain development were evacuated. They were allowed to return to their homes the night of May 1, after it became clear the dam was not in danger of failing.

3.5.2 Inventory Exposed

In 1981, the U.S. Army Corps of Engineers (USACE) completed an inspection program for nonfederal dams under the National Dam Inspection Act (P.L. 92-367). This was a four-year work effort and included compiling an inventory of about 50,000 dams and conducting a review of each state's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams. Part of the inspection included evaluating the dams and assigning a hazard potential based on the effects downstream should one of the dams fail. The dams were rated (1) high, (2) significant, and (3) low hazard. The Corps of Engineers based the hazard potential designation on such items as acre-feet capacity of the dam, distance from nearest community downstream, population density of the community, and age of the dam. High hazards dams would, in case of failure of the dam, likely cause loss of life. Significant hazard dams would, in case of failure, likely cause significant property damage, but no loss of life. Failure of a low hazard dam would likely cause only minimal property damage. Hazard potential classification is no guarantee of safety.

The Wyoming State Engineer's Office (SEO) inspects dams more than 20 feet high or with a storage capacity of 50 acre-feet or more, although smaller dams are also regulated if the potential for failure indicates a need. In 2018, the SEO regulated 1,553 dams and of these dams 88 were rated high hazard, 104 were rated significant hazard, and 1,361 were rated low hazard. The SEO inspects these dams once every five years.

According to the National Inventory of Dams maintained by USACE, Laramie County has 38 dams that are regulated by the state, including four high hazard dams and six significant hazard dams

Table 3.2 presents those dam's in the county that have a high or significant hazard ranking. The City of Cheyenne owns all four of the high hazard dams and one of the significant hazard dams. The other significant dams are owned by private entities. The nearest downstream community is also identified, as is the fact that none of these dams currently have Emergency Action Plans (EAPs). Emergency Action Plans are used to create a common understanding of what a response to a dam/levee incident would entail and they are developed by the owner, in collaboration with local response agencies and other key stakeholders.

Table 3.2 High and Significant Hazard Dams in Laramie County

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Carey Detention	City of Cheyenne	Dry Creek tributary of Crow Creek	High	Cheyenne	0	**Y**
Crystal Lake	City of Cheyenne	Middle Crow Creek	High	Cheyenne	25	**Y**
Granite Springs	City of Cheyenne	Middle Crow Creek	High	Cheyenne	35	**Y**
Upper Van Tassel (Upper North Crow)	City of Cheyenne	North Crow Creek	High	Cheyenne	46	**Y**

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Lower North Crow	City of Cheyenne	North Fork of Crow Creek	Significant	Cheyenne	20	**N**
One Mile	Warren Livestock Company	North Lodge Pole Creek Offstream	Significant	U.S. Highway 85	0	**N**
Polaris	Ron Thiel	Lone Tree Creek Offstream	Significant	Timnath, Colorado	35	**N**
Swan	Warren Livestock Company	Clear Creek	Significant	Cheyenne	2	**N**
WY Hereford Ranch No. 1	J. Sloan Hales and Dean Fog	Crow Creek	Significant	Altvan	2	**N**
WY Hereford Ranch No. 2	Ed Ferguson	Crow Creek	Significant	Hereford, Colorado	20	**N**

There is one levee in Laramie County, Crow Creek Levee, which is owned by the City of Cheyenne and accredited by FEMA. There is a total of 19 parcels exposed to the Crow Creek Levee inundation area. The total value of these parcels is approximately $1.4 million. Of the 19 parcels, there are three commercial parcels valued at $237,000.

Figure 3.2 illustrates where high hazard dams are located in relation to the Laramie County boundary. This map also includes the locations of other, national level inventoried dams. It is important to note that three of the four high hazard dams, as well as two significant hazard dams, in the county are located upstream of the City of Cheyenne.

Figure 3.2 Location of Dams in Laramie County

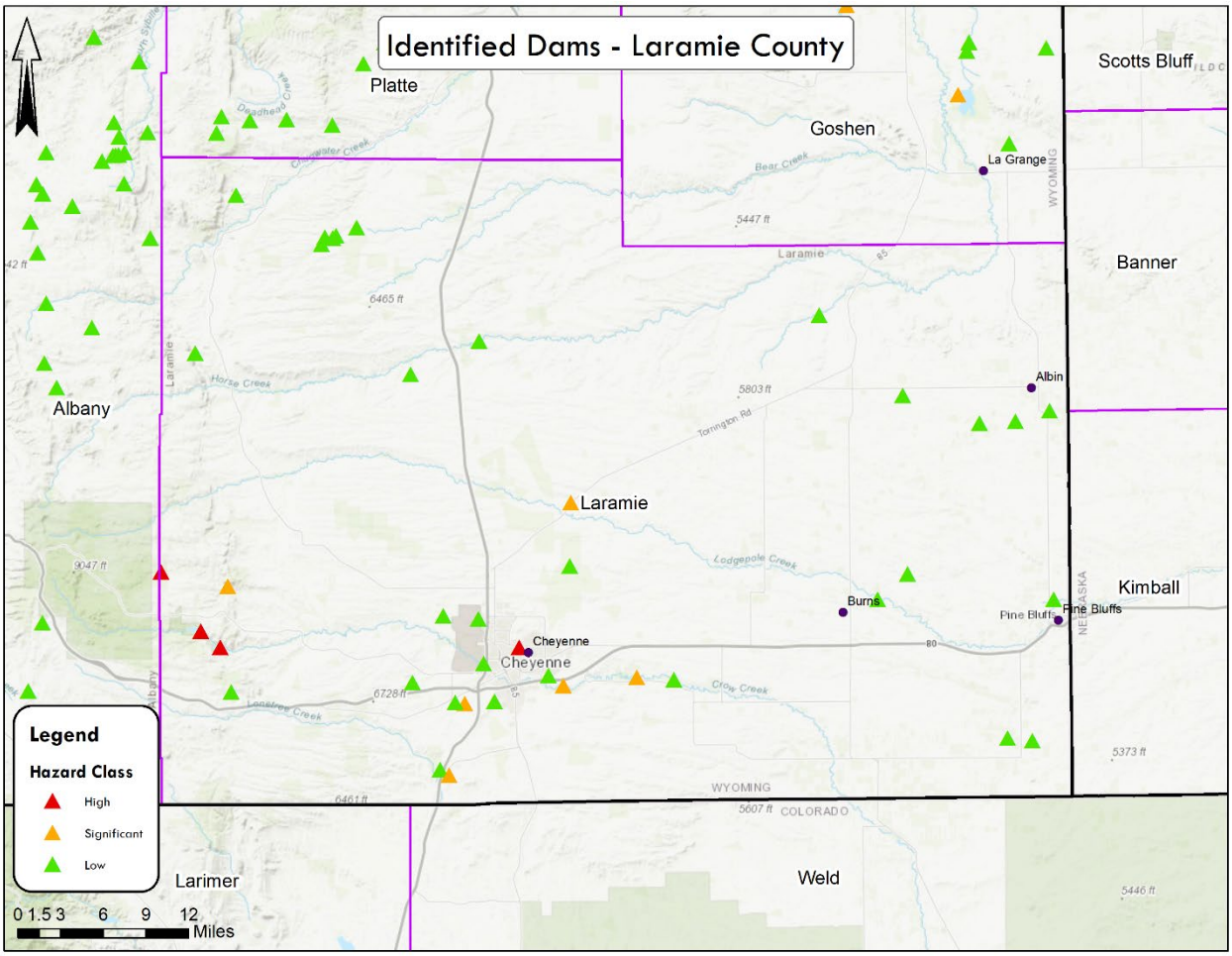


Table 3.3 shows the parcels in Cheyenne and the unincorporated areas of the county with exposure to potential dam inundation areas. More than $378 million in property (per Wyoming Department of Revenue data) is exposed to the impacts of a dam incident. The majority of properties are residential and located in Cheyenne. The largest number of commercial properties is also within Cheyenne. Although the only agricultural properties exposed to the dam inundation area are located in the unincorporated areas. While the properties are primarily in Cheyenne, the unincorporated areas hold approximately 83% of the total value of property exposed to potential dam inundation areas, but only 9% of the properties are located in the unincorporated areas.

Table 3.3 Parcels Exposed to Potential Dam Inundation Areas

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)	Agricultural	Improved Value ($)
Cheyenne	503	408	46,322,526	95	17,311,654	-	-
Unincorporated	53	48	314,509,425	2	40,163	3	1,336

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)	Agricultural	Improved Value ($)
County Total	**556**	**456**	**360,831,951**	**97**	**17,351,817**	**3**	**1,336**

The infrastructure for the energy; food, water, and security; and hazardous materials lifelines are not exposed to dam inundation areas. Other lifelines have minimal exposure of infrastructure, with the largest exposure at 13% for transportation.

Table 3.4 Lifeline Exposure to Dam Inundation Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	634	11	2 %
Health & Medical	30	2	7 %
Safety & Security	44	1	2 %
Transportation	365	46	13 %

3.5.3 Probability of Future Occurrences

Although the chances of a dam or levee incident are perceived as low, the magnitude of damage could be significant if an incident occurs. The structural integrity of dams and levees depends on regular inspections and maintenance, which do not always happen and could increase the likelihood of an incident. In the past, a number of the dam failures in Wyoming and other Rocky Mountain states have occurred due to snow melt flooding exceeding the capacity and strength of dams. Wyoming's dams and levees will continue to be tested by snow melt, heavy rains, and other types of floods every year. Thus, dam and levee incidents have the potential to threaten Laramie County's communities, especially the City of Cheyenne, in the future.

3.5.4 Future Development Trends

As growth in Laramie County continues there is greater potential for communities located closer to the dam to be unaware of the risk and impacts of a dam incident, as well as uneducated about emergency notifications, such as evacuations if necessary. Communities with higher population densities and large numbers of structures, utilities, and critical facilities, are expected to experience greater damage and loss. As populations expand and new structures are built, it is important for jurisdictions to enforce building codes and standards that will help prevent future loss should a dam incident event occur.

3.5.5 Climate Change Impacts

The lack of predictability in weather patterns, due to climate change, is a concern in the possibility of future dam incidents. As seasons change rapidly, snow melt flooding can exceed the capacity and strength of dams, as well as increase water levels in waterways testing levees. The expected increased size and intensity of future severe storms pose a risk as well, as prolonged precipitation is a major factor in incidents, especially overtopping and spillway discharges.

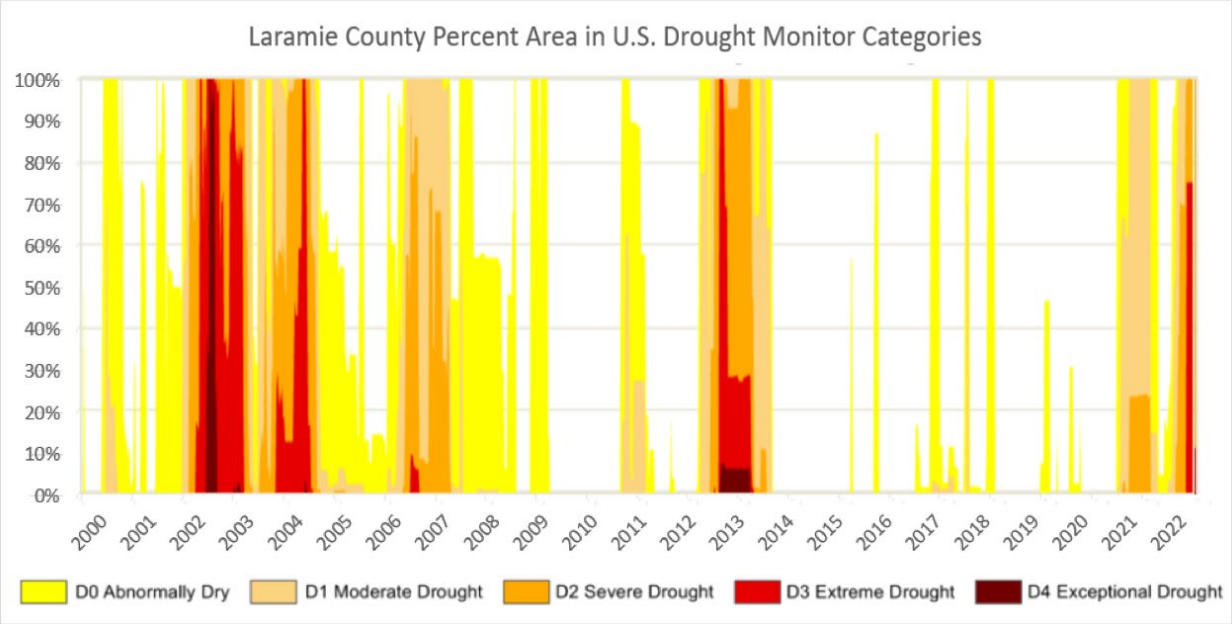
3.6 Drought

3.6.1 Previous Occurrences

Laramie County has experienced several multi-year droughts over the past several decades. Most recently, the county has been included in several regional United States Department of Agriculture (USDA) disaster declarations for droughts and designated as a primary county in declarations in 2007, 2012, 2013, 2020 and most recently in 2021.

Figure 3.3 illustrates drought type, by time and exposure of Laramie County from 2000 to 2021. Based on data from the U.S. Drought Monitor, in 2002 100% of Laramie County was in drought for weeks to months, with a portion of that time being categorized as Exceptional Drought. Another period in 2004 is shown as having 100% of the county in Extreme Drought which is similar to an event in 2012. However, saw approximately 6% of the county experience Exceptional Drought.

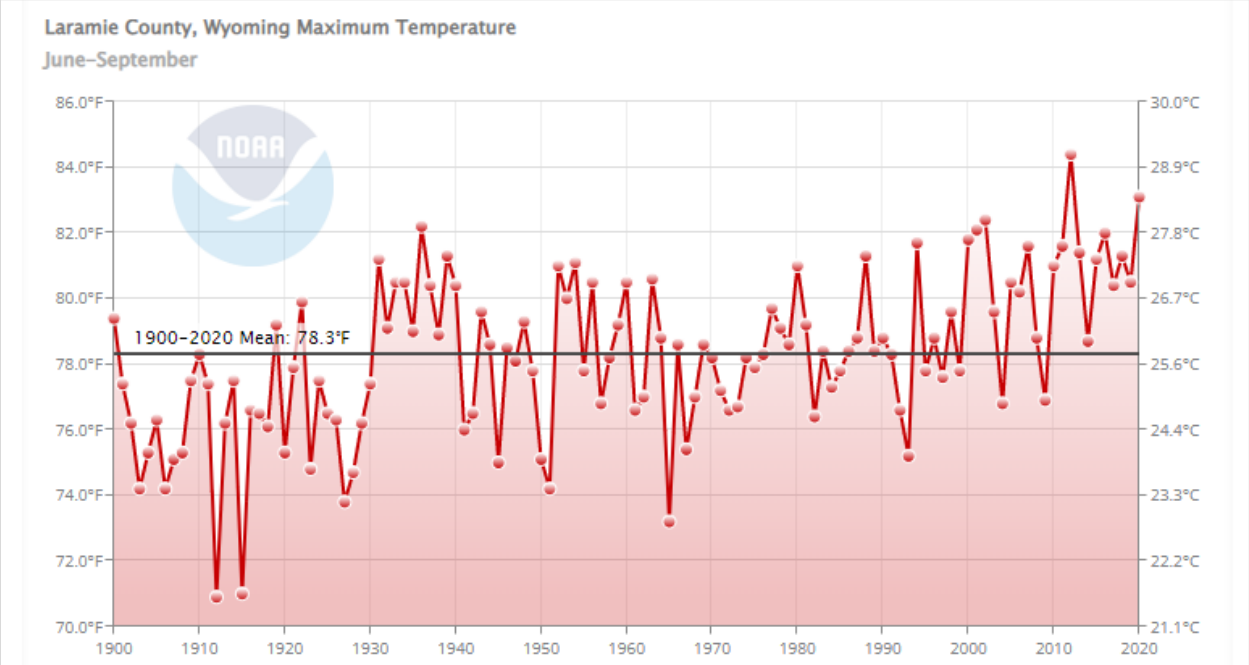
Figure 3.3 Laramie County Percent Area in Drought 2000-2021



Source: U.S. Drought Monitor

High heat and drought often occur simultaneously, and heat can increase the impacts of drought. Figure 3.4 shows the average maximum temperature between June and September from 1900-2020 and illustrates a trend of overall increasing temperatures during that timeframe over recent decades.

Figure 3.4 Average Maximum Temperature between June and September 1900-2020



Source: National Oceanic and Atmospheric Administration (NOAA)

3.6.2 Inventory Exposed

In Laramie County, data from the USDA shows disaster assistance payments have totaled more than $15.1 million dollars between 1995 and 2020. The majority of this, more than $8.5 million, were payments issued for livestock disaster assistance, and another $5.7 million was issued for crop disaster and non-insured assistance. While these numbers seem substantial, it is likely that not all producers took advantage of these programs after a USDA declared disaster and designation for a multitude of reasons. Approximately one third ($5 million) of the overall total was paid out in 2014 alone, which is reflective of the impact of back-to-back drought declarations, both contiguous and primary, in 2012 and 2013.

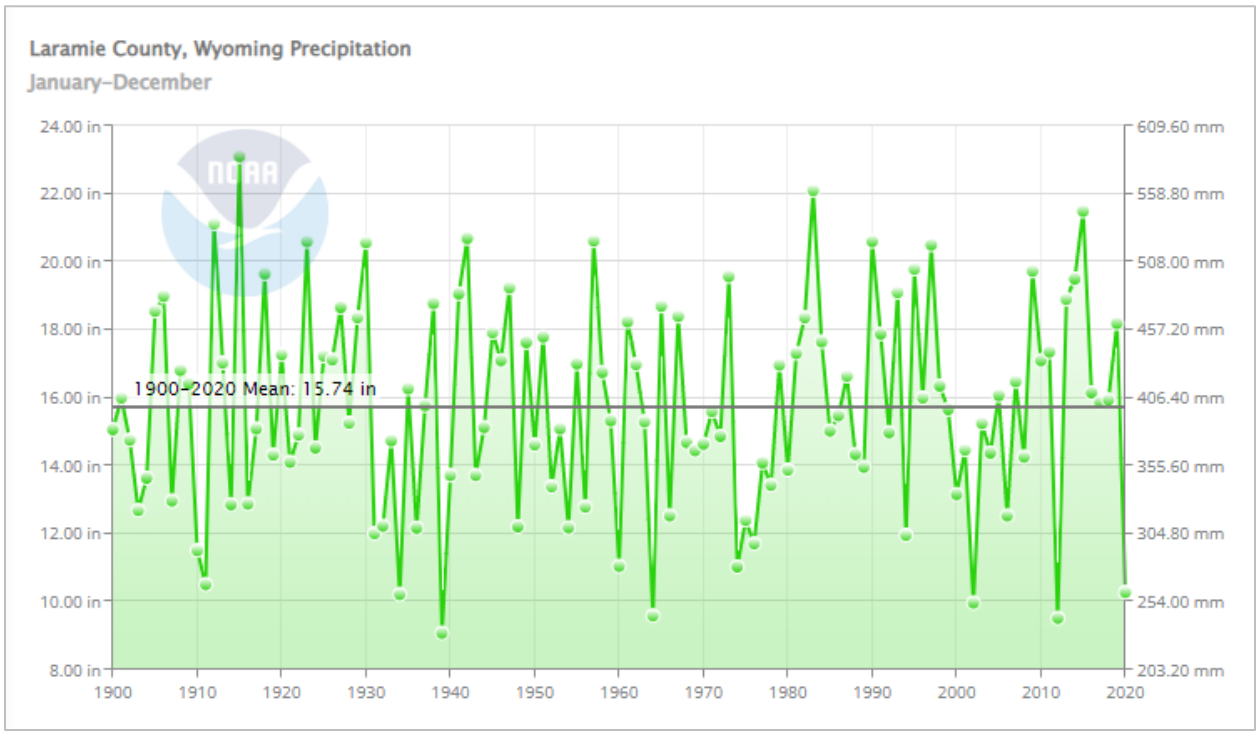
The USDA issues declarations for a number of other disasters and the available data does not distinguish between the cause of declaration for the payments in this time period. However, it is likely that a considerable portion of these payments were necessary due to the effects of multiple drought specific declarations.

From an agricultural perspective all crops, grazing lands, and livestock in the county are exposed to drought. The population and properties of the county are also exposed and the economic impact of drought, rather than any direct impacts, can be difficult for community members to cope with long term.

3.6.3 Probability of Future Occurrences

Drought is difficult to predict, but based on historical records, it is reasonable that Laramie County will be impacted by drought conditions in the future. The county is located in an arid region and based on National Oceanic and Atmospheric Administration (NOAA) data since 1900, shown in Figure 3.5, receives approximately 15.74 inches of precipitation annually. Droughts are typically regional events, impacting multiple counties and states simultaneously. Drought is expected to be a normal occurrence due to the county's natural climate and therefore will likely continue to occur.

Figure 3.5. Average Annual Precipitation 1900-2020



Source: National Oceanic and Atmospheric Administration (NOAA)

3.6.4 Future Development Trends

A community's vulnerability to drought is affected largely by population growth, urbanization, demographic characteristics, technology, water use trends, government policy, social behavior, and environmental awareness. These factors are continually changing, and society's vulnerability to drought may rise or fall in response to these changes. In scenarios where a community's population is increasing or shifting, increased pressure on water and other natural resources can be seen causing a shortage of water availability. Laramie County is expected to experience consistent growth over the next two decades, increasing the risk and impacts of an extended drought period year over year.

Any future growth will greatly impact drought hazards by stressing both surface and ground water resources. Agricultural and industrial water users consume large amounts of water and expansion of existing water services is limited when a drought occurs. In rapidly growing communities, new water and sewer systems or significant well and septic sites could use up more of the available water, particularly during periods of drought. Public water systems are monitored, but individual wells and septic systems are not as strictly regulated.

Related to both current land use and future development trends, the use of turf grass affects the available water supplies. Urban lawn watering is the single largest water demand for many municipal supplies.

Future water use regulations may be able to mitigate this trend. As Laramie County grows, it is recommended that staff revisit existing standards for determining the impacts of drought.

3.6.5 Climate Change Impacts

The presence of droughts across the nation is due to the changing climate, which affects weather patterns and temperature fluctuations. As hotter weather increases in duration and precipitation is less predictable, droughts will likely continue to be a common occurrence, potentially being experienced more regularly.

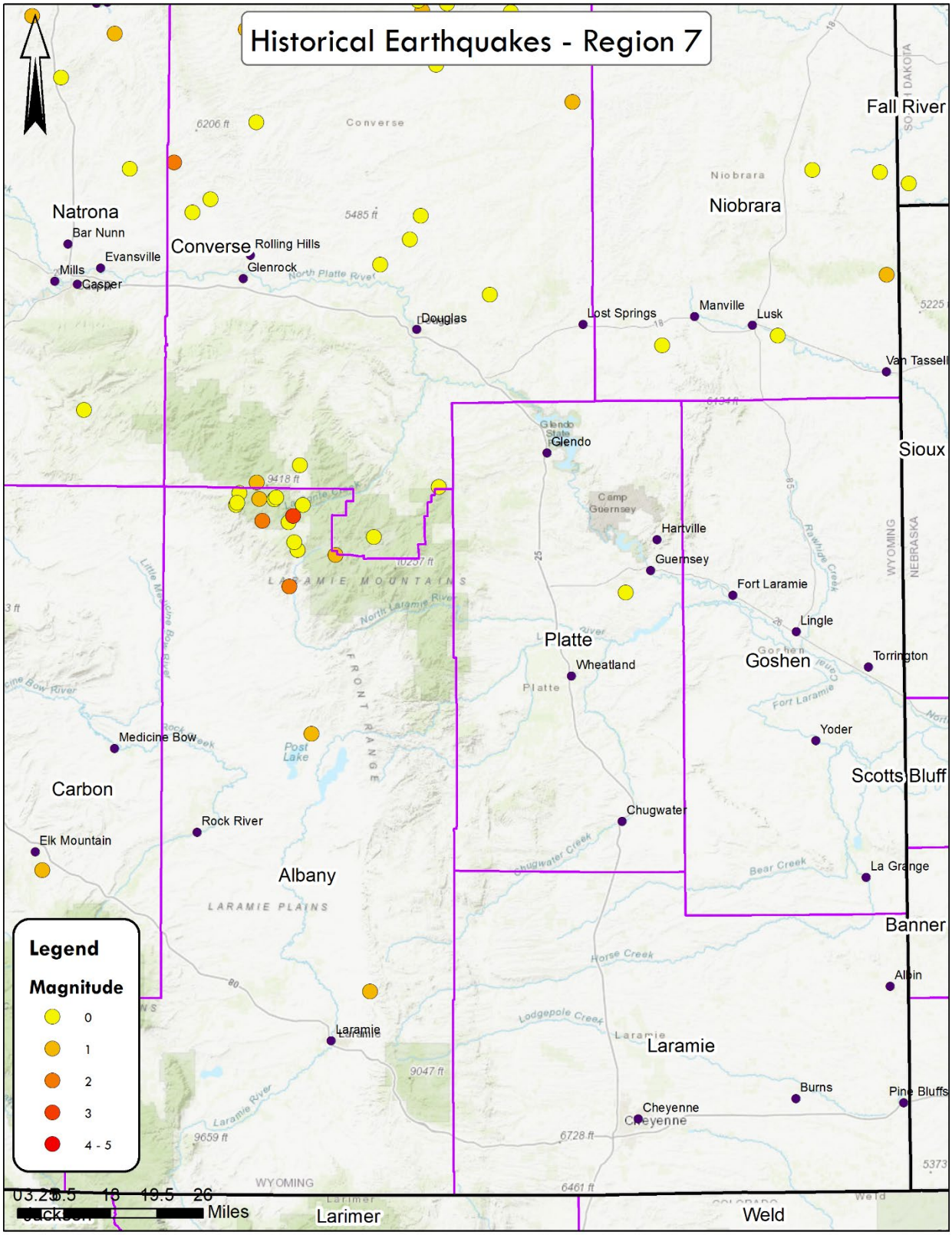
3.7 Earthquake

3.7.1 Previous Occurrences

Historically, earthquakes have occurred across much of Wyoming. The first reported event was in Yellowstone National Park in 1871. Yellowstone National Park is one of the more seismically active areas in the United States but is on the opposite corner of the state from Laramie County. Figure 3.6 shows the location of seismic events identified, with a magnitude of 0 or higher, within Region 7.

It is important to note that while no earthquakes have been recorded in the county, several historical earthquakes epicenters have occurred in neighboring counties

Figure 3.6 Region 7 Historical Earthquake Hazards



3.7.2 Inventory Exposed

For this risk assessment, a 2,500-year, magnitude 5.0 earthquake scenario was modeled in FEMA's Hazus v5.0 software. This scenario was used to represent the "worst case scenario" for the county and loss estimates were gathered through analysis of the modeled earthquake data at the census tract level.

In Laramie County, there are an estimated total of 37,000 buildings, with a total building replacement value of more than $9.6 billion. This value represents the estimated costs to repair or replace the damage caused to a building and does not include building contents.

The total economic loss estimated for this modeled earthquake event is more than $131 billion, which includes building and Lifeline related losses. Building-losses include both the direct loss of a building and its contents and business interruption costs. These costs of business interruption are the losses from the inability to operate a business due to earthquake damages.

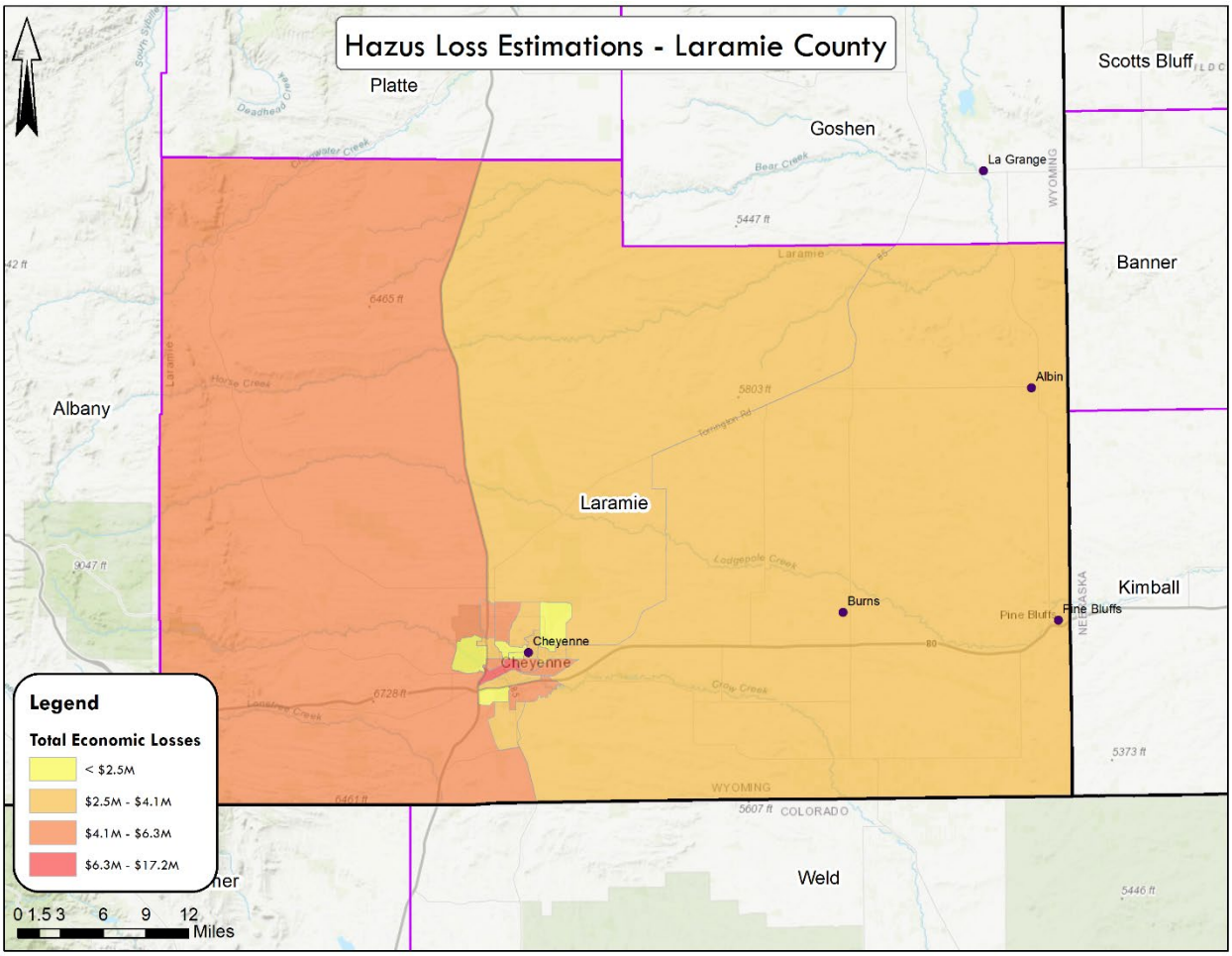
Further notable loss estimations from Hazus include:

- $ 4.6 billion – Transportation Lifeline system replacement value, 251 bridges and 265 miles of highway
- $ 2.7 billion – Utility Lifeline system replacement value, 13,000 miles of pipeline (water, wastewater, natural gas, oil systems, electrical power, communications)
- 27 – Utilities Lifeline system pipeline breaks
- $92 million – estimated total building-related losses, including business interruption which makes up 20% of the total building related losses
- 56% – percent of total build-related losses that were residential properties
- 1,054 – buildings at least moderately damaged, 2 buildings estimated to be damaged beyond repair
- 98% – percent of essential facilities operational by 30 days after incident (hospitals, police and fire stations, EOC, and schools)

Figure 3.7 illustrates the breakdown of Hazus economic loss estimation by census tract.

For more detailed information from the Hazus scenario model, see the Earthquake Hazus Risk Report.

Figure 3.7 Hazus Loss Estimations



3.7.3 Probability of Future Occurrences

The likelihood of a future occurrence of an earthquake is very low, but not impossible. Since the historic record is limited, it is not feasible to determine when a 2,500-year event last occurred in the county. This type of event was used for loss estimation analysis because of the uncertainty involved and based upon the fact that the International Building Code utilizes 2,500-year events for building design. This conservative approach is in the interest of public safety.

3.7.4 Future Development Trends

While Laramie County is seeing steady growth, the risk and impacts of an earthquake are still prevalent to existing infrastructure, as well as new development. With the unpredictable nature of earthquake epicenter locations, there is potential for significant structural damage to occur anywhere in the county. Due to the nature of earthquake hazards, communities in the county with higher population densities and larger numbers of structures and critical facilities are expected to experience greater damage and loss from an earthquake event. If population and development should occur, continued enforcement of the unified construction code has great potential to mitigate increasing vulnerability and development pressure.

3.7.5 Climate Change Impacts

There is no evidence currently that climate change will influence earthquake activity.

3.8 Flood

3.8.1 Previous Occurrences

The Spatial Hazard Events and Losses Database for the United States (SHELDUS) data between 1966 and 2019 shows 13 flood events, totaling approximately $78.9 million in property damages and more than $100,000 in crop damages. One event in 1985 accounts for roughly $78.2 million of the total property damages, resulted in 35 injuries, and 6 deaths. This event is cross-listed with the Hail hazard and it is an important example of damage reporting redundancies in which multiple hazards contribute to the total damage figures.

Table 3.5 Flood Damages - SHELDUS 1966-2019 (2019 USD)

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1966	86,941	0	0	0
1970	417,452	0	0	0
1983	43,366	434	0	0
1984	104	103,928	0	0
1985*	78,276,214	0	35	6
1990	991	0	0	0
1996	82,586	0	0	0
1997	1,615	0	0	0
1999	15,555	0	0	0
2000	30,099	0	0	0
2006	25,710	0	0	0
2007	2,500	0	0	0
2010	8,201	0	0	0
TOTAL	**78,991,334**	**104,362**	**35**	**6**

*Data cross-listed with Hail Hazard

Past flood events in Laramie County indicate that many of the most damaging floods have occurred on Dry Creek and Crow Creek.

While the City of Cheyenne has suffered the most damage, major flood events have also struck Albin, Meriden, Pine Bluffs, Carpenter, and unincorporated parts of the county.

Laramie County has an extensive flood history with recorded floods dating back to the 1880s. Most of these floods were attributed to severe localized thunderstorms that typically occurred between late spring and the fall. Many of these floods caused extensive damage due to a combination of significant development in the floodplain, and poor drainage. Damages were most often related to flooded basements and washed out roads, bridges, or railroads.

The flood on August 1, 1985, is considered to be the flood of record for Laramie County. This flood, which occurred along Crow Creek, is estimated to have had a peak flow rate of 8,000 cubic feet per second (cfs). The recurrence interval for that magnitude of discharge on Crow Creek is roughly 0.2 percent annual chance; in other words, this was a 500-year flood. The 1985 flood caused widespread damage, dozens of injuries, and several deaths. This was the costliest flood in Laramie County's history, not only in terms of property damage, but also regarding human life and safety.

Table 3.6 summarizes several of the most severe floods in Cheyenne. Three of these floods are described as being similar in magnitude to the 1985 event, showing that devastating floods are not atypical in the Cheyenne area. High magnitude flood events generally occur in the summer months and are caused by intense localized rainstorms. Flash floods and urban small stream floods are the most common types of floods. Table 3.7 shows county flood events and the data for both was obtained from the NCEI Storm Database.

When reviewing data and narratives of weather events, including flooding, it should be kept in mind that no central reporting location exists for event details. In some cases, databases may have differing details regarding an event or an event narrative is based on firsthand experience without confirmation of details. However, presenting the best available data allows for a holistic understanding of the impacts of an event.

Table 3.6 City of Cheyenne Flood History

Date	Event Details
1883	Significant flood along Crow Creek.
July 15, 1896	Precipitation of 4.7 inches in 3 hours and 4.86 inches in 24 hours produced significant flood along Crow Creek.
May 20, 1904	The night of May 19th precipitation of 0.63 inches was recorded. On the 20th, 1.10 inches of rain and hail fell in 1 hour. Precipitation was likely more intense along the upstream reach of Crow Creek. Maximum discharge was estimated to be 8,500 cubic feet per second (CFS).
1918	Large flood occurred along downstream reaches of Dry Creek, approximately the same magnitude as the August 1, 1985, flood event.
June 14, 1926	Severe hail storm lasting from 10:20pm to 11:05pm concentrated in a 1- by 6-mile area and produced 2.51 inches of precipitation.
April 23, 1929	Storm produced 3.20 inches of precipitation in a 24 hour period.
1929	Large flood event along Dry Creek.
June 2, 1929	Flood in Crow Creek was caused by precipitation near the headwaters west of town, where the ground was already saturated and tributaries were full from melting snow. Maximum discharge was estimated to be 8,200 cubic feet per second.
June 1935	Large flood event along downstream reaches of Dry Creek, approximately the same magnitude at the August 1, 1985, event. Precipitation was greatest in the Roundtop area at the headwaters of Dry Creek. Flooding also occurred along Crow Creek.
August 1946	Severe storm produced 1 inch of precipitation in 10 minutes caused flooding along Dry Creek.
June 1955	Intense rains occurred in the afternoon of June 14th and continued into the next day producing 2.68 inches of precipitation. This produced a large flood along the downstream reaches of Dry Creek at approximately the same magnitude as the August 1, 1985, flood.
1972	Flood occurred along the downstream reaches of Dry Creek. Water surface elevations were slightly lower than those for the 1955 flood event.
August 1985	On August 1st, intense thunderstorm produced 7 inches of precipitation in the downtown area between 6:20pm and 9:45pm. The storm was accompanied by hail, drifting up to 3 feet in areas. A new 24-hour Wyoming rainfall record was set. Flooding occurred along Dry Creek, Crow Creek, and their tributaries in the City of Cheyenne.
August 29, 1996	Heavy rainfall from thunderstorms caused flooding in and near Cheyenne. Some roads had up to a foot of water on them and some intersections were closed. Basements in the north part of town were flooded. The storm caused $30,000 in property damage.
August 15, 2000	Heavy rains fell west of Cheyenne, with estimates of 4 to 6 inches over an area southwest of Federal, WY. Some flooding was reported on Happy Jack Road, with parts of county road 109 washed out. This storm caused $20,000 in property damage.

Date	Event Details
July 1, 2006	A thunderstorm produced very heavy rain over far western Laramie county. Floodwaters produced severe wash-away damage to county roads 110 and 110-A near Happy Jack Road with water reported to have flowed almost a foot deep over Happy Jack Road. This storm caused $20,000 in property damage.

Table 3.7 Laramie County Flood History

Location	Start Date	Information
Cheyenne, Crow Creek, Dry Creek	July 15, 1896	Heavy rain (4.78 inches in 3 hours) caused flooding resulting in extensive damage to buildings, transportation facilities, and utilities.
Cheyenne, Crow Creek	May 20, 1904	A 500-year flood from heavy rain created a 20-25 foot wall of water down Crow Creek. Damage to buildings, transportation facilities, utilities, bridges and houses washed from foundations; large numbers of people caught in houses. There were 1.10 inches of rain in one hour and estimated discharge of 7,000 CFS. Two children killed.
Cheyenne, Crow Creek	April 23, 1929	A 500-year flood was caused by heavy rain producing 3.20 inches in 24 hours. The flood damaged buildings, transportation facilities, and utilities. The event resulted in one death. Crow Creek had a discharge of 8,000 CFS.
Cheyenne, Crow Creek	June 1, 1929	Flooding was produced by showers near headwaters, ground saturation, and tributaries full of melting snow. Flooding was also caused by rainfall combined with snowmelt runoff (Wyoming Floods and Droughts, National Weather Summary 1988-89). The flooding led to bridges, dams, highways, crops, and railroads being damaged at a cost of an estimated $500,000. There was one death because the individual did not hear warnings to evacuate the area. According to FEMA Flood Insurance Study for March 2, 1994, it was a 500-year flood and Crow Creek had a discharge of 8,000 CFS.
Dry Creek Basin	August 26, 1949	A severe storm producing 1 inch of rain in 10 minutes led to widespread street and basement flooding at an estimated cost of $100,000.
Cheyenne, Dry Creek, Crow Creek	June 15, 1955	Heavy rain causing flooding washed out railroad tracks, flooded parts of the city, basements, streets crumbled, estimated cost $105,000 according to WEMA, Laramie Boomerang, and NOAA. Also, according to these agencies 2.4 inches of rain fell during the storm. According to FEMA Flood Insurance Study March 2, 1994, Dry Creek had a discharge of 5,800 CFS. $105,000 property damage reported.
Cheyenne	July 22, 1966	Heavy rains up to 2 inches with hail measuring up to ¾ inch caused flash flooding. Damage mostly in the central and eastern portion of Cheyenne. $22,500 in property damage reported
Meriden	August 9, 1966	Heavy rain with some small hail damaged crops and flash flooding destroyed small bridges. $22,500 in property damage reported
Cheyenne	July 19, 1973	On the 19th, Cheyenne and part of Laramie County received heavy rains which resulted in swollen creeks and flooded basements. For Cheyenne, it was the second greatest 24-hour rainfall on record and totaled 3.42 inches. The rains occurred over much of the state but seemed heaviest over the southeast corner. $2,250 in property damage reported
Cheyenne	September 8, 1973	A nearly 3 inch downpour of rain with small hail caused flash flooding mainly in downtown Cheyenne. Hail caused damage to trees, shrubs, and flowers. $225,000 in property damage reported

Location	Start Date	Information
Cheyenne	May 23, 1982	Brief heavy rains from 1.43 inches at the weather office to 2.8 inches on the east side of the city and soft hail caused local flooding and evacuation of several homes. $22,500 in property damage reported
Cheyenne, Crow Creek	July 22, 1983	Heavy rain amounting to 3 inches caused a flood where a mobile home park was evacuated and ranches, bridges, roads, and an irrigation system had damage. Estimated damage to bridges was $25,000. The flooding made a new channel and basements flooded.
Albin	July 31, 1985	Five inches of rain and marble sized hail fell at Albin. Basements were flooded and there was extensive flooding of low-lying areas. Estimated property damage of $225,000.
Cheyenne, Crow Creek, Dry Creek	August 1, 1985	A nearly stationary severe thunderstorm, or storms, produced the most damaging flash flood on record in Cheyenne and the State of Wyoming. 12 people lost their lives, 70 were injured, and damage to homes, cars, and businesses were estimated at $65 million, $61.1 million (Wyoming Floods and Droughts, National Weather Summary, 1988-89), and $40 million (WEMA). At the NWS Forecast Office near the airport, 6.06 inches of rain fell in just over 3 hours. Three and a half inches fell in just one hour. Elsewhere in and around Cheyenne, rainfall from the storm totaled between 2 and 6 inches. Around 1900 MST cars and trucks were reported floating down Dry Creek in northwest Cheyenne. By 1930 MST, in addition to blinding rain, hail up to 2 inches in diameter and winds up to 70 mph were occurring in the Cheyenne area. Flood waters in the city were at their height from 1900 to 2200 MST. Dry Creek became a raging torrent through north Cheyenne.
25 W Cheyenne	May 17, 1987	A thunderstorm developed over the west section of Laramie County during the morning of the 17th of May. This thunderstorm marched through Laramie County with locally heavy rain and hail. Rains of over an inch were reported west and north of Cheyenne with 0.82 inches of rain reported at the Cheyenne airport. Water got as deep as 3 to 4 feet in areas of Cheyenne. This flooded some parked cars and made a few roads temporarily impassible. Numerous reports of 0.25 to 0.75 inch diameter hail were noted around Cheyenne. Drifts of hail 6 to 8 inches deep were observed about 1.5 miles north of the airport.
Pine Bluffs	July 29, 1990	A thunderstorm produced 3 to 4 inches of rain in the Pine Bluffs area. Minor flooding of streets occurred in the city, with some basements flooded. $2,250 in property damage reported
Near Cheyenne	July 12, 1991	Heavy rains with thunderstorms brought 1.70 inches of rain 4 miles west of Cheyenne and 1.95 inches of rain 3 miles north of the airport. Street and some basement flooding was reported in Cheyenne.
3 W Cheyenne	July 22, 1991	A thunderstorm brought 0.56 inches of rain in 45 minutes with some street and basement flooding.
Cheyenne Airport	August 13, 1994	A thunderstorm moved north out of Colorado into southwest Laramie County. This storm produced flash flooding in a few small streams in extreme southwest Laramie County, washing out a couple of roads. Rainfall totaled 3.26 inches in an hour and 0.65 inches in 10 minutes. $20,000 in crop damage reported.
Cheyenne	July 31, 1996	Heavy rain caused by thunderstorms caused urban flooding in Cheyenne. $10,000 in property damage reported.
8 NE Cheyenne	August 15, 1996	Heavy rainfall from thunderstorms caused some flooding of creeks in the area. $10,000 in property damage reported.
Cheyenne	August 29, 1996	30kp Heavy rainfall from thunderstorms caused flooding in and near Cheyenne. Some roads had up to a foot of water on them and some intersections were closed for a time. Some basements in the north part of town became flooded.

Location	Start Date	Information
Cheyenne	August 16, 1997	Two to three feet of water flooded intersections in southern Cheyenne. $1,000 in property damage reported.
9 ESE Cheyenne to 12 SE Cheyenne	July 9, 1998	A thunderstorm produced rainfall amounts of up to 3.5 inches 9 miles east of Cheyenne. Water was flowing over Campstool Road, which runs along Crow Creek.
West Portion of Laramie County	August 15, 2000	Heavy rains fell over parts of western Laramie County west of Cheyenne, with estimates of 4 to 6 inches over an area southwest of Federal. Flooding was reported on Happy Jack Road, with parts of County Road 109 washed out. $20,000 in property damage reported.
Laramie	June 30, 2004	Heavy rain fell over Orchard Valley resulting in flooding of low-lying areas. U.S. Highway 85 was closed for a time just south of Cheyenne, WY due to flooding.
Carpenter	June 3, 2005	Water up to a foot deep covered roads in and near Carpenter, WY.
Cheyenne	July 1, 2006	A thunderstorm produced very heavy rain over far western Laramie county. Floodwaters produced severe wash-away damage to county roads 110 and 110-A near Happy Jack Road with water reported to have flowed almost a foot deep over Happy Jack Road. $20,000 in property damage reported.
Cheyenne	July 2, 2006	Heavy rain resulted in water flowing 12 feet wide and 1 foot deep over County Road 128.
Cheyenne	July 3, 2006	A large, slow moving thunderstorm moved over western and central Laramie county and produced significant flash flooding. Cheyenne recorded nearly 2 inches of rain resulting in widespread street flooding, and flooded the hospital emergency room parking lot. Dry creek was reported flowing over its banks at Dell Range Blvd and Prairie Rd.
Cheyenne	July 12, 2006	Strong to severe thunderstorms produced some hail and flash flooding over southern Platte and western Laramie counties. County road 109 washed out in 2 places with up to a foot of water across the road. 2kp
Cheyenne	July 26, 2006	A slow moving thunderstorm produced very heavy rains over parts of Cheyenne, resulting in some flash flooding of streets and drainages.
Carpenter	July 27, 2007	Slow moving thunderstorms produced very heavy rain which produced some flash flooding in and near Carpenter. Flooding in Carpenter and along parts of Cottonwood Creek with some county roads flooded.
Pine Bluffs	August 3, 2007	Heavy rains produced flash flooding in Pine Bluffs, WY. Market Street was closed for a time with 3.10 inches of rain reported.
Cheyenne	August 17, 2007	Heavy rain produced minor flooding on US Highway 85, mile marker 26.
Cheyenne	August 22, 2007	Upslope flow behind a cold front produced strong to severe thunderstorms over parts of southeast Wyoming. Large hail, strong winds, and some minor flooding was reported. Some flooding reported on streets, lawns and sidewalks at 17th and Logan Avenue.
Pine Bluffs	May 18, 2010	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado the afternoon of May 18, 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe thunderstorms. By midafternoon thunderstorms over northern Colorado began to rotate, producing a tornado just south of the Wyoming state line south of Cheyenne. Severe thunderstorms continued into the evening hours of the 18th producing severe weather across the Nebraska panhandle and extreme southeast Wyoming. Flash flooding of low lying areas. 1.53 inches total rainfall. $300 in property damage reported.

Location	Start Date	Information
Burns	May 18, 2010	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado the afternoon of May 18, 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe thunderstorms. By midafternoon thunderstorms over northern Colorado began to rotate, producing a tornado just south of the Wyoming state line south of Cheyenne. Severe thunderstorms continued into the evening hours of the 18th producing severe weather across the Nebraska panhandle and extreme southeast Wyoming. Flash flooding reported by spotter at Burns exit off of Interstate 80. $5,000 in property damage reported
Carpenter	May 18, 2010	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado the afternoon of May 18, 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe thunderstorms. By midafternoon thunderstorms over northern Colorado began to rotate, producing a tornado just south of the Wyoming state line south of Cheyenne. Severe thunderstorms continued into the evening hours of the 18th producing severe weather across the Nebraska panhandle and extreme southeast Wyoming. Heavy rain lasted 45 minutes. Total of 1.19 inches of rain fell in 45 minutes. $500 in property damage reported
Cheyenne	May 18, 2010	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado on May 18, 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe thunderstorms. By midafternoon thunderstorms over northern Colorado began to rotate, producing a tornado just south of the Wyoming state line south of Cheyenne. Severe thunderstorms continued into the evening hours of the 18th producing severe weather across the Nebraska panhandle and extreme southeast Wyoming. Flooding on access roads between Archer and Hillsdale at exits 370 and 377 of Interstate 80. $1,000 in property damage reported.
Cheyenne	June 19, 2011	Thunderstorm with heavy rain caused flash flooding across Laramie County. Flooding was reported at the Ames Underpass, the 2200 block of E 16th Street and Hynds Blvd and 2nd Ave. The Murdoch's parking lot along E Lincolnway was flooded. The public reported basement flooding in northwest Cheyenne.
Cheyenne	July 12, 2011	Intense afternoon and evening thunderstorms produced numerous reports of large hail and flash flooding throughout Laramie County in southeast Wyoming. Six inches of water flowing over the intersection of 19th Street and Carey Avenue in Cheyenne.
Cheyenne Airport/ Archer/ Hillsdale/ Carpenter	July 12, 2011	Intense afternoon and evening thunderstorms produced numerous reports of large hail and flash flooding throughout Laramie County. Swiftly moving water was flowing over the intersection of Pershing and Evans Avenue. Water was flowing over Whitney Road approximately 6 to 8 inches deep and 15 feet wide. Flooding over the access road between Interstate 80 mile markers 380 and 381, as well as the intersection of Highway 142 and the access road. About six inches of swiftly flowing water over Carpenter Road from flooding in nearby farm fields.
Archer	July 14, 2011	Afternoon and early evening thunderstorms produced hail the size of quarters over the county. Flash flooding was observed just northeast of Cheyenne. Street flooding with 1.25 inches of rain in 30 minutes.
Albin	July 14, 2011	Afternoon and early evening thunderstorms produced hail to the size of quarters over Laramie County. Flash flooding was observed just northeast of Cheyenne. More than six inches of water was observed over Highway 215 between County Roads 222 and 223.
Orchard Valley	July 24, 2011	Late afternoon and early evening thunderstorms produced numerous reports of large hail, as well as isolated strong winds and flash flooding across extreme

Location	Start Date	Information
		southeast Wyoming. One lane was closed due to high water along South Greeley Highway and Williams Road.
Cheyenne Airport	August 3, 2011	Strong, slow moving thunderstorms produced one to three inches of rain within a two-hour period during the late afternoon, resulting in flash flooding on the north side of Cheyenne.
Cheyenne Airport	June 6, 2012	Afternoon and evening thunderstorms produced hail and heavy rain in portions of southeast Wyoming, with Laramie County receiving the brunt of the severe weather. WYDOT officials closed U.S. Highway 85 from north of Cheyenne to the Goshen County line due to high water.
Little Bear	July 24, 2013	Afternoon and early evening thunderstorms produced large hail, strong winds and very heavy rainfall over much of southeast Wyoming. Flash flooding was observed north of Cheyenne. Several county roads, including Iron Mountain Road, were washed out. Railroad workers were stranded on the tracks. Chugwater Creek overflowed its banks.
Cheyenne Airport	September 13, 2013	Heavy rainfall from thunderstorms caused flash flooding over parts of the southern Laramie Range foothills west of Cheyenne. Two to four inches of rain in a two-hour period caused flash flooding west of Cheyenne and Warren AFB. Roads that were impassable from high water included Roundtop, Otto and Happy Jack. There was considerable ponding of water on Interstate 80 between mile markers 348 and 358.
Archer	September 14, 2013	Two to three inches of rain in a two-hour period resulted in flash flooding across north and northeast Cheyenne. Several roads and intersections were flooded. Flash flooding was reported on portions of Christiansen Road, Gardenia Road, Powderhouse Road and Legacy Parkway. Mylar and Smalley Parks in Cheyenne were flooded. Dry Creek overran its banks flooding a greenway.
Skyview Airpark	September 14, 2013	Two to three inches of rain in a two-hour period resulted in flash flooding across north and northeast Cheyenne. Several roads and intersections were flooded. Dry Creek overflowed its banks. U.S. Highway 85 was flooded from County Road 227 to 149.
Pine Bluffs	May 26, 2014	Intense slow moving thunderstorms produced two to three inches of rain in less than two hours. The torrential rainfall resulted in flash flooding near Pine Bluffs. Flash flooding was observed along Chivington Draw northwest of Pine Bluffs. Water was running over the Pine Bluffs-Albin Road bridge.
Carpenter	June 8, 2014	Slow moving thunderstorms produced torrential rainfall that led to flash flooding in eastern Laramie County. A EF0 tornado was reported east of Carpenter. Water six to 12 inches deep was running over County Roads 156 and 203 eight to nine miles east of Carpenter.
Pine Bluffs	June 8, 2014	Slow moving thunderstorms produced torrential rainfall that led to flash flooding in eastern Laramie County. A EF0 tornado was reported east of Carpenter. Up to five inches of rain in an area three miles northwest to five miles north of Pine Bluffs caused flash flooding. Water a foot deep and 30 yards wide flowed across the 1600 block of County Road 215.
Gun Barrel	June 27, 2014	Thunderstorms produced large hail and locally heavy rainfall over portions of Laramie County. Three to four inches of rain in less than two hours resulted in flash flooding over a two square mile area including Gun Barrel. Water over six inches deep covered U.S. Highway 85 and County Road 213.
Cheyenne	July 13, 2014	Thunderstorms produced several reports of large hail, strong winds, a tornado and very heavy rainfall across portions of southeast Wyoming. One to two inches of rain in less than 30 minutes resulted in numerous reports of flash flooding in and around Cheyenne. Water was 6 to 12 inches high in many areas. Dry Creek was bankfull.

Location	Start Date	Information
Federal	July 5, 2015	Afternoon thunderstorms in western Laramie County produced up to four inches of rain in less than two hours. Flash flooding occurred a few miles south and southwest of Federal. Flash flooding was reported between Federal and Spring Creek ranches. Highway 109 North near North Table Mountain Loop was covered by six inches of water.
Albin	July 21, 2015	Four to six inches of rain in three hours caused flash flooding in extreme northeast Laramie County. Torrential rainfall from thunderstorms produced up to six inches of rain in three hours, resulting in flash flooding. County Road 162 and Highway 216 were closed by high water. Highway 216 was closed between Albin and Pine Bluffs with a foot of water over the highway. Several roads in and surrounding Albin were closed.
Cheyenne Airport	June 12, 2016	Thunderstorms produced very large hail, damaging winds and torrential rainfall across portions of south central and southeast Wyoming. Flash flooding was reported in and around Torrington and Cheyenne. Flash flooding was reported in Cheyenne and East Cheyenne. Several city streets were flooding with two to three feet of water, including East Lincolnway and Pershing. Several cars were stranded and garbage cans floated down residential streets.
Pine Bluffs	July 1, 2016	Thunderstorms produced damaging winds in eastern Converse County and flash flooding in parts of Goshen and Laramie counties. At least six inches of rapidly flowing water closed several county roads south of Pine Bluffs, as well as some streets in Pine Bluffs.
Pine Bluffs	July 27, 2016	Thunderstorms produced large to very large hail and damaging winds across portions of southeast Wyoming. Golf ball size hail driven straight-line winds estimated as high as 90 mph caused extensive damage to homes and businesses at Pine Bluffs. Many trees and power lines were toppled throughout the town. Clogged drains from hail and stripped leaves with torrential rainfall flooded many roads and intersections in town. Two to four inches of rain combined with extensive hail drifts and clogged drains from stripped leaves caused flash flooding throughout Pine Bluffs. Many streets were inundated by one to two feet of water.

Other sources of flood events within the county can be used to create the most comprehensive record possible. Table 3.8 shows flood event details obtained from unpublished reports from the Wyoming Office of Homeland Security, newspaper accounts, and periodicals from public libraries.

Table 3.8 Additional Notable Flood Events

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Crow Creek, Cheyenne	**6/1/1929**	**1**	**0**	**$500,000**	**-**
The flooding was caused by a combination of rain showers, ground saturation, and snowmelt runoff. Bridges, roads, dams, crops, and railroads were damaged by floodwaters. FEMA estimated that this was a 0.2% annual chance flood, also known as the 500-year event. The 1929 flood is believed to be one of the most significant floods in Laramie County's history.					
Cheyenne	**8/26/1946**	**0**	**0**	**$100,000**	**-**
A severe thunderstorm flooded Cheyenne. Damaging basements and low-elevation apartments resulted in an estimated $100,000 in property damages.					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Dry Creek Basin	**8/26/1949**	**0**	**0**	**$100,000**	**-**
A severe storm produced one inch of rain in a mere 10 minutes, flooding streets and basements.					
Northern Larimer County	**6/26/1955**	**0**	**0**	**$0**	**$100,000**
A flood $100,000 in crop damage in northern Laramie County, roughly 18 miles south of Chugwater. The flood washed out roads and train tracks and filled basements with water and hail. The National Guard was called in to help direct traffic and maintain security in the area.					
Cheyenne	**9/8/1973**	**0**	**0**	**$225,000**	**-**
Three inches of rain and hail caused flash flooding, primarily located in the downtown area. The hail damaged trees, shrubs, and flowers in the city.					
Albin	**7/31/1985**	**0**	**0**	**$225,000**	**-**
An estimated five inches of rain and marble-sized hail fell over the town. Damages were most attributable to flood damage in basements.					
Laramie County, Cheyenne	**8/1/1985**	**12**	**70**	**$65,000,000**	**-**
The most damaging flood in Wyoming's history occurred in Laramie County on August 1, 1985. A severe thunderstorm stalled over Cheyenne and dropped six inches of rain over the city in less than four hours. The storm was also notable for lightning strikes that ignited several fires, three tornadoes, and several inches of hail that piled into drifts. The estimated property loss was roughly $136,167,242 million in 2011 dollars. 70 people were injured in the flood, and 12 others lost their lives. In one instance, an elderly woman took shelter in her basement after hearing the tornado sirens sound off. Flood waters trapped her in the basement where she ultimately drowned. Most of the deaths resulted from people becoming trapped in their cars by rushing flood waters. Emergency communications systems were washed out in the police department and county courthouse, slowing response times. The Cheyenne Memorial Hospital emergency room was flooded, forcing doctors to relocate to the cafeteria to work on patients. Several areas of the city lost power. An outcome of this event is that Laramie County and the City of Cheyenne have implemented several flood control and stormwater drainage projects, including stormwater basins and channels to divert floodwaters away from people and critical facilities in future floods.					

3.8.2 Inventory Exposed

Magnitude and severity can be described or evaluated as a combination of the different levels of impact that a community sustains from a hazard event. Specific examples of negative impacts from flooding on Laramie County span a comprehensive range. Flooding causes:

- damage to private property that often creates financial hardship for individuals and families;
- damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- loss of personal income for agricultural producers that experience flood damages;
- loss of income to businesses relying on recreational uses of county waterways;
- emotional distress on individuals and families; and

- harm to people and animals.

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the "event of record." The flood of record is almost always correlated to a peak discharge at a gage, but that event may not necessarily have caused the worst historic flood impact in terms of property damage, loss of life,

The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year. Emergency management protocols, public emergency notification improvements, and development/land use codes will all help mitigate future impacts of floods.

Table 3.9 shows the parcels that are exposed to the 1% annual chance floodplain, also called the 100-year floodplain. The 1% annual chance flood has a one in 100 chance of being equaled or exceeded in any one year. While the recurrence interval is 100 years, this is an average and a flood of that magnitude may occur more than once within 100 years.

Table 3.10 shows the exposure of parcels to the 500-year floodplain, also called the 0.2% annual chance floodplain, which has a one in 500 chance of being equaled or exceeded in a given year. This summary includes those same parcels exposed to the 1% Annual Chance Floodplain.

The floodplains used for this vulnerability assessment are currently a preliminary product (as of May 2022) mapped by FEMA. Figure 3.8 illustrates this floodplain, which determined the parcels exposed to the 1% annual chance floodplain.

Parcels exposed to the 1% Annual Chance Floodplain are approximately 86% residential with an overall value of more than $390 million. Approximately 68% of the residential parcels are located in the unincorporated areas of the county and are worth almost $376 million. Cheyenne has the largest number of impacted parcels across the municipalities, with almost three times as many residential parcels as commercial. The 54 commercial parcels exposed in Cheyenne are valued at more than $9.2 million. In contrast, the 24 commercial parcels in the unincorporated county areas are valued more than $12 million.

Table 3.9 Parcels Exposed to 1% Annual Chance (100-year) Floodplain

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)	Agricultural	Improved Value ($)
Burns	2	1	9,918	1	90,128	-	-
Cheyenne	202	148	14,821,352	54	9,214,958	-	-
Pine Bluffs	3	3	121,281	-	-	-	-
Unincorporated	454	419	375,969,953	24	12,025,438	11	323,961
County Total	**661**	**571**	**390,922,504**	**79**	**21,330,524**	**11**	**323,961**

The parcels exposed in the 0.2% Annual Chance Floodplain include those in the 1% Annual Chance Floodplain, which is reflected in the values in Table 3.10 All of the exposed parcels are valued at more than $572 million and are 82% residential. Cheyenne holds the highest number of commercial parcels exposed to the 0.2%

Annual Chance Floodplain, while the unincorporated areas hold the highest number of residential parcels exposed. The value of the residential parcels exposed in the unincorporated areas is approximately 73% of the total value of all parcels in the county overall.

Table 3.10 Parcels Exposed to 0.2% Annual Chance (500-year) Floodplain

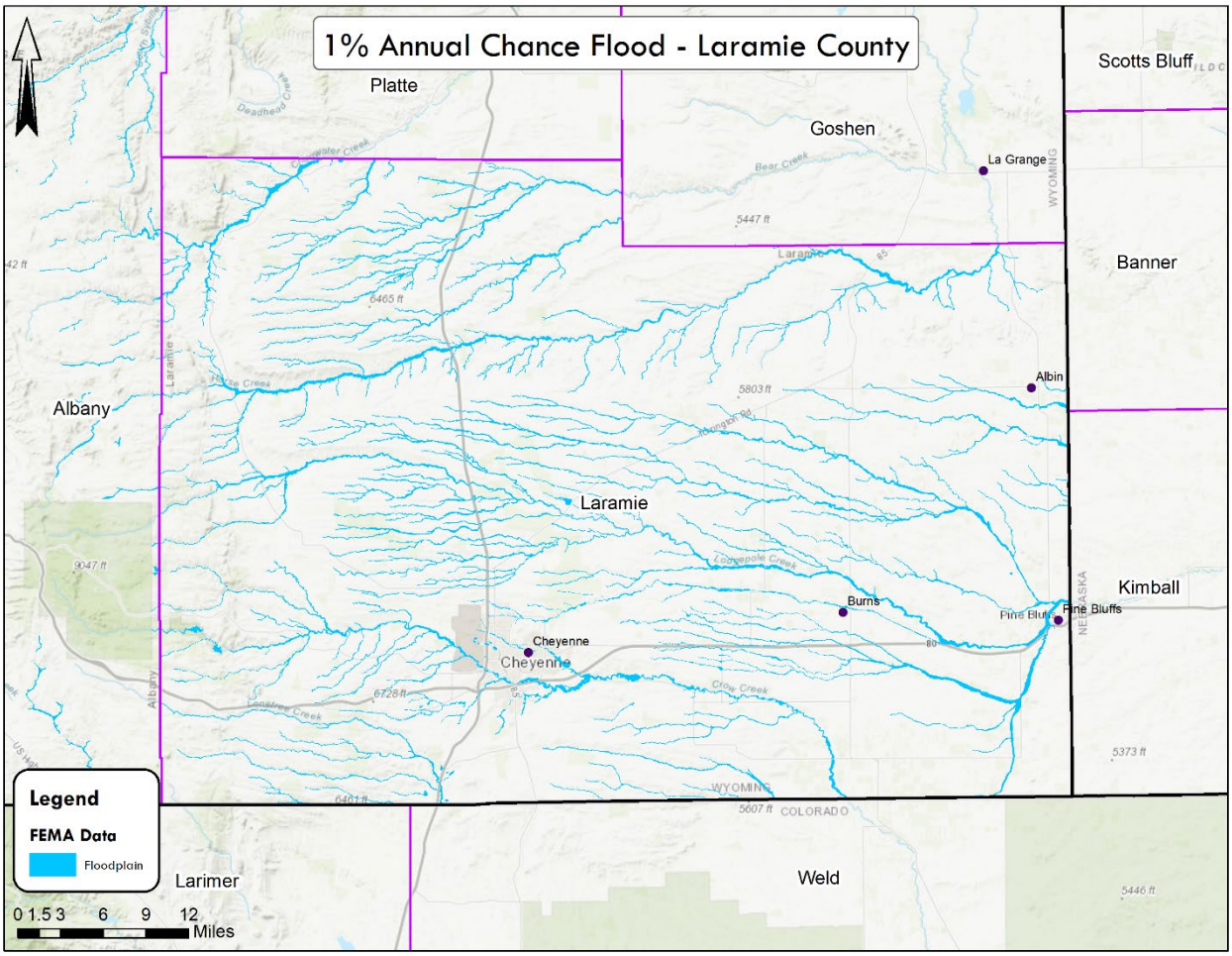
Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)	Agricultural	Improved Value ($)
Burns	2	1	9,918	1	90,128	-	-
Cheyenne	716	527	94,520,152	188	39,867,032	1	1,832
Pine Bluffs	3	3	121,281	-	-	-	-
Unincorporated	678	630	418,403,808	37	18,881,905	11	323,961
County Total	**1,399**	**1,161**	**513,055,159**	**226**	**58,839,065**	**12**	**325,793**

Communication, energy, and transportation are the only lifelines with exposure to the 1% Annual Chance Floodplain in the county. While exposure is minimal for energy and communication, transportation has 38% of infrastructure exposed.

Table 3.11 Lifeline Exposure to 1% Annual Chance (100-year) Floodplain

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	634	6	1 %
Energy	102	4	4 %
Energy (miles)	1,478	75	5 %
Transportation	365	138	38 %

Figure 3.8 1% Annual Chance Floodplain



3.8.3 Probability of Future Occurrences

While the probability that the county will experience a flood event can be difficult to predict or quantify, the frequency of previously reported flood events in Laramie County shows that localized flooding will likely be experienced yearly. Flooding in general has the potential to cause moderate property and crop damage within the county and severe flooding has the potential to inflict significant damage to people and property. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

3.8.4 Participation in National Flood Insurance Program (NFIP)

According to the NFIP's Community Information System (CIS) all jurisdictions, except for the Town of Albin, participate in NFIP. The City of Cheyenne and Laramie County participate in the Community Rating System (CRS), which is a program within NFIP that can discount insurance rates of participating jurisdictions. The county currently has a CRS class rating of 8, and Cheyenne has a rating of 7. These classes determine the discount available and run from 9 to 1, with 9 having the lowest discount.

Details of local jurisdiction NFIP participation, including current policies in force, are shown in Table 3.12. The table also includes the date the initial Flood Insurance Rate Map (FIRM) and initial Flood Hazard Boundary Map (FHBM) were identified.

The current effective map for the county is dated 1/17/2007 and the Towns of Albin and Burns have never been mapped. The Town of Burns is a participant in the program, however there are no policies currently in force.

Table 3.12 NFIP Participation

Jurisdiction	Date of Entry	Initial FIRM ID	Initial FHBM ID	Policies in Force	Number of Paid Claims since 1978	Total Coverage	Claims Paid since 1978
Laramie County	5/21/1980	5/21/1980	11/15/1977	56	17	$14,836,200	$221,140
Town of Burns	1/13/2008	1/17/2007	4/12/1974	0	0	0	$0
City of Cheyenne	9/30/1977	9/30/1977	6/28/1974	194	175	$53,615,400	$717,907
Town of Pine Bluffs	5/01/1986	5/01/1986	1/17/2007	1	0	$350,000	$0

The county and the City of Cheyenne are the only jurisdictions with repetitive loss properties. A repetitive loss property is an NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978.

Table 3.13 Repetitive Loss Data

Jurisdiction	RL Losses (Total)	RL Losses (Insured)	RL Payments (Total)	RL Payments (Insured)
Laramie County	4	0	$33,971	$0
City of Cheyenne	23	0	$183,952	$0

3.8.5 Future Development Trends

Laramie County is experiencing steady growth and the risk and impacts of a flooding event to existing infrastructure and new development requires critical attention to address safety and security. Any development, whether new of redevelopment, must take into account which parcels are within the 100-year floodplain. Floodplain management ordinances, zoning and subdivision ordinances, and state regulations address methods and practices to minimize flood damage to new and substantial home improvement projects. Quality construction and compliance with local ordinances, which exceed National Flood Insurance Program (NFIP) requirements, are the greatest protection against flooding. The county along with the City of Cheyenne, and Towns of Burns and Pine Bluffs participate in the NFIP and support floodplain management activity at the local scale. Code adoption by local jurisdictions, compliance by builders, and local government inspection of new homes can greatly reduce the risk of flooding. Laramie County and its municipalities should continue to look into monitoring, analysis, modeling, and the development of decision-support systems and geographic information applications for floodplain management activities.

In addition to land-use planning, zoning, and codes applicable to new development, flood mitigation measures include structural and non-structural measures to address susceptibility of existing structures. Flood mitigation measures such as acquisition, relocation, elevation-in-place, wet/dry flood proofing, and enhanced storm drainage systems all have the potential to effectively reduce the impact of flood in the county.

The emphasis on pre-disaster flood mitigation in Laramie County centers on Crow Creek and its tributaries: Dry Creek, Allison Draw, and Clear Creek. The City of Cheyenne is responsible for Crow Creek as it passes through the incorporated boundaries. Laramie County and Cheyenne share Dry Creek, with City responsibility until the channel passes into the county owned Dry Creek Parkway.

3.8.6 Climate Change Impacts

The impacts of climate change on weather patterns and temperature fluctuations and these impacts contribute to the potential for increased extent and frequency of floods in the future. The unpredictable nature of precipitation patterns and drought creates conditions conducive for flooding from heavy rains and/or rapid snowmelt. Wildfires are occurring more often due to drier conditions and the effects of these fires on the landscape also lead to more severe and frequent flooding.

3.9 Hail

3.9.1 Previous Occurrences

According to the NCEI database, 1030 hail events have occurred in Laramie County between 1955 and 2021. These events resulted in no deaths, 3 injuries, more than $41 million in property damage, and more than $500k in crop damage. The SHELDUS database provided property damage totaling more than $183 million in 2019 USD, as well as approximately $6.9 million in crop damages. SHELDUS lists 38 injuries total, 35 of which along with 6 deaths occurred in 1985.

Data can vary from one database to another due to access and reporting criteria of the sources of information used to compile the database. Presenting both NCEI and SHELDUS data for Laramie County gives a better overall picture of the hazard and impacts it can have. SHELDUS specifically only reports the events which resulted in damages or loss of life, while NCEI reports events regardless of these figures.

Table 3.14 SHELDUS Reported Hail Damage by Year 1960 – 2019 (2019 USD)

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1960	0	438	0	0
1962	237,272	429	0	0
1964	41,799	417,991	0	0
1965	411	0	0	0
1966	20,396	0	0	0
1967	39,184	0	0	0
1968	409,583	0	0	0
1969	35,307	0	0	0
1970	33,396	0	0	0
1972	3,130,933	0	0	0
1973	145,920	0	0	0
1974	26,283	2,628	0	0
1975	401,416	0	0	0
1977	4,714,815	0	0	0
1978	19,893,684	39,946	0	0
1979	196,329	178	0	0
1981	14,255	4,894,190	0	0
1982	0	14,770	0	0
1983	65,049	6,505	0	0

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1984	173	103,928	0	0
1985*	78,717,772	401,416	35	6
1986	131,232	130,050	0	0
1987	13,745,910	115,205	3	0
1988	43,813	0	0	0
1990	1,586	1,289	0	0
1991	9,514	9,514	0	0
1995	1,700	0	0	0
1996	18,064,835	513,684	0	0
1997	113,027	71,045	0	0
1998	38,158	238,009	0	0
1999	15,555	1,556	0	0
2001	43,900	0	0	0
2002	43,216,423	0	0	0
2003	45,070	0	0	0
2006	643	0	0	0
2007	31,247	0	0	0
2009	24,159	0	0	0
2010	7,012	357	0	0
TOTAL	**183,657,765**	**6,963,129**	**38**	**6**

*Data is cross-listed with Flood Hazard

Details of notable historical hail events are shown in Table 3.15. Historical hail events for the county are illustrated in Figure 3.9, as well as the diameter of hailstones reported. It is worth noting reports of hail are typically higher near populations centers, which can be seen in the clustering of events near the jurisdictions, shown on the map. Based on this trend, it is likely that many hail events go unreported and records of events may be considerably lower than what is actually occurring in the county.

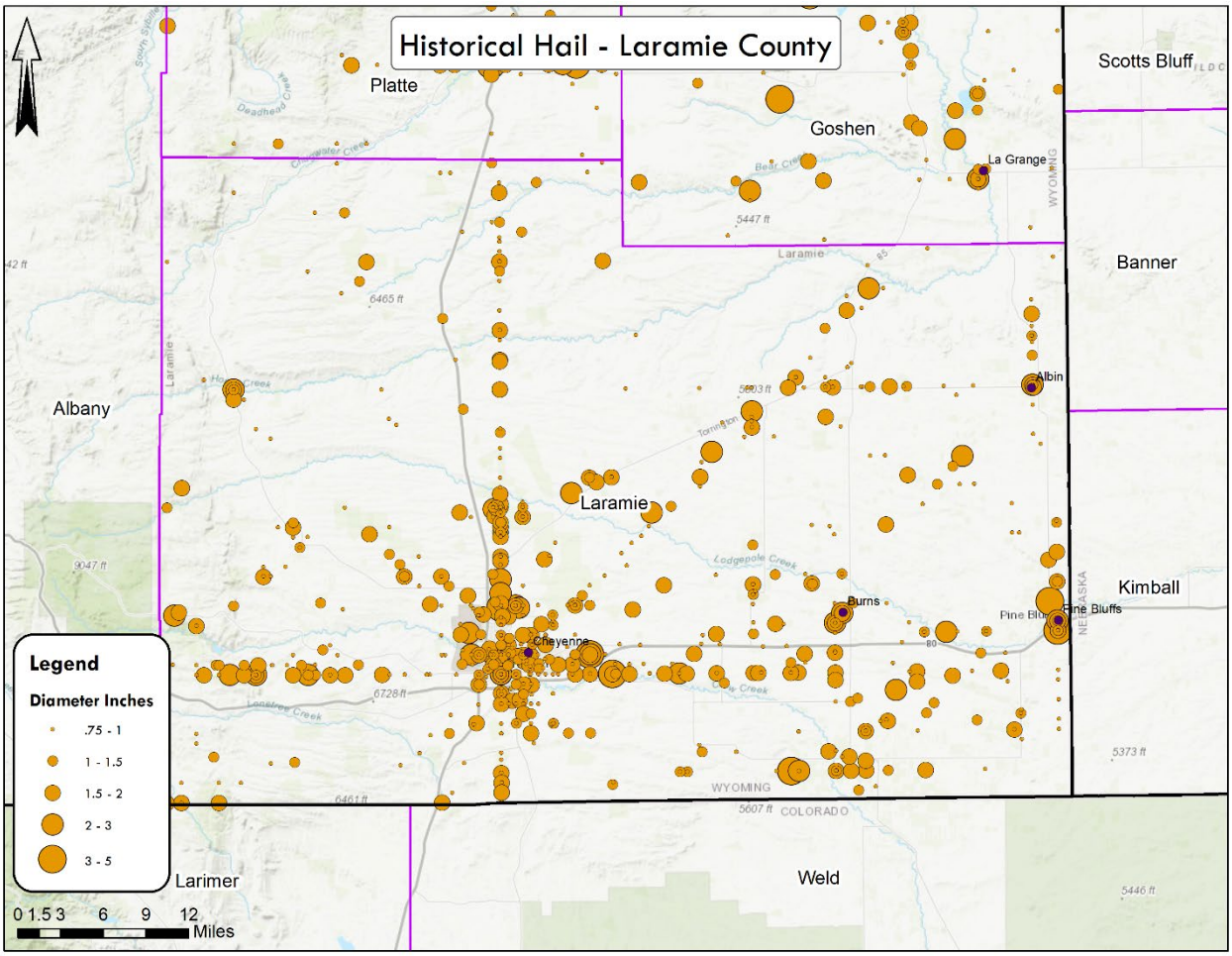
Table 3.15 Notable Historical Hail Events

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Cheyenne, Archer	**6/11/1944**	**0**	**0**	**$500,000**	**$20,000**
In the afternoon and evening a hail storm struck the City of Cheyenne resulting in considerable property damages. Stones in the city reported as larger than baseballs, and up to 6in in Archer. Damage resulted to windows, roofs, automobile tops and glass, and neon signs. One large stone was cut into halves that showed 18 concentric circles.					
Cheyenne	**6/10/1972**	**0**	**0**	**$500,000**	**$0**
A heavy thunderstorm with 0.75-inch diameter hail and 1.5-inch hail damaged roofs, cars, windows, trees, shrubbery, gardens, and signs. This total is approximately $3 million in 2019 USD					
Cheyenne	**6/16/1977**	**0**	**0**	**$1,000,000**	**$0**

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
A mile wide strip of hail 1-2 inches in diameter cut across Cheyenne from northwest to southeast with damage along the center of the strip to houses, cars, trees, gardens, etc. This resulted in more than $4 million 2019 USD in damages					
Cheyenne	**7/31/1978**	**0**	**0**	**$5,000,000**	**$0**
Two thunderstorms brought hail up to three inches in diameter resulting in damage to homes, property, and vehicles. Estimated damages of $20 million (in 2019 USD)					
Cheyenne	**7/30/1979**	**0**	**0**	**$3,200,000**	**$0**
An extremely large and intense thunderstorm moved through the Cheyenne area, causing extensive damage to cars, homes, and city buildings. Hail up to two inches in diameter was verified in town with reports of baseball-sized hail south of the city.					
Cheyenne	**8/1/1985**	**12**	**70**	**$65,000,000**	**$0**
A nearly stationary severe thunderstorm produced the most damaging flash flood on record for Cheyenne and the state. Twelve people lost their lives, 70 were injured, and damage to homes, cars, and businesses was estimated at $65 million ($154.4 million in 2019 USD). At the NWS Forecast Office near the airport, 6.06 inches of rain fell in just over three hours. Hail up to two inches in diameter and winds up to 70 mph occurred in the Cheyenne area. Streets turned into 2 to 4 inch deep rivers with large amounts of hail floating on top. Basements of homes and businesses filled with water and hail. Some basements equipped with drains were flooded with 2 to 5 feet of hail after the water drained away. In some areas of Cheyenne the hail had piled up into 4 to 8 foot drifts. (SHELDUS data states there were 6 fatalities and 35 injuries in 1985, as well as approximately $80 million (2019 USD) in crop and property damages)					
Cheyenne, Warren Air Force Base	**8/3/1987**	**0**	**0**	**$6,000,000**	**$0**
A hail storm hit Cheyenne with 0.5- to 2-inch diameter hail. This storm heavily damaged cars at three major car dealerships west of downtown. Many of the cars were severely dented, with numerous broken or cracked windshields. Another area with damages was F.E. Warren Air Force Base, where numerous vehicles were dented and windows shattered or broken. Three people were slightly injured during the hail storm. The damage was estimated at almost $13.8 million in 2019 USD.					
Cheyenne	**7/13/1996**	**0**	**0**	**$4,000,000**	**$0**
A hail storm caused damages to windows, roofs, and trees in the Cheyenne area. Estimated at $4,000,000					

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Cheyenne	**7/31/1996**	**0**	**0**	**$3,400,000**	**$0**
Hail between 1 to 2.5 inches fell in Cheyenne causing $3.4 million in property damage.					
Cheyenne	**8/29/1996**	**0**	**0**	**-**	**-**
A hail storm produced large hail that broke some car windows in Cheyenne and damaged numerous roofs.					
Cheyenne	**8/26/2002**	**0**	**0**	**$30,000,000**	**$0**
Hail from 1- 2.75 inches in diameter fell over the central and western parts of Cheyenne, causing $30 million ($43.2 million in 2019 USD) in damages. Significant wind damage to automobiles and roofs was reported.					

Figure 3.9 Historical Hail Events



3.9.2 Inventory Exposed

Laramie County has the highest number of loss-causing hail storm events (215) across the state, per the Wyoming State Hazard Mitigation Plan (2021-2026). The entire county is exposed to hail events, as they are regional and travel. All structures, infrastructure, property, people, crops, and livestock could be damaged or harmed by a hail storm.

3.9.3 Probability of Future Occurrences

The frequency of previously reported hail events in Laramie County provides an acceptable framework for determining the probability of future hail storm occurrence in the area. The probability that the county will experience a damaging hail event can be difficult to predict or quantify, but it is expected that hail events will be experienced yearly and may result in damage. Severe hail storms have the potential to inflict significant damage to people and property in the county. Mitigating damage requires that communities remain diligent about building structures that meet current building codes in order to be able to withstand damage.

3.9.4 Future Development Trends

As Laramie County experiences steady growth, the risk and impacts of a hail event are still prevalent to existing infrastructure, as well as new development. All structures in Laramie County will likely be exposed to hail storm events. Because these events are not typically isolated to one geographical area, the location does not increase or reduce the risk necessarily. Laramie County must continue to adhere to building codes and development should be built to current standards in case of adverse weather.

3.9.5 Climate Change Impacts

As humidity is lowered, due to rising temperatures, extended drought, and extreme heat events, convective instability increases. The movement of dry air into thunderstorms can increase the likelihood and size of hail due to evaporate cooling which lowers the elevation of the freezing level in thunderstorm clouds. This creates an opportunity for hailstones to grow larger and become more dangerous, as well as appear in areas where hail was uncommon previously, due to unpredictable weather patterns.

3.10 Hazardous Material Release

3.10.1 Previous Occurrences

Hazardous materials incidents are likely to occur in Laramie County each year, due in part to the transportation routes for both railroad and highways that traverse the county. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) records hazardous material transportation incidents based on reports submitted by businesses and responders. Between 1990 and 2020, there have been 452 transportation incidents reported in Laramie County. Total damages for these incidents are approximately $1.8 million, which includes the cost of the material lost, carrier damage, property damage, response costs, and remediation clean-up costs. Of these incidents, 316 involved rail transport, 134 were on roadways, and 2 were related to air transport.

PHMSA categorizes incidents as 'serious' based on multiple criteria, including if there are fatalities or injuries, evacuations, bulk release of material, main artery closures, and the type of material involved in the incident. There have been no fatalities as a result of a hazardous material incident. Table 3.16 shows the number and type of serious incidents on record with PHMSA. The number of derailments and rollover/vehicle accidents is included as well. Table 3.17 shows the type and quantity of material released for the top four bulk releases.

Table 3.16 Serious Hazardous Material Transportation Incidents 1990-2020

Injuries	Artery Closure	Evacuations	Bulk Releases	Derailments	Rollover /Vehicle Accident
5	5	5	19	3	14

Table 3.17 Top 4 Bulk Release Details

Date	Hazardous Material	Quantity Released	Cost
6/15/1996	Fuel Oil	11,074 gallons	$34,000
12/9/1994	Liquified Petroleum Gas	7,634 gallons	$10,000
8/13/1994	Tars, Liquid	6,840 gallons	$170,000
6/12/1999	Hydrocarbons, Liquid	4,900 gallons	$93,000

3.10.2 Inventory Exposed

A significant portion of the county is affected by hazardous materials risk. Most communities and some unincorporated areas of Laramie County are exposed to potential hazardous material release incidents due to proximity to major roadway transportation corridors, such as Interstates 26 and 85. Union Pacific Railroad and Burlington Northern Santa Fe (BNSF) both have railroad lines that run through the county, which also provides risk for communities located near the tracks.

A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a single location. Fixed facilities include companies that store hazardous waste at their facility and also all hazardous waste sites. Some of these facilities contain extremely hazardous substances. Those are the facilities that are required to generate Risk Management Plans (RMP). An accident resulting in the release of chemicals from those facilities could pose a significant problem to Laramie County.

The hazardous materials release exposure data was calculated based using a 1-mile buffer from major highways and rail. This captures the infrastructure along transportation routes throughout the county that are exposed to, and could be impacted by, a transportation related hazardous materials release.

All lifeline infrastructure has high exposure in the county. As infrastructure is typically located in populated areas, the large percentages of exposure are reasonable and with the majority of infrastructure is exposed it is important to acknowledge that hazardous materials release incidents vary drastically in severity and impacts. For example, high exposure to communication infrastructure has much less consequence than exposure to health and medical or food, water, and safety. The data in Table 3.18 illustrates the importance of public education regarding hazardous materials release incident risks and how widespread the effects could be.

Table 3.18 Lifeline Exposure to Hazardous Materials Transportation Routes

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	634	455	72 %
Energy	102	80	78 %
Food, Water, & Shelter	18	17	94 %
Hazardous Materials	5	5	100 %
Health & Medical	30	26	87 %
Safety & Security	44	38	86 %

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Transportation	365	326	89 %

3.10.3 Probability of Future Occurrences

Predicting hazardous material release incidents in Laramie County is difficult due to the numerous variables of any given event, such as location, weather conditions, type and amount of chemical, quantity released, and whether the incident happens in transit or stationary. Based on those variables, the potential impacts and losses that could be incurred are extremely varied.

There is potential for an incident to occur, however with the low number of previous occurrences over approximately two decades the probability is likely low. It should be noted that even a single event could have devastating effects and possible consequences to life safety. Any possible future occurrences will be minimized through proper supervision, protocols, inspections, and procedures.

3.10.4 Future Development Trends

Proximity to identified hazardous material sites or major transportation corridors within Laramie County should be considered in the development of all future structures. The risk and impacts of a hazardous materials incident are concerns for infrastructure and public safety. Those located near transportation corridors and hazardous material handling sites are especially at risk of being impacted by a hazardous material release incident.

3.10.5 Climate Change Impacts

Climate change effects on transport and handling of hazardous materials could manifest in multiple ways. The U.S. DOT Climate Action Plan published in 2021, explains the effects of climate change are increasing over time and this climate variability and change pose threats to transportation systems. Highlights in the report of potential notable impacts include increased risk of vehicle crashes in severe weather, increased temperatures damaging infrastructure (asphalt degradation, expansion of paved surfaces, and railroad tracks buckling), and more frequent / severe flooding due to more intense precipitation damaging drainage infrastructure.

In 2022, the U.S. Government Accountability Office (GAO) released a report informing the U.S. Environmental Protection Agency (EPA) of the importance for the Risk Management Plan (RMP) rule to receive an update to include the consideration of facility risks due to climate change and natural hazards. The GAO report concluded:

> Climate change may exacerbate natural hazards, such as flooding, storm surge, and wildfires, which could potentially lead to accidental releases at RMP facilities. EPA has the opportunity to reduce the risk of accidental releases and minimize the consequences of such releases by ensuring that RMP facilities are managing risks from natural hazards and climate change.

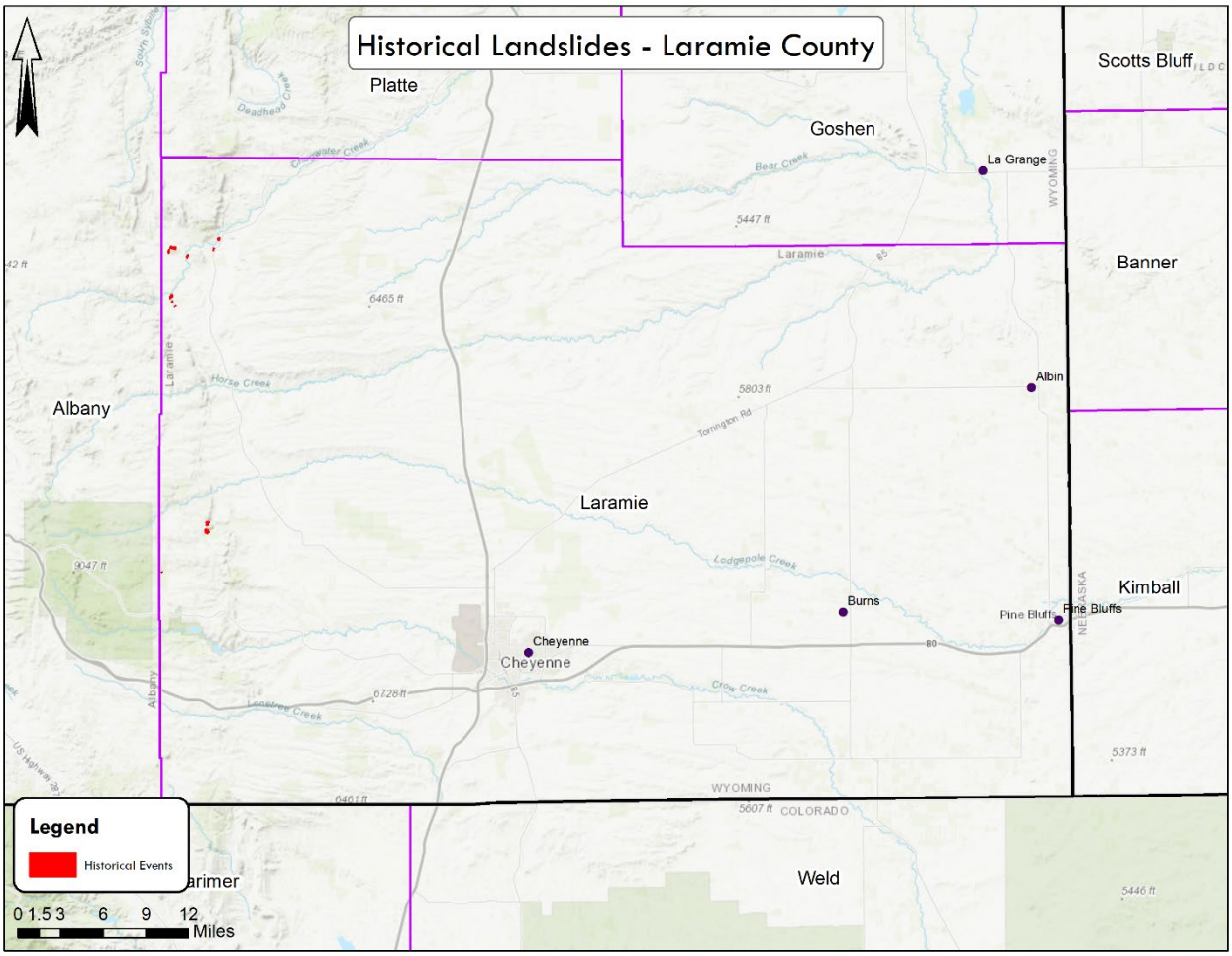
Many hazardous materials are unsafe if not within specific temperature ranges. Extreme temperatures can therefore pose a risk during transport and handling.

3.11 Landslide

3.11.1 Previous Occurrences

Landslides in Laramie County have potentially occurred, however there are no recorded incidents. Landslides often happen in unpopulated areas and therefore go unnoticed.

Figure 3.10 Historical Landslides



3.11.2 Inventory Exposed

Exposure in a landslide incident is localized and the risk to life safety and property is dependent on the proximity of people, structures, and infrastructure to an event. Landslides have the potential to be very large and a large landslide near a populated area or near Lifeline infrastructure, such as transportation, power, or communications, could cause significant economic losses, damages, injuries, and deaths. Rockfalls are also localized and present a risk primarily to those on transportation corridors, as a rockfall could harm motorists, economic impacts from closed roads, or in some cases cause extended damage to the roadway.

Debris flows are less localized and capable of moving trees and boulders considerable differences. The rapid nature and immediate impacts of a debris flow create considerable risk to public safety and any property in its path. Lifelines have the potential to be affected if a debris flow damages roads or bridges, and power or communications systems. Water quality and delivery systems could be impacted by a debris flow.

Table 3.19 accounts for the exposure of parcels to the highest landslide susceptibility areas (highest 30% of risk statewide). These areas are where landslides are most likely to happen and therefore pose the highest risk to people and property. The parcels exposed to the highest risk are worth more than $4.1 million and all but three are residential properties.

Table 3.19 Parcels Exposed to Areas of High Landslide Susceptibility

Jurisdiction	Total Count	Residential	Improved Value ($)	Agricultural	Improved Value ($)
Cheyenne	7	7	166,172	-	-
Pine Bluffs	3	3	387,321	-	-
Unincorporated	35	32	3,559,957	3	52,208
County Total	**45**	**42**	**4,113,450**	**3**	**52,208**

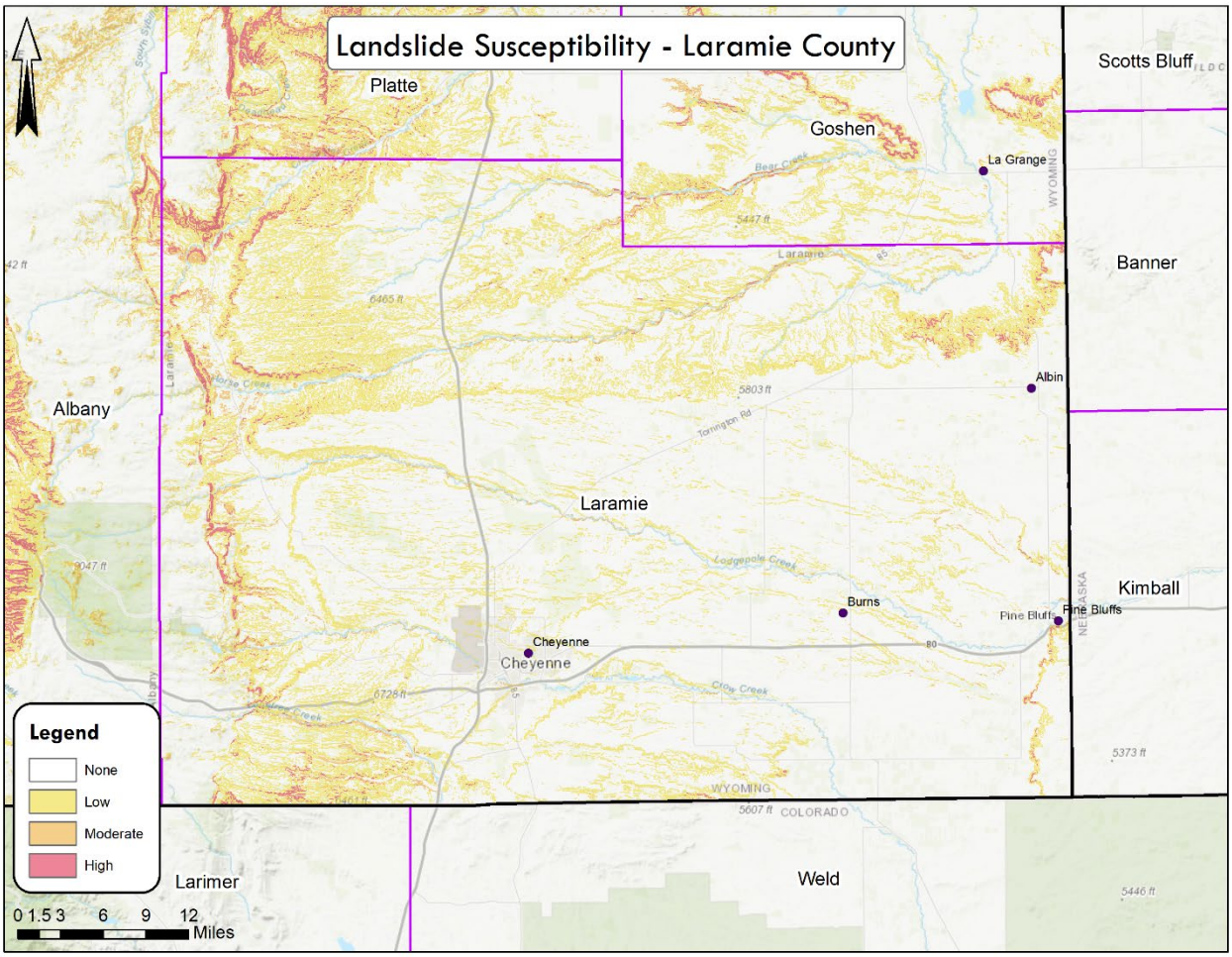
Communications lifeline infrastructure is the only infrastructure exposed to landslide susceptible areas in the county. Approximately, 10% is exposed.

Table 3.20 Lifeline Exposure to Landslide Susceptible Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	634	6	10 %

Figure 3.11 shows all areas of landslide susceptibility across Laramie County. Note that the high susceptibility areas in the county are primarily away from municipalities and transportation routes.

Figure 3.11 Landslide Susceptibility



3.11.3 Probability of Future Occurrences

Landslides occur in potential areas often, however the majority are not witnessed and therefore not reported. Landslides are most common in areas with previous landslide activity.

3.11.4 Future Development Trends

Development should be monitored to ensure no construction is occurring in potential landslide areas.

3.11.5 Climate Change Impacts

The conditions required for landslides and debris flows are greatly affected by climate, including the melt speed and level of snowpack, rapid temperature fluctuations, and erratic amounts of precipitation. The integrity of the soil and rock is affected with each freeze and thaw cycle, which are occurring more often and more rapidly due to unseasonable temperature swings. As landslides are more likely to occur after heavy precipitation and rapid snowpack melt, the unpredictable weather leads to dangerous conditions more frequently. The increased climate variability being experienced is expected to continue and with that the trend toward landslide and debris flow conducive situations will also.

3.12 Lightning

3.12.1 Previous Occurrences

According to NCEI data, only one lightning event has occurred in Laramie County, in 1996 in Cheyenne, since 1950. While there were no injuries or deaths reported, records show a chimney was knocked off a house and a tree was split. Records do not always paint a full picture of hazards within an area and community members of Laramie County will likely say that a number of significant lightning events happen each year.

Data from the SHELDUS database shows 10 incidents of damaging lightning events in Laramie County from 1960 to 2019. These events combined caused 7 injuries, 1 death, and more than $128,000 (2019 USD) in property damages.

Thunderstorm wind events records from NCEI were also analyzed to give a better picture of potential lightning events. According to NCEI, 184 thunderstorm wind events have occurred within Laramie County between 1950 and 2021 causing 1 recorded injury and more than $120,600 in property damage. These statistics are related to wind, but it is important to note that thunderstorms often cause lightning events and are not reported as separate events.

3.12.2 Inventory Exposed

Property, structures, crops, people, and livestock outside during a thunderstorm is at risk of being struck by lightning. The unpredictability of lightning and the recorded instances of lightning strikes occurring miles away from an active thunderstorm illustrate the risk this hazard poses indiscriminately across the county. Lightning has the potential to cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It can also cause forest, brush, and structural fires. Damage from lightning typically occurs in four ways:

- Electrocution, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
  Power surges that can damage electrical and electronic equipment

3.12.3 Probability of Future Occurrences

Past events in Laramie County indicate that the potential magnitude of lightning events will likely be limited but may occur often with thunderstorm and wind events. Future events will likely occur in any given year. While losses are dependent on each particular incident, damage to structures and potential loss of life and injury may occur. Also, adverse effects due to lightning, such as wildfires, have the potential to occur within Laramie County in the future. Wildfire impacts to Laramie County are described in described in further detail in the Wildfire profile section.

3.12.4 Future Development Trends

As Laramie County experiences steady growth, the risk and impacts of a lightning event are prevalent to existing infrastructure and new development. Because these events cannot be predicted, it is hard to determine which particular structures and areas will be impacted. Laramie County should continue to adhere to building codes and development to mitigate future damage to structures should a lightning event occur.

3.12.5 Climate Change Impacts

The effects of climate change are seen across many hazards and lightning is not an exception. The unpredictable number of storms and their characteristics indicate the amount of lightning they bring could change significantly. With the changing weather patterns, the potential increase in thunderstorms events can result in increased lightning occurrences.

3.13 Public Health Hazards

3.13.1 Previous Occurrences

The first case of COVID in Laramie County was identified on March 17, 2020, and was followed by a second the same day. Laramie County, at the time of this plan's writing, had 26,166 cases and 290 deaths.

Laramie County was also affected by the H1N1 outbreak in 2009, as the state saw more than 700 cases. Data discrepancies at the county level make it difficult to give an exact number of cases and deaths. However, there were numerous cases in the county, at least 50, and multiple deaths. The rollout of the vaccine for H1N1 was swift and effective, with thousands of people receiving vaccines at clinics across the state.

In September 2020, the Mullen fire potentially contaminated a reservoir used by the City of Cheyenne. The Board of Public Utilities monitored the situation and educated the public on the Water Treatment Plants methods to address any ash or sediment in the water source from the wildfire.

Air quality has been noted as a concern in the county as an increase in oil drilling could potentially have an effect and this was monitored by Wyoming Department of Environmental Quality since 2018.

3.13.2 Inventory Exposed

The whole population of Laramie County is at risk to public health hazards, especially those with chronic health conditions or other risk factors including access and functional needs. The residents are exposed to public health hazards in multiple ways, whether it is illness through contagious pathogens, harm from poor air quality, or the dangers of poor water quality. The ELC Sanitation District ranked this as a high hazard, highlighting district specific vulnerability concerns with landfill debris spread outside of the landfill or mix contamination, which could cause air and ground contamination if not contained properly.

Mental and behavioral health are critical to include when discussing public health hazards and the whole population can be affected by an event.

See Table 2.1 and Table 2.2 for the demographics and health indicators of the population of Laramie County, which help to keep a holistic view of needs in the communities when planning for potential events.

3.13.3 Probability of Future Occurrences

Laramie County will likely have a public health hazard incident in the future, whether it is water quality, potential disease transmission, or the occurrence of a traumatic event in the community. Air quality is also an example of a prevalent hazard, as wildfire smoke can travel great distances and affect large populations.

The potential for an epidemic or pandemic outbreak is probable, as more novel pathogens are discovered around the world and infectious diseases evolve rapidly. Climate change can contribute to the spread of illness as the increased number of disaster events leads to more mass evacuations and the need for more disaster sheltering, increasing person-to-person interactions.

Mental and behavioral health will continue to be impacted after an incident and as a result of any future incidents. The assistance and support should not stop once the response or even recovery from an incident is over but should considered for the community consistently going forward.

3.13.4 Future Development Trends

Future planning for land use and development should include review of water and sewer systems with public health partners in addition to typical entities. This ensures that should a water quality or environmental safety issue arise all partners are informed and prepared to address the issue.

Consideration of shelters is important when thinking of public health hazards and prioritizing access and functional needs populations is critical. Developing adequate sheltering where residents can be healthy and have hygienic accommodations can assist in slowing the effects of a public health hazard.

3.13.5 Climate Change Impacts

Climate change has affected disease transmission globally, according to the World Health Organization. Temperature fluctuations and extreme weather events create conducive conditions for diseases to manifest and spread. Around the world the movement of people out of cities, heat centers, into the rural areas leads to more interactions between humans and animals. These interactions will lead to the continued discovery of never-before-seen disease and will continue to be a concern. Climate change can also contribute to an increase of person-to-person interactions, as the increased number of disaster events leads to more mass evacuations and need for more disaster sheltering.

The impacts of climate change on wildfire and drought create indirect public health issues related to air and water quality. Research has shown exposure to wildfire smoke, even from great distances, has a long-term effect on people's health and drought can contribute to heavy metal concentration increases in water sources. The indirect impacts of climate change on public health are being studied around the world and as climate change continues, the negative effects on public health will likely increase rapidly.

3.14 Tornado

3.14.1 Previous Occurrences

NCEI records for Laramie County include 123 tornado events reported from 1950 to 2021. The highest ranking tornadoes seen in Laramie County were two F3 events in 1960 and 1979, as well as multiple F2 and EF2 tornadoes between 1976 and 2018.

The most devastating tornado in Laramie County occurred on July 16, 1979. This event caused extensive damages as it moved through the north portion of Cheyenne. The tornado was reported to have injured 40 people, killing one, and destroyed or damaged aircraft, National Guard equipment, airport hangars, municipal buildings, and residential structures. A Department of Commerce report from July 1979 stated an estimated $18 million in privates homes and $10 million in city-owned structure damage, however these figures may have been overestimated, not reported, or any claims may have not been shared outside of private databases.

Based on SHELDUS data, Table 3.21 shows the years with reported tornado damages, injuries, and deaths from 1960 to 2019. It is important to note that data can vary from one database to another based on multiple factors, such as reporting gaps and differing information sources. SHELDUS presents the overall picture of best available data for reported tornado damages, which are adjusted to 2019 USD.

Tornadoes are an important example of best available data constraints, as multiple databases have highly differing information due to a lack of centralized, standardized reporting. Laramie County is located near "tornado alley" making tornadoes an understandable risk, with any number of tornadoes posing significant hazard to the public and property. Figure 3.12 shows the identified historical tornadoes in the county

Table 3.21 Tornado Event Damages per Year, 1950-2019 (2019 USD)

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1960	43,776	0	3	0
1962	0	4,291	0	0
1965	411	0	0	0
1968	37,235	0	0	0
1971	3,199	0	0	0
1974	26,283	0	0	0
1976	0	455	0	0

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1977	0	428	0	0
1979	17,850,068	0	40	1
1986	118	0	0	0
1990	2,082	0	0	0
1991	104,651	95,137	0	0
1997	3,229	0	0	0
1999	3,111	0	0	0
2002	43,216	0	0	0
2008	24,073	0	0	0
2010	59,424	0	0	0
TOTAL	**18,200,879**	**100,311**	**43**	**1**

Figure 3.12 Historical Tornado Events, Laramie County

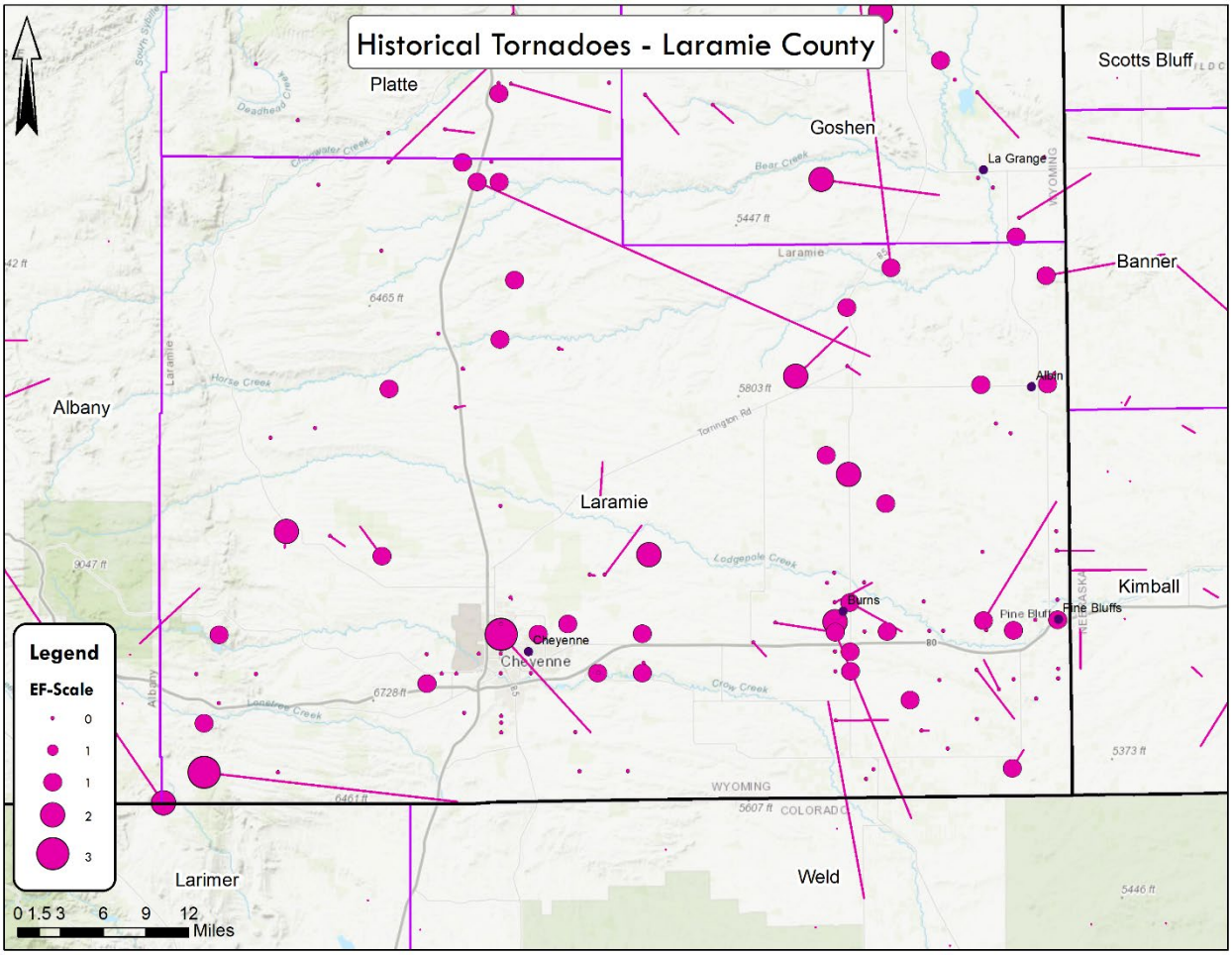


Table 3.22 details notable tornado events in and around Cheyenne.

Table 3.22 Notable Historical Tornado Events - Cheyenne

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Cheyenne	**5/29/1948**	**0**	**0**	**$10,000**	**$0**
A tornado occurred about 10 miles north of Cheyenne. The tornado destroyed some farm buildings, causing about $10,000 in damage. There was no loss of life.					
Cheyenne	**4/19/1971**	**0**	**0**	**$2,750**	**$0**
A tornado moved from southeast to northwest, damaged roofs, outbuildings, and toppled one house trailer. Damages were estimated at $2,750					
Cheyenne	**7/16/1979**	**0**	**0**	**$5,000,000**	**$0**
An F3 tornado rapidly developed from a moderate thunderstorm and moved through the north part of Cheyenne housing and airport areas. Damage included four C-130 aircraft and National Guard ground equipment, city-owned airport hangars and buildings damaged, 40 homes destroyed, 100 homes with major damage, 225 homes with lesser damage, and 17 trailer homes destroyed. One destroyed trailer home contained a family, killing a 14-month old boy and severely injuring the mother and a second child. The Cheyenne area received an estimated $5 million worth of damage.					
Cheyenne	**7/30/1979**	**0**	**0**	**-**	**$0**
Two tornadoes and several funnel clouds were seen just west of town. One tornado damaged buildings on a ranch 8 miles west of Cheyenne. The second tornado caused no damage					
Cheyenne	**6/18/1997**	**0**	**0**	**$2,000**	**$0**
A tornado touched down near the intersection of Four Mile Road and College Drive, destroying a storage shed. The tornado caused $2,000 in damages.					
Cheyenne	**5/30/1999**	**0**	**0**	**$2,000**	**$0**
A tornado briefly touched down on the extreme north edge of Cheyenne, blowing out two windows and causing minor roof damage to a house. Damages were estimated at $2,000					
Cheyenne	**6/13/2017**	**0**	**0**	**-**	**$0**
Multiple tornadoes touched down in Laramie County and surrounding counties. These tornadoes caused a variety of damage, including at least nine homes or agricultural structures in the community of Carpenter, as well as northeast of Cheyenne near County Road 222 and U.S. Highway 85. The tornadoes downed power lines and damaged a gas line. No injuries or deaths were reported					
Cheyenne	**5/18/2018**	**0**	**0**	**-**	**$0**
A tornado touched down and approximately 10 homes were damaged. Three of these homes had to be torn down and re-built.					

3.14.2 Inventory Exposed

Exposure to tornadoes is the same for the whole county, as tornadoes can touch down randomly throughout. Therefore, all assets are exposed but the potential damages are dependent on the characteristics of the tornado and its location as well as: the age and type of buildings, construction material used, and condition of the structure.

Lifelines could potentially be impacted based on the location of the tornado, including damage to infrastructure leading to power and communications disruption, water and fuel shortages, transportation issues and damage to services such as hospitals, water treatment, and wastewater facilities. Specific concern for the ELC Sanitation District include facility damage and wide spread of debris.

The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. The population needs to be aware of how to seek shelter during a tornado and avoid behaviors or decisions that place them in greater danger.

3.14.3 Probability of Future Occurrences

Although tornadoes are difficult to predict, based on previous occurrences, Laramie County could anticipate significant property damages from a single tornado event in the future. Historical frequency suggests that there is a likely chance that a tornado will occur somewhere in the county each year.

The likelihood of a tornado occurring changes according to the time of year. Based on historical records, tornadoes occur most frequently in May and June with some occurring as early as April. Community members should maintain awareness of tornado watches and warnings throughout the year

3.14.4 Future Development Trends

All future structures built in Laramie County are exposed to tornado and severe wind damage. As with other large extent hazards, increased development will increase the vulnerability of these areas. Laramie County must continue to adhere and enforce building codes and facilitate new development that is built to the highest design standards to account for tornadoes and severe wind.

Due to the sporadic nature and characteristics of tornadoes, the county is not expected to be impacted equally. Older, non-code compliant homes and mobile homes are especially dangerous places during a tornado. Growth in Laramie County should include local agencies monitor the inventory and locations of mobile homes, particularly in areas of high tornado risk. Mitigation action discussion for severe winds and tornadoes in the county should have a focus on communities and geographic locations with large numbers of mobile homes.

3.14.5 Climate Change Impacts

The effect of climate change on frequency and intensity of tornadoes is being studied by scientists across the country. Tornadoes last for short durations, seconds to hours, and have a relatively small footprint compared to other weather-related hazards, making it difficult to model them. Scientists are using predictions of weather components that contribute to tornado occurrence and as weather shifts they can see trends in these components. The changes in weather patterns include increases in warm, moist air and wind shear, as well as an unstable atmosphere which create more favorable environments for tornadoes. These trends can possibly increase future occurrences and as climate change effects continue that likelihood grows.

3.15 Wildfire

3.15.1 Previous Occurrences

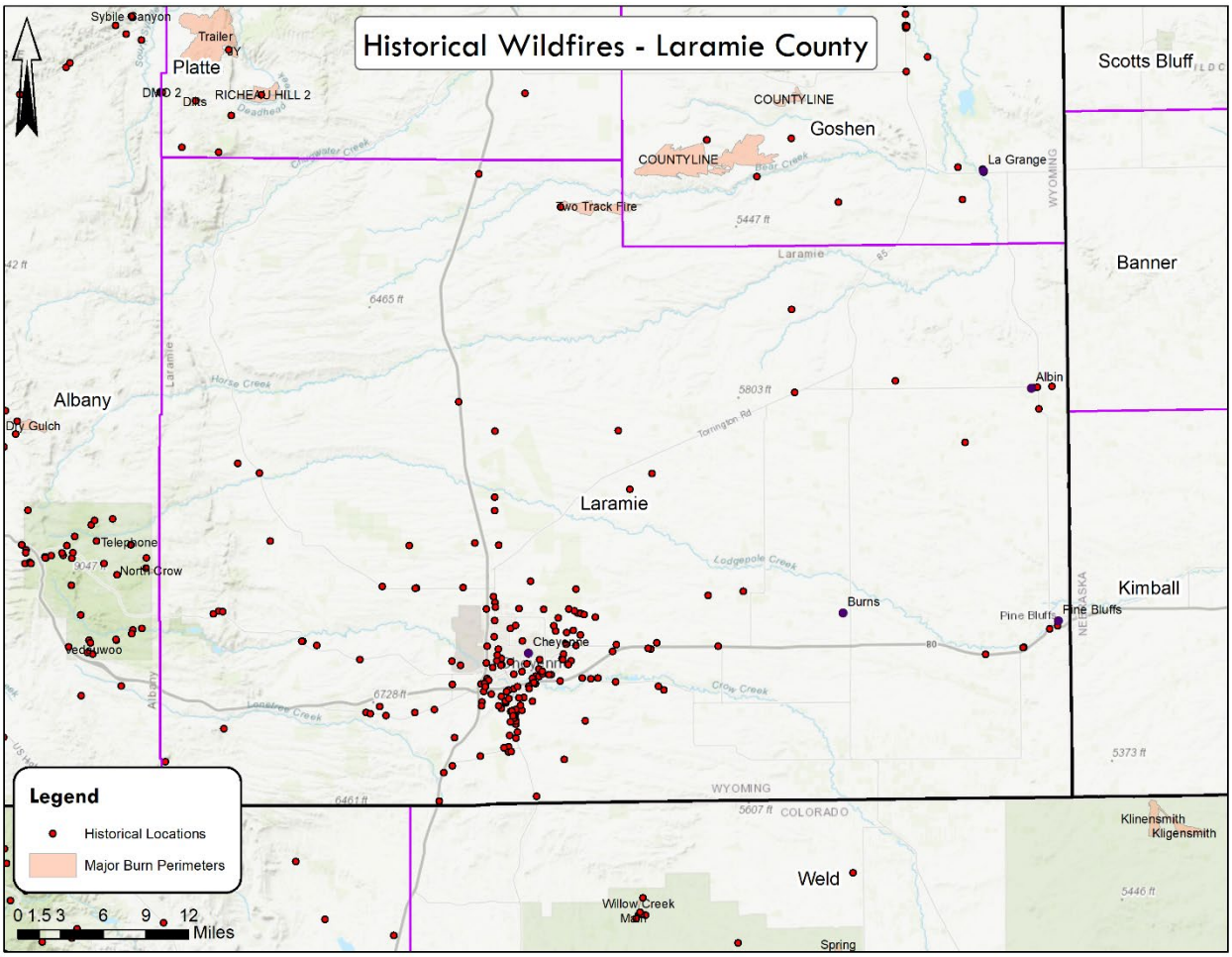
The Federal Wildland Fire Occurrence Database recorded five wildland fires in Laramie County between 1980 and 2021. Two of those fires were false alarms and burned zero acres. The Herrick Creek Cabin #2 fire

burned a tenth of an acre on July 4, 1999, and the Little Bear fire burned 3,125 acres on September 15, 2005.

Wyoming State Forestry GPS mapping determined details for a wildland fire that occurred on January 27, 2004, which started from a spark from a residential wood-burning stove and caused a grass fire five miles southeast of Cheyenne. High wind (50-60 mph) and an abnormally high ambient temperature (60 degrees Fahrenheit), helped the fire spread rapidly. The actual burn area covered 3,014 acres. Overall, the fire "ran" a linear distance of seven miles. The fire destroyed rangeland grasses, a large tree row, and an abandoned building.

The Otto Road fire on October 11, 2015, burned more than 1,000 acres including hundreds of acres of his private grazing lands. It is believed to have started due to a man in the area shooting recreationally at exploding targets.

Figure 3.13 Historical Wildfires



3.15.2 Inventory Exposed

All structures, infrastructure, people, and exposed utilities are potentially vulnerable to damages from a wildfire event. Figure 3.14 presents the wildfire risk across Laramie County. Structures that have not proactively mitigated wildfires are most at risk. Table 3.23 summarizes those parcels that are located within the highest (top 20% statewide). Readers are directed to the WY State Forestry Division's Wildfire Risk Assessment Portal to best review this information at a more user-friendly community scale.

Unincorporated areas of the county and all municipalities have some exposure to the highest wildfire risk areas. The unincorporated areas have the largest amount of parcels exposed, approximately half of the total in the county, and valued at more than $695 million. Residential properties make up the vast majority of the total exposed parcels in Cheyenne and value at more than $608 million. Of the properties exposed in the county, approximately 96% are residential. The unincorporated areas have the highest number of commercial properties exposed with a value more than $95.8 million. Within the county, commercial properties are approximately 4% of the total number of parcels exposed in the highest wildfire risk areas and hold approximately 7% of total parcel value. There are 18 exposed agricultural parcels, the highest number of which are in the incorporated areas and combined are worth approximately $168,000.

Table 3.23 Parcel Exposure to Areas with Highest Wildfire Risk

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)	Agricultural	Improved Value ($)
Albin	51	48	3,737,444	3	550,227	-	-
Burns	138	135	9,791,546	3	255,674	2	2,343
Cheyenne	2,501	2,403	608,028,111	98	78,347,074	4	59,974
Pine Bluffs	232	220	14,347,838	12	619,321	1	937
Un-incorporated	2,968	2,861	599,427,206	107	95,858,340	11	104,816
County Total	**5,908**	**5,667**	**1,235,332,145**	**223**	**175,630,636**	**18**	**168,070**

All lifelines, with the exception of hazardous materials, have infrastructure exposed to areas with the highest wildfire risk in the county. The lifelines with the greatest exposure are communication and food, water, and shelter which both have 28% of infrastructure exposed. This is followed by safety and security, with 25% of infrastructure exposed and energy with 21% of the infrastructure exposed. The remaining lifelines have infrastructure exposure below 20% and can be seen in Table 3.24.

Table 3.24 Lifeline Exposure to Areas with Highest Wildfire Risk

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	634	177	28 %
Energy	102	21	21 %
Energy (miles)	1,478	191	13 %
Food, Water, & Shelter	18	5	28 %
Health & Medical	30	5	17 %
Safety & Security	44	11	25 %
Transportation	365	61	17 %

There are no parcels or lifeline infrastructure exposed to the highest risk (top 33% statewide) Wildland Urban Interface (WUI) areas.

The areas covered by the Fire Protection Districts in Laramie County are shown in Figure 3.15.

Figure 3.14 Wildfire Risk

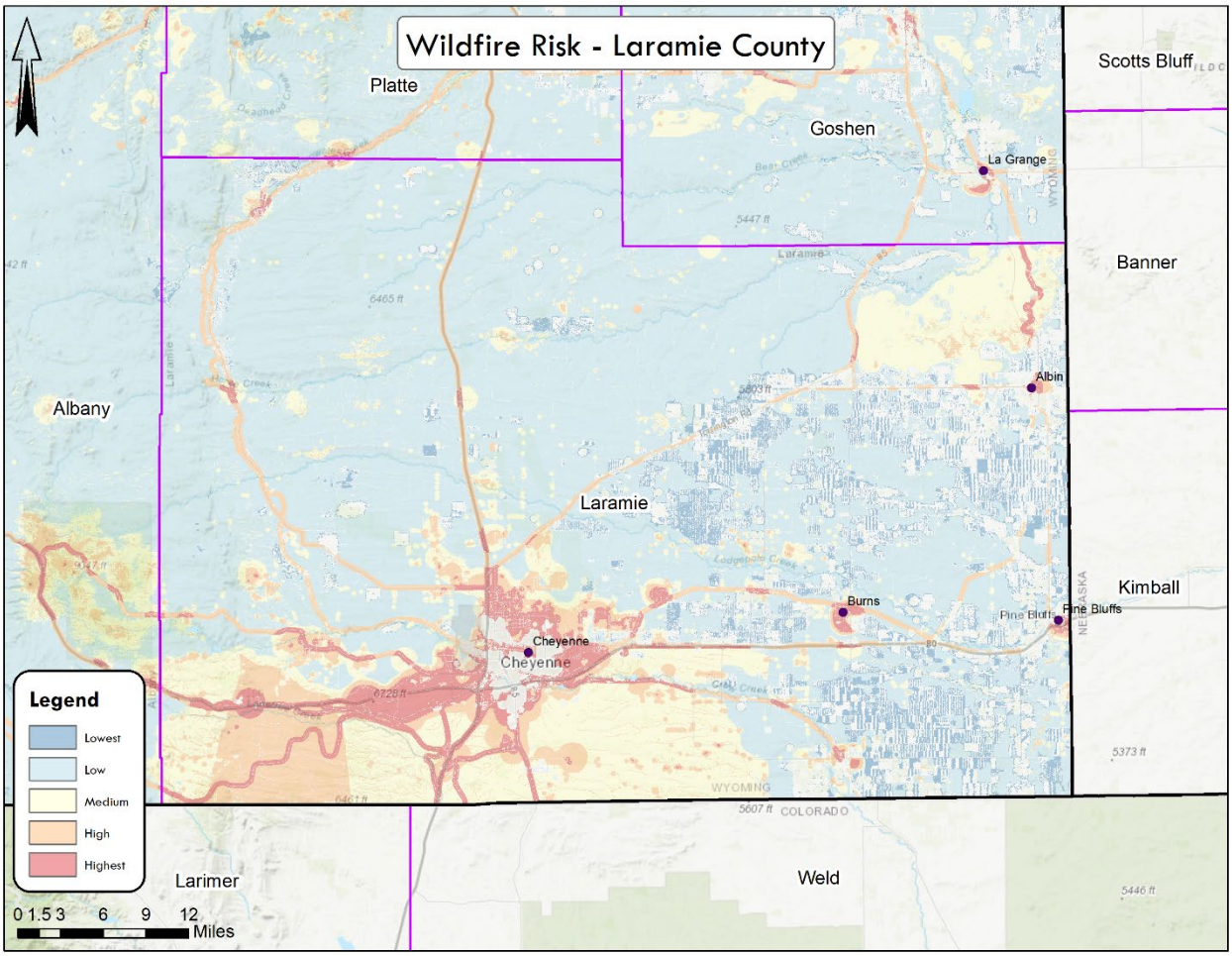
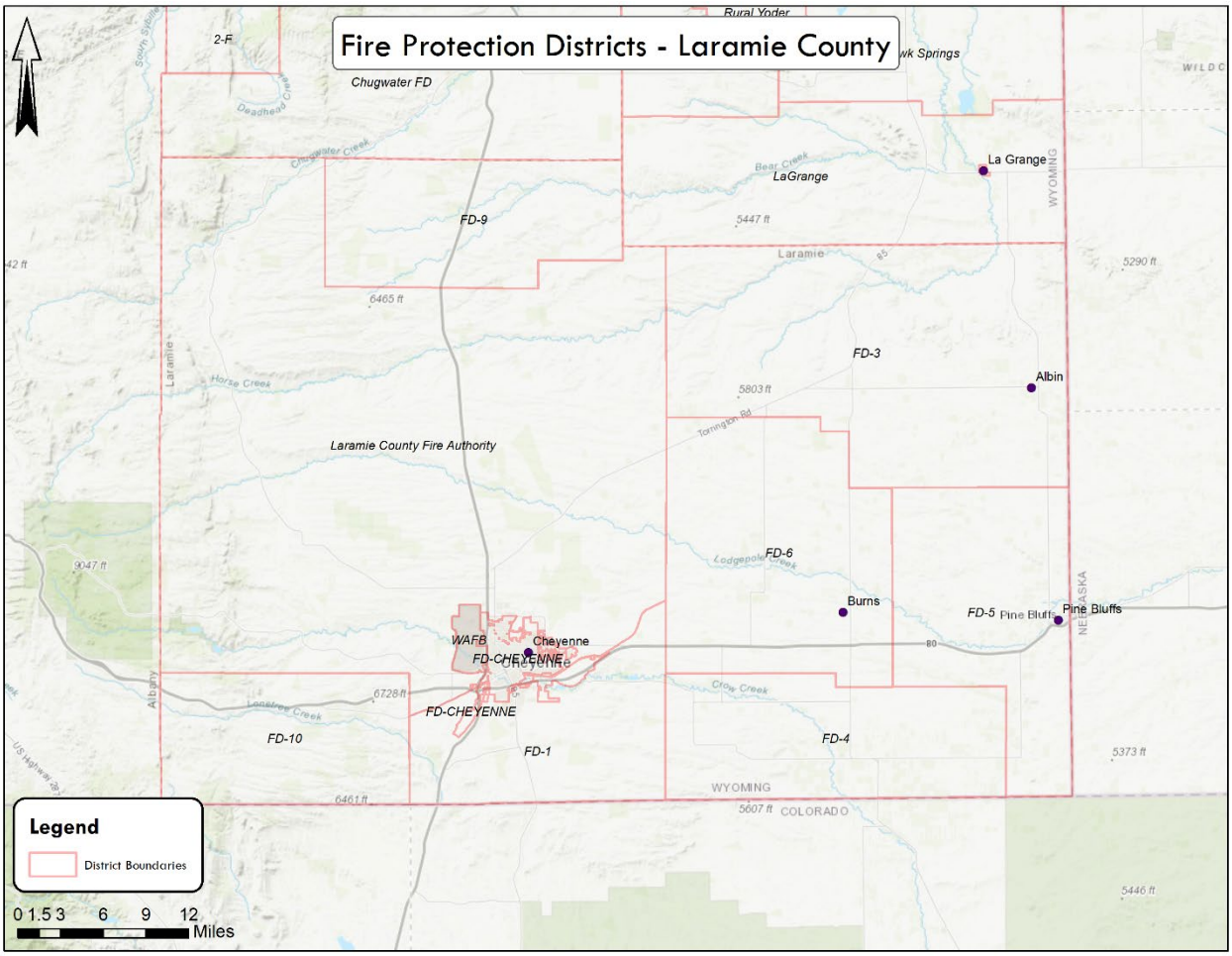


Figure 3.15 Fire Protection Districts



In Figure 3.16 and Figure 3.17, the United States Forest Service's (USFS) Wildfire Risk to Communities overview of risk to homes in Laramie County and its communities can be seen. The portal allows for a closer look down to the community level and comparison of risk against other counties or communities. The risk to homes in the county, which is determined based on the likelihood and consequences of wildfire is illustrated in the portal snapshot. According to the assessment of data in the portal the populated areas in Laramie County have, on average, greater risk to homes than 32% of the counties in Wyoming. Using the portal at the community level, the assessment of data shows that populated areas in Cheyenne have, on average, greater risk to homes than 10% of the communities in Wyoming.

Figure 3.16 Wildfire Risk to Communities Portal – Laramie County Level

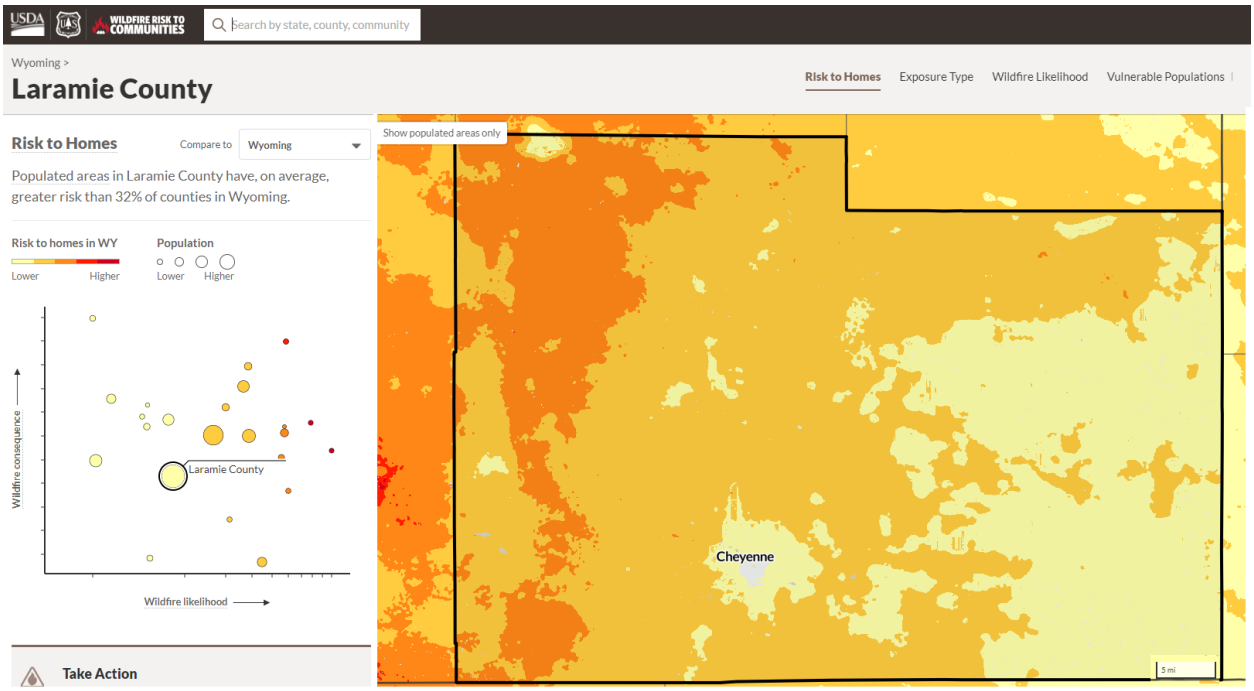
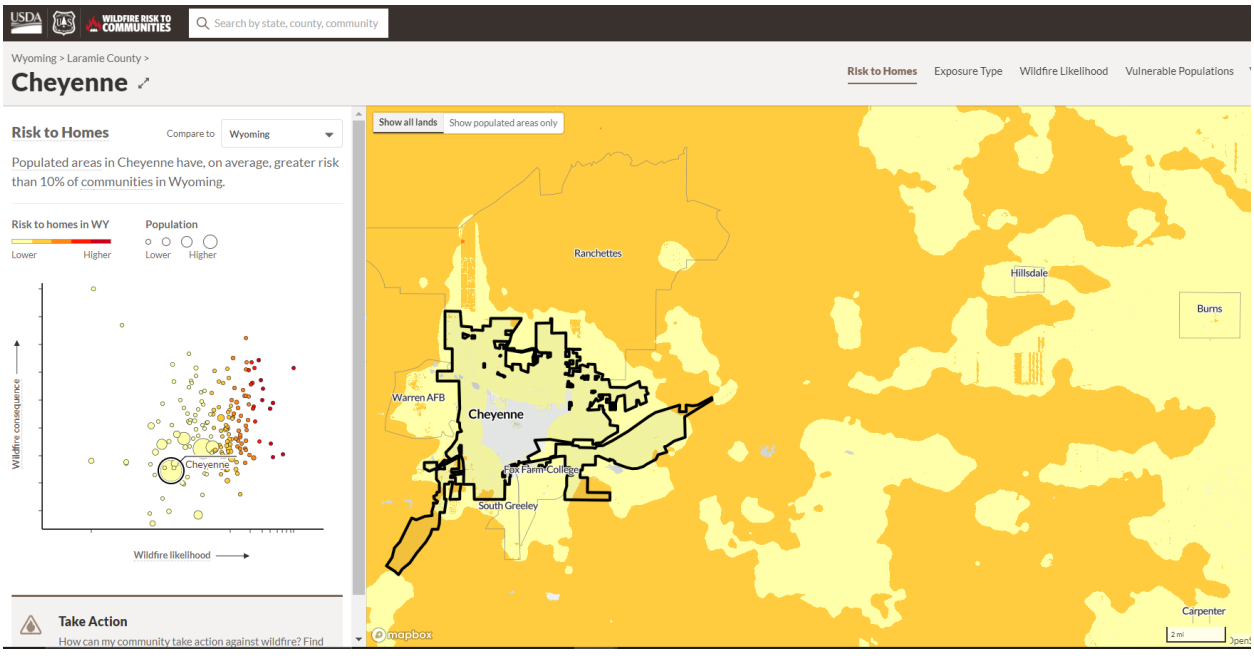


Figure 3.17 Wildfire Risk to Communities Portal – Community Level



Specific concern for the ELC Sanitation District include burnt landfill content which could cause hazardous smoke due to mix content.

3.15.3 Probability of Future Occurrences

Given Laramie County's previous records of wildfire occurrences, it can be assumed that future wildfire events will occur within the county. Wildfires can occur year-round and that the risk of wildfires occurring may increase

during times of drought, especially prolonged droughts. Most events are quickly contained and do not burn a large number of acres.

According to research by the National Park Service, 85% of wildfires are human-caused, primarily due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity. Events are more likely to occur in wildfire-prone areas experiencing new or additional development.

3.15.4 Future Development Trends

As Laramie County experiences steady growth, the risk and impacts of a wildfire event are prevalent to both existing infrastructure and future development. Subdivisions and other high-density developments can create a situation where wildland fires can involve more buildings than any amount of fire equipment can possibly protect. By identifying areas of higher density in high-risk areas, communities can identify areas of mitigation interest and reduce hazard risks associated with increased exposure.

Development and population growth in the WUI contributes to increased exposure of people and property and can exacerbate the potential magnitude of a wildland fire. By identifying areas with significant potential for population growth and/or future development in high-risk areas, communities can identify areas of mitigation interest and reduce hazard risks associated with increased exposure. Some land use and building codes include and/or focus on mandatory mitigation measures. As a mitigation strategy, Laramie County and its jurisdictions should continue to regulate building and future development in the WUI.

Laramie County has a Community Wildfire Protection Plan (CWPP) for the Laramie County Fire Authority (LCFA), developed in 2022, and Fire District 10, which was developed in 2016. These were created to better understand and address the risk presented by wildfires. The CWPP was created to help reduce the threat of devastating wildfires to the watersheds that feed the lakes, especially in Curt Gowdy State Park, and to protect the numerous homes in the area. The CWPPs developed recommended actions to address ways for residents, fire districts, and agencies to reduce their collective risk.

Continuous public education is crucial to implementing actions and preparing homeowners. Safety zones can be created around structures by reducing or eliminating brush, trees, and vegetation around a home or facility. FEMA recommends using a 30-foot safety zone; including keeping grass below two feet tall and clearing all fallen leaves and branches promptly. Additionally, only fire-resistant or non-combustible materials should be used on roofs and exterior surfaces. Firebreaks-areas of inflammable materials that create a fuel break and reduce the ability for fires to spread and roads and pathways-can be planned and designed to serve as wildfire mitigation.

3.15.5 Climate Change Impacts

Climate change has steadily increased the frequency and intensity of wildfires around the nation. Continued unpredictable precipitation and weather patterns will lead to increased occurrence, extended durations, and magnified severity. The patterns of drought, brought by drier and hotter climate, create conditions that wildfires thrive in, and these fires have begun to consistently spread faster and farther. Wildfires will continue to thrive on the lack of humidity and dry vegetation created by drought, often perpetual. Hotter conditions fuel fires, the extreme temperature fluctuations and unseasonable increases in heat have and will continue to create a longer wildfire season.

3.16 Wind

3.16.1 Previous Occurrences

Between 2009 and 2021, NCEI recorded more than 618 high wind events in Laramie County. These events resulted in the reports of one death, seven injuries, and $2,000 in property damage. Damages due to high

wind events usually include damaged roofs, toppled trees, broken branches, and blown-out windows. It is also common for semi-tractor trailers to be blown over, as was the case with the event with reported damages.

Thunderstorm winds impact Laramie County as well and are associated with 58mph winds or greater related to a thunderstorm event. Damages from these events may be due to hail or lightning and not wind in particular, but the best available data from NCEI extends further in the past than for high wind events. From 1950 to 2017, 180 thunderstorm wind events were recorded in Laramie County. These events caused 1 injury and more than $119,000 in property damage.

The highest wind speed measured was 81mph, recorded in November of 2020 by a Union Pacific Railroad sensor in the South Laramie Range Foothills, approximately 14 miles from Cheyenne.

The SHELDUS database has damages reported for 41 out of the 58 years between the period of 1961-2019. The total property damages reported due to high wind events in that time period is more than $6.5 million (2019 USD), while crops damages were more than $5.3 million (2019 USD). A total of 29 injuries and zero fatalities were reported. Not all damages get reported and it is possible the losses and number of event years is higher.

Table 3.25 shows historical damaging wind events across the county. The two most notable events for property and crop losses were in 1981 and 1984. In 1981, there was a report $4.8 million in crop losses and in 1984, property damages of more than $3.1 million were reported.

Best available data is used for these figures. SHELDUS utilizes multiple sources for determining damaging events and loss figures, but does not report on events without recorded damages. If damages are not reported, the data cannot represent the actual losses caused by an event. The information below is based on the best available data from reported damaging events.

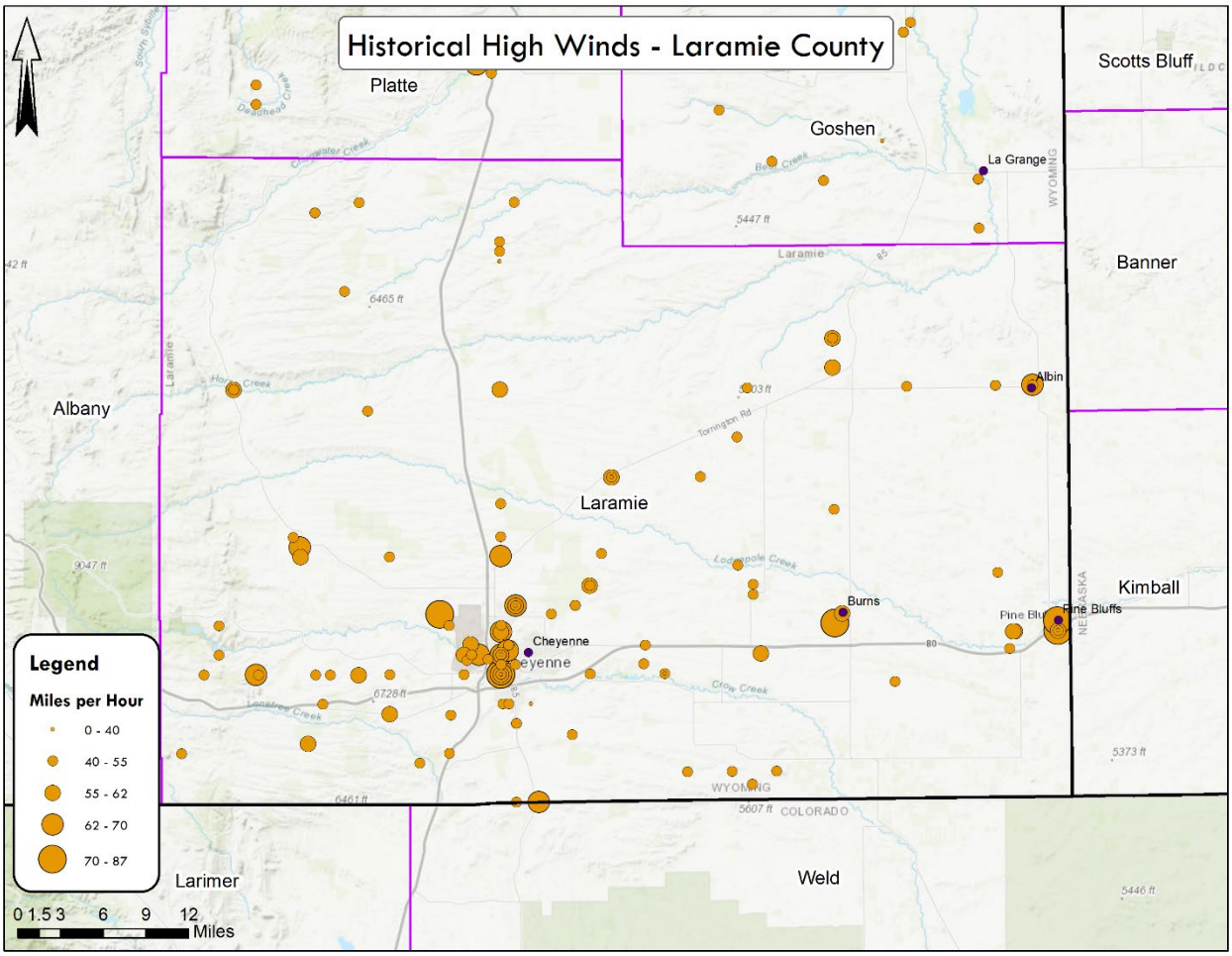
Windblown deposits, also called loess, are common in some parts of Wyoming. There are no recorded events in Laramie County of windblown deposits causing structural damage, however it is possible such instances go unreported. Identified windblown deposit areas can be seen in Figure 3.19.

Table 3.25 Wind Damages per Year 1961-20194 (2019 USD)

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1961	6,630	54,171	0	0
1964	72,694	0	0	0
1966	44,437	0	0	0
1972	283,037	0	0	0
1973	222,053	0	0	0
1974	80,476	0	0	0
1975	261,793	0	0	0
1976	227,728	0	0	0
1977	4,648	0	0	0
1978	203,923	0	0	0
1979	77,600	0	0	0
1981	0	4,751,641	0	0
1982	14,905	0	0	0
1983	5,979	0	0	0

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1984	3,120,087	103,928	0	0
1985	414,663	401,416	1	0
1986	20,510	0	2	0
1987	3,526	0	0	0
1988	73,095	13,570	0	0
1989	9,804	0	0	0
1990	13,098	0	0	0
1992	4,618	0	0	0
1993	896,728	0	7	0
1994	43,717	0	7	0
1995	5,668	0	0	0
1996	6,273	0	0	0
1997	2,402	1,998	0	0
1998	7,022	0	0	0
1999	79,685	0	0	0
2000	82,773	0	3	0
2002	36,014	0	0	0
2003	28,169	0	0	0
2004	68,596	0	0	0
2006	6,749	0	0	0
2007	28,747	0	1	0
2008	48,147	0	0	0
2009	4,832	0	1	0
2010	40,071	0	0	0
2011	0	0	7	0
2014	0	0	1	0
TOTAL	**6,550,897**	**5,326,724**	**29**	**0**

Figure 3.18. Historical High Wind Events, Laramie County



3.16.2 Inventory Exposed

Laramie County's topography can exacerbate high wind conditions. Laramie County lies in the eastern plains of Wyoming, marked by miles of prairie without natural windbreaks. High winds can speed across the plains without any obstacles, adding to the velocity and force of the wind. Wind speeds of 60mph are not uncommon in the county. High winds that occur in combination with severe winter storms can be especially damaging.

All of Laramie County may be affected by high wind events and events could potentially impact Lifeline function, such as damaging power and communications infrastructure. Specific to the ELC Sanitation District high winds could carry contents and potentially cause injury and public health hazards.

According to the Wyoming State Geological Survey, windblown deposits are considered a hazard because they may damage property. These deposits may also impact infrastructure, crops, and water supplies. Table 3.26 shows the parcel exposure of properties in areas identified as locations of windblown deposits.

There are 19 parcels in unincorporated areas of the county that are exposed to areas identified as having windblown deposits. The total value for all exposed parcels is approximately $800,000 and except for one are all residential. The remaining is an agricultural parcel valued at more than $5,500.

Table 3.26 Parcels Exposed to Identified Windblown Deposit Areas

Jurisdiction	Total Count	Residential	Improved Value ($)	Agricultural	Improved Value ($)
Unincorporated	19	18	793,054	1	5,544
County Total	**19**	**18**	**793,054**	**1**	**5,544**

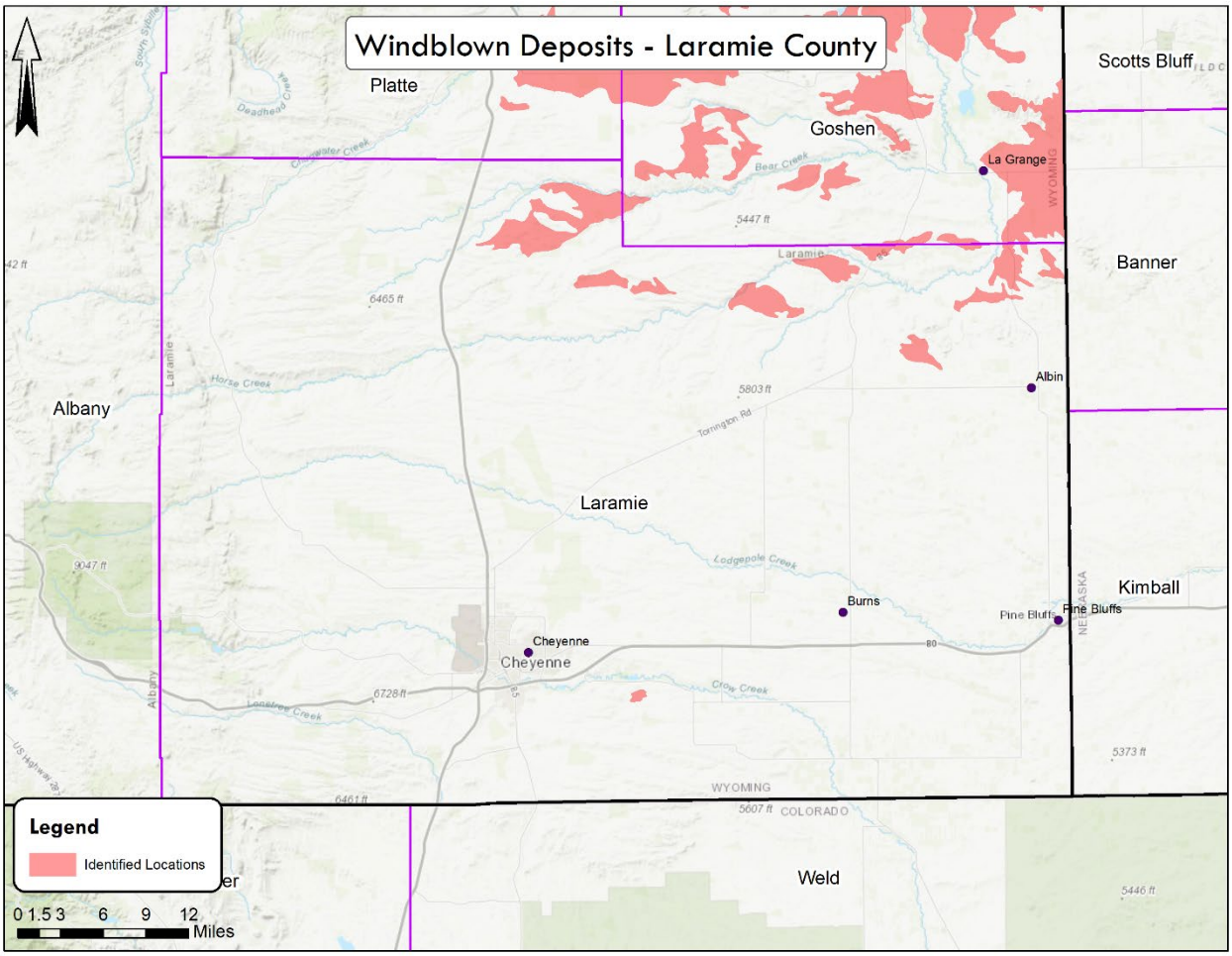
Only two lifelines have infrastructure exposed to windblown deposits areas, however the exposure is minimal.

Table 3.27 Lifeline Exposure to Windblown Deposits Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	634	2	<1 %
Energy	102	1	1 %

Figure 3.19 shows the areas identified as having windblown deposits, which are located predominantly in the northeastern portion of the county.

Figure 3.19 Identified Windblown Deposit Areas



3.16.3 Probability of Future Occurrences

Historical records and the frequency of previously reported high wind events in Laramie County indicate that high winds are likely to occur in any given year and have the potential to inflict costly damage to people and property. Mitigating damage requires that communities remain diligent about building structures that meet current building codes in order to be able to withstand damage.

Windblown deposits are consistently being carried to different areas and will likely continue for the foreseeable future.

3.16.4 Future Development Trends

As Laramie County experiences steady growth, the risk and impacts of a wind storm are prevalent to both existing infrastructure and future development. Because these events are not typically isolated to one geographical area, the location of structures does not increase or reduce the risk necessarily. Laramie County should adhere to building codes and development should be built to current standards in case of adverse weather.

Consideration of windblown deposit locations should be taken into account for any potential development sites. Destabilizing deposits can have longer term impacts on health, property, and infrastructure

3.16.5 Climate Change Impacts

Climate change has increased global wind speeds according to a study in the journal Nature Climate Change. Analyzing data from 1978 to 2017 from more than 1,400 stations, revealed increasing wind speeds since

2010. This trend is expected to continue, as fluctuations in temperatures and unpredictable weather patterns will continue to alter the natural climate cycle. It is unknown whether this will impact the occurrence or severity of high wind events. It is unknown if climate change will affect windblown deposits.

3.17 Winter Storm

3.17.1 Previous Occurrences

According to NCEI storm events database, 520 blizzard/heavy snow/winter storm/winter weather events have occurred in Laramie County since records began in 2009 and continued through 2021. No injuries, property, or crop damage were reported due to these events, however one death has occurred. These events include the storms in which Laramie County and its jurisdictions were primarily impacted, however numerous other regional storms have been recorded as affecting the county, including extended road closures.

According to the SHELDUS database, 35 injuries, 4 deaths, more than $3.1 million in property damages, and more than $600,000 in crop damage resulted from winter weather events in Laramie County between 1960 and 2019. These figures are adjusted to the value of 2019 U.S. dollars.

Roughly one third of the property damages reported in SHELDUS occurred in 1997, with $1.1 million reported. Based on a 1997 NOAA Storm Data Report, the event occurred between December 8-11, 1997, and contributed to 76 accidents between Laramie and Albany counties. On December 10th, a bus was rear-ended by a semi-truck 14 miles west of Cheyenne resulting in 21 passengers being injured and on December 11th a woman died of exposure after leaving her disabled vehicle. The temperature at the time was approximately 20 degrees below zero Fahrenheit and the wind chills in the vicinity were 70 degrees below zero.

Details for a recent significant winter storm event, which occurred between March 12th and 15th 2021, have been provided by the NWS Cheyenne. The storm brought high snowfall totals, thundersnow, and increased windspeeds up to 55mph. The windspeeds and intense snowfall led to snow drifts, up to three feet high, which closed roads for up to three days and segments of I-25 and I-80 were closed for extended periods over multiple days. It was reported by the planning committee as resulting in $1.5 million damages in Laramie County alone. There were widespread power outages and it was reported multiple roofs collapsed. There was one reported fatality due to exposure and the official snow total was almost 31 inches.

According to NCEI storm events database, nine extreme cold or wind chill events have occurred in Laramie County between 2009 and 2021. Although these events take place as a result of winter weather, their primary feature was extreme cold. No deaths, injuries, or damages were reported as a result of these events.

3.17.2 Inventory Exposed

Winter storms can cover a large geographic area, as the event travels. Therefore, all of Laramie County is exposed to this hazard and could be impacted. However, the severity of these impacts on the people, property, crops, and livestock in the county is not uniform and is dependent upon numerous variables.

Damaged power lines and dangerous or impassable roadways may hinder the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or the provision of basic utilities, such as heat and running water.

Extreme cold poses a risk to all assets and the population located in Laramie County. Most structures should be able to provide adequate protection if an extreme cold event occurs. Extreme cold can disrupt communications facilities and utility transmission lines, as well as the potential for water pipes to freeze. Extreme cold has the ability to impact livestock and crops if the event occurs during certain times of the year.

3.17.3 Probability of Future Occurrences

Severe winter storms and blizzards can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow

storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter storms provide benchmarks for projecting similar conditions into the future. The probability that participating communities will experience a severe winter storm event, based on historical records and frequencies, is highly likely and expected to occur at least once every year.

The probability that Laramie County will experience another extreme cold event can be difficult to quantify. It is important to note that the limited amount of historical accounts for extreme cold temperatures does not necessarily indicate a low frequency of occurrence. Certain hazards occur more frequently in specific areas. Therefore, the residents of these areas are less likely to report events that seem commonplace, even though the events may be considered extreme in other locations.

3.17.4 Future Development Trends

As Laramie County continues to see steady growth, the risk and impacts of a winter storm event are prevalent to both existing infrastructure and future development. Since the previous statement is assumed to be uniform for the county, the location of structures does not increase or reduce the risk necessarily. Participating communities should adhere to building codes, and therefore, new development can be built to current standards to account for adverse weather. Additionally, as homes go up in more remote parts of the county, accessing those rural residents may become impossible should sheltering or emergency services be needed in an extreme event.

3.17.5 Climate Change Impacts

As climate change unpredictably affects weather patterns, the types and numbers of winter storms is being impacted. The intensity and frequency of storms has been notably different in recent history, from unexpectedly heavy precipitation and extreme cold temperatures, to unseasonable temperatures and minimal precipitation. These drastic fluctuations are indicative of the impacts from climate change and are likely to create more dangerous and damaging winter storms. The limited ability to consistently predict accurate conditions for winter storms can leave people exposed and infrastructure unprotected

4 Plan Adoption, Implementation, and Maintenance

Having a plan for monitoring, evaluating, maintaining, and implementing this HMP is critical to maintaining its value and success. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continual basis.

4.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the HMPC will be tasked with the plan's implementation and maintenance and will be led by the Laramie County Emergency Management Department. The HMPC will act as an advisory body. Its primary duties will be to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. With the adoption of this plan, the HMPC agrees to:

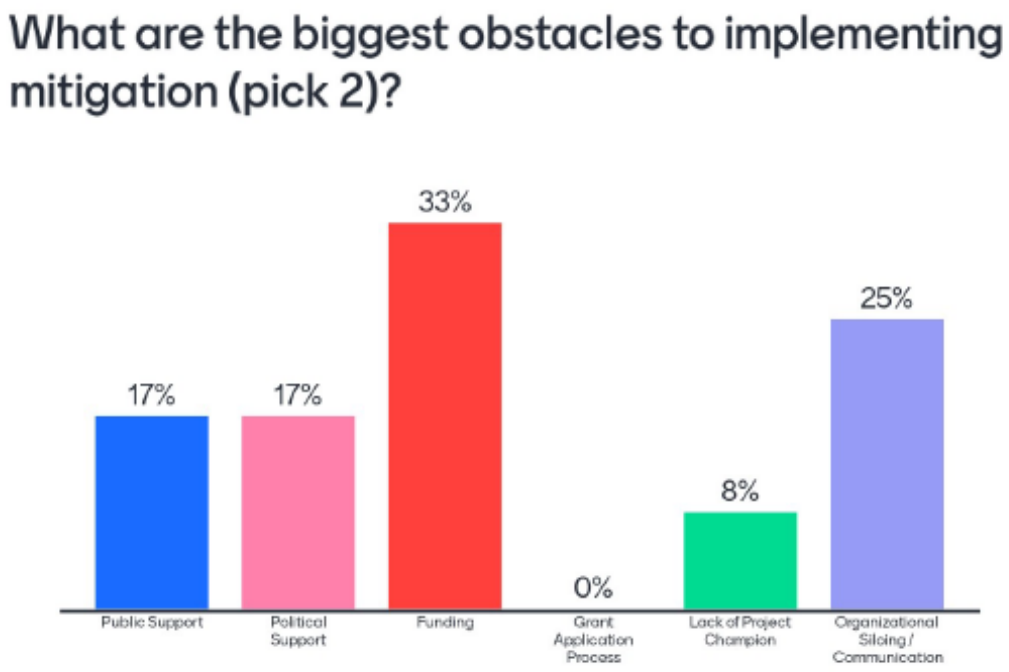
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision-making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the County Commissioners; and
- Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, coordinating with appropriate entities, and updating relevant information on the county's and Emergency Management Department's website, along with local newspapers and Emergency Management social media accounts.

4.2 Implementation

Upon updating and adopting this plan, it is intended to be implemented to reduce Laramie County's vulnerability to natural hazards over time. Implementation is informed by multiple factors, including funding, project schedule, available personnel, and priority of completion. Figure 4.1 shows the barriers Laramie County's HMPC see as impacting implementation, with the greatest identified as funding, and organizational silo-ing / communication. A large part of implementing this plan is utilizing it to promote mitigation and educate other stakeholders, government agencies, and potential partners to assist in accomplishing mutually beneficial mitigation projects. These identified obstacles have the potential to increase capabilities, as communication across agencies, organizations, and the public can often lead to funding opportunities that were unknown previously. Leveraging the contributions of people across sectors is the most effective way to develop, progress, and implement mitigation projects for a community.

Figure 4.1 Implementation Obstacles



Continuous, cooperative, and informed efforts to network and highlight the multi-objective benefits of each project to the community and its stakeholders is crucial to implementation. These efforts include the promotion of mitigation, collaboration, and the value to the community overall.

Simultaneous to these efforts, the HMPC will consistently monitor funding opportunities that could be leveraged to implement actions. Coordinating ahead of time on how to meet local match for grants, or to adapt projects to fit grant requirements are important proactive steps to obtain funding. When funding does become available, the HMPC will then be in a position to capitalize on the opportunity.

Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective projects.

While grant funding allows for many mitigation action projects to be funded, Laramie County intends to diversify funding opportunities in an effort to be less reliant on grant monies. This allows for greater flexibility in implementation of projects that are important to communities.

4.3 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

4.3.1 Maintenance Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration has occurred. The Laramie County Emergency Management Agency is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. The annual review is recommended to occur in the month of January.

This plan will be updated, approved, and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. The county will inquire with the Wyoming Office of Homeland Security (WOHS) and FEMA for funds to assist with the update. Funding sources may include the Emergency Management Performance Grants, Hazard Mitigation Grant Program (if a presidential disaster has been declared), Building Resilient Infrastructure and Communities grants, and Flood Mitigation Assistance grant funds.

4.3.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Such changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Based on plan implementation, the HMPC will use the following process to evaluate progress, note changes in vulnerability, and consider changes in priorities:

- A representative from the responsible entity identified in each mitigation measure will track and report on project status to the HMPC annually. The representative will provide input on whether the project meets the defined goals and objectives and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals and objectives, the HMPC will select alternative projects for implementation.
- New projects identified will require that an individual be assigned as responsible for defining the scope, implementation, and monitoring success of the project.
- Projects not ranked high priority but were identified as potential mitigation strategies will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to accommodate for projects that have failed or are not considered feasible after review of the established criteria, the time frame, priorities, and/or funding resources.

Updates to this plan will follow the most current FEMA and WOHS planning guidance and will consider the following:

- Changes in vulnerability due to project implementation;
- Documentation of
    - success stories where mitigation efforts have proven effective;
    - areas where mitigation actions were not effective;
    - any new hazards that may arise or were previously overlooked;
    - hazard events and impacts that occurred within the five-year period;
    - continued public involvement; and
    - changes to the planning process, which may include new or additional stakeholder involvement;
- Incorporation of
    - new data or studies on hazards and risks;
    - new capabilities or changes in capabilities;
    - growth and development-related changes to building inventories;
    - projected development that could be vulnerable to hazards;
    - new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to WOHS/FEMA; and
- Include re-adoption by all participating entities following WOHS/FEMA approval.

4.3.3 Plan Integration

Laramie County maintains a comprehensive set of emergency management plans, developed in a multidisciplinary environment where county departments, jurisdictional agencies and representatives, nonprofit

and community organizations, and the private sector are included in the planning process. This set of plans encompass all phases of emergency management and the work done on the Wyoming Region 7 HMP update will be integrated into these efforts moving forward.

By integrating the HMP with the county's comprehensive set of emergency management plans, a strong foundation for resilience can be set through smart emergency preparedness, mitigation, response, and recovery; before, during, and after an emergency or disaster event.

Additionally, considering hazard mitigation during all applicable future county, municipal, and regional planning efforts is crucial. Some of the larger opportunities for impactful integration involve comprehensive plans, transportation plans, building codes, community wildfire protection (and implementation) plans, and annual capital expenditure planning. The greater the investment of hazard mitigation planning into other plans, the more likely the success of implementation and achieving common goals across departments and jurisdictions.

HMPC members are responsible for promoting and advocating for integration of the findings and recommendations of this plan with other plans, policies, and studies, as appropriate. This plan will be considered a core document that will help provide a plan and process for the county to mitigate against future hazard events. This plan may also initiate more in-depth analysis and reports (i.e. Wildfire Study) should funding become available.

Plans are only as informed and stable as the energy and knowledge put into them, which is why plan integration involves an intersectional approach to be successful. Identifying relevant and relatable plans to integrate is the first step, however the right people need to come to the table to coordinate, problem solve for any possible issues, and most importantly celebrate the strengths and progress of each plan.

There are a number of other community plans that will benefit from strategies and content within this updated HMP. Integrating components of this plan across other community planning efforts will be an ongoing effort and will help to ensure no strategic conflicts are created through other planning processes, and most critically that areas of mutual interests are identified.

This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs. Wherever possible it is recommended that project implementation be achieved through collaborative and collectively beneficial work with other programs, planning, and policy development.

4.3.4 Continued Public Involvement

The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, Local Emergency Planning Committee LEPC meetings, web postings, and press releases to local media.

It is important to share success stories with the community as mitigation actions are completed, to ensure the public understands the value of the plan and their input going forward. Sharing the plan with the communities often and consistently, throughout the planning cycle, provides opportunities to seek additional public comment.

A public hearing(s) to receive comment on plan maintenance and updating from residents will be held during the maintenance period and information will be taken into account for formal updates. When the HMPC reconvenes for the plan update, they will coordinate with all stakeholders participating in the planning process. This includes those that joined the committee during the maintenance period, those that were a part of the last planning process, and those who are new additions to the roster, to update and revise the plan.

Public awareness of the plan and outreach was thoroughly discussed by the planning committee and it was determined that outreach specific to flood and wildfire would be best to hand out seasonally. There is already some wildfire outreach, which was created through the regional meeting of fire wardens. The brochure has wildfire awareness information and also information about Firewise and how to strengthen the program. These

fire warden meetings are closed, however there was discussion on how to potentially make the wardens and information available to the public through some open meetings.

Community health was particularly active in ideas for public involvement and education, including drafting a handout for property developers and potential new residents wanting to move out to more rural areas. The importance of educating new residents, who may not have exposure to aspects like unimproved roads and weather event isolation, cannot be underestimated in the value to life safety. Outreach regarding how rural living impacts availability of services and emergency responders, could be a deciding factor for those potential residents.

The community health department also educates on water quality issues due to silt run-off from fire scars, which can be an issue for those without alternate water sources.

Further discussion involved how to leverage existing community outreach methods for other hazards, and just as importantly education about the plan.

5 Earthquake Hazus Risk Report

Hazus: Earthquake Global Risk Report

Region Name: LaramieEQm5

Earthquake Scenario: Probabalistic m5 2500

Print Date: February 21, 2022

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

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

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Wyoming

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,686.85 square miles and contains 21 census tracts. There are over 37 thousand households in the region which has a total population of 91,738 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 37 thousand buildings in the region with a total building replacement value (excluding contents) of 9,581 (millions of dollars). Approximately 92.00 % of the buildings (and 77.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 4,555 and 2,732 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 37 thousand buildings in the region which have an aggregate total replacement value of 9,581 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 75% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 4 hospitals in the region with a total bed capacity of 206 beds. There are 53 schools, 21 fire stations, 13 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 32 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 7,287.00 (millions of dollars). This inventory includes over 264.70 miles of highways, 251 bridges, 12,953.10 miles of pipes.

Table 1: Transportation System Lifeline Inventory

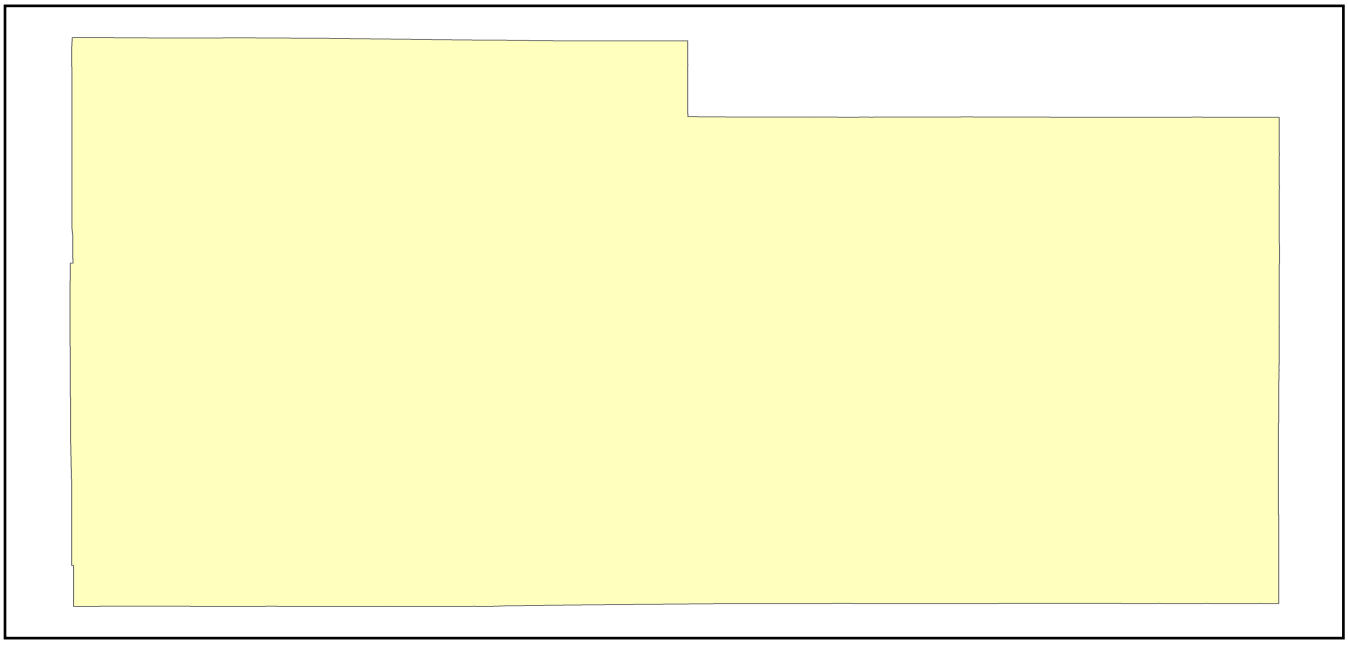
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	251	605.3553
	Segments	125	2614.5085
	Tunnels	0	0.0000
		Subtotal	**3219.8638**
Railways	Bridges	105	464.7391
	Facilities	0	0.0000
	Segments	417	608.1597
	Tunnels	0	0.0000
		Subtotal	**1072.8988**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	1.4163
		Subtotal	**1.4163**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	3	26.7335
	Runways	3	234.9473
		Subtotal	**261.6808**
		Total	**4,555.90**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	258.1485
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**258.1485**
Waste Water	Distribution Lines	NA	154.8891
	Facilities	8	1012.6886
	Pipelines	0	0.0000
		Subtotal	**1167.5777**
Natural Gas	Distribution Lines	NA	103.2594
	Facilities	1	1.5491
	Pipelines	23	117.9499
		Subtotal	**222.7584**
Oil Systems	Facilities	1	0.0900
	Pipelines	0	0.0000
		Subtotal	**0.0900**
Electrical Power	Facilities	3	1082.6208
		Subtotal	**1082.6208**
Communication	Facilities	15	1.3500
		Subtotal	**1.3500**
		Total	**2,732.50**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	Probabalistic m5 2500
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	5.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 1,054 buildings will be at least moderately damaged. This is over 3.00 % of the buildings in the region. There are an estimated 2 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

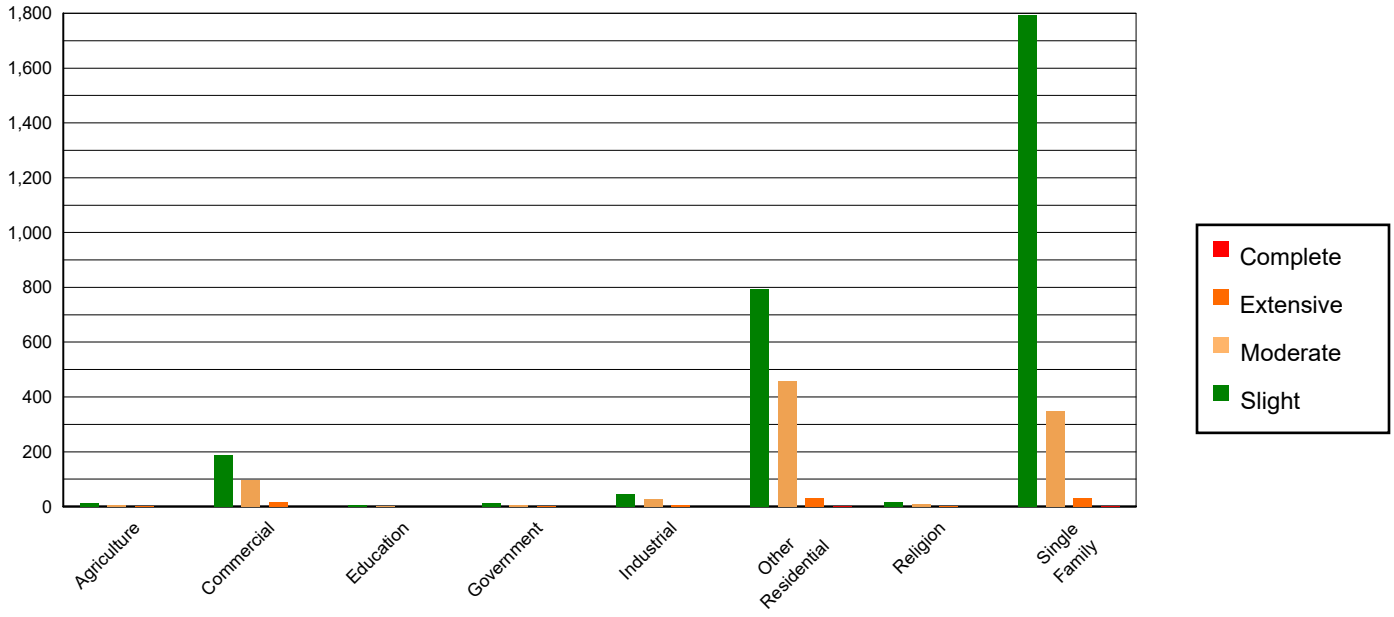


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	153.85	0.45	13.73	0.48	7.12	0.74	1.26	1.38	0.04	1.52
Commercial	1640.31	4.84	188.89	6.56	98.10	10.22	17.93	19.51	0.78	28.54
Education	80.77	0.24	7.65	0.27	3.94	0.41	0.61	0.66	0.02	0.91
Government	123.17	0.36	14.24	0.49	7.45	0.78	1.10	1.19	0.05	1.79
Industrial	407.00	1.20	47.11	1.64	26.73	2.78	5.02	5.46	0.14	5.26
Other Residential	4582.15	13.53	795.42	27.61	459.72	47.87	31.92	34.75	0.79	28.81
Religion	182.67	0.54	18.12	0.63	8.86	0.92	1.29	1.41	0.06	2.20
Single Family	26688.27	78.82	1795.80	62.33	348.35	36.28	32.74	35.64	0.85	30.97
Total	**33,858**		**2,881**		**960**		**92**		**3**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	26441.89	78.10	1772.01	61.51	254.13	26.46	11.58	12.60	0.00	0.00
Steel	552.93	1.63	65.47	2.27	41.62	4.33	6.37	6.93	0.29	10.57
Concrete	534.50	1.58	64.79	2.25	29.65	3.09	3.23	3.52	0.04	1.48
Precast	427.00	1.26	48.87	1.70	41.23	4.29	10.58	11.52	0.14	4.95
RM	2413.35	7.13	176.54	6.13	124.48	12.96	22.45	24.44	0.00	0.00
URM	369.41	1.09	75.24	2.61	44.65	4.65	11.01	11.99	1.69	61.85
MH	3119.10	9.21	678.04	23.54	424.52	44.21	26.64	29.00	0.58	21.16
Total	**33,858**		**2,881**		**960**		**92**		**3**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 206 hospital beds available for use. On the day of the earthquake, the model estimates that only 153 hospital beds (75.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 89.00% of the beds will be back in service. By 30 days, 98.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	4	0	0	4
Schools	53	0	0	53
EOCs	2	0	0	2
PoliceStations	13	0	0	13
FireStations	21	0	0	21

Transportation Lifeline Damage

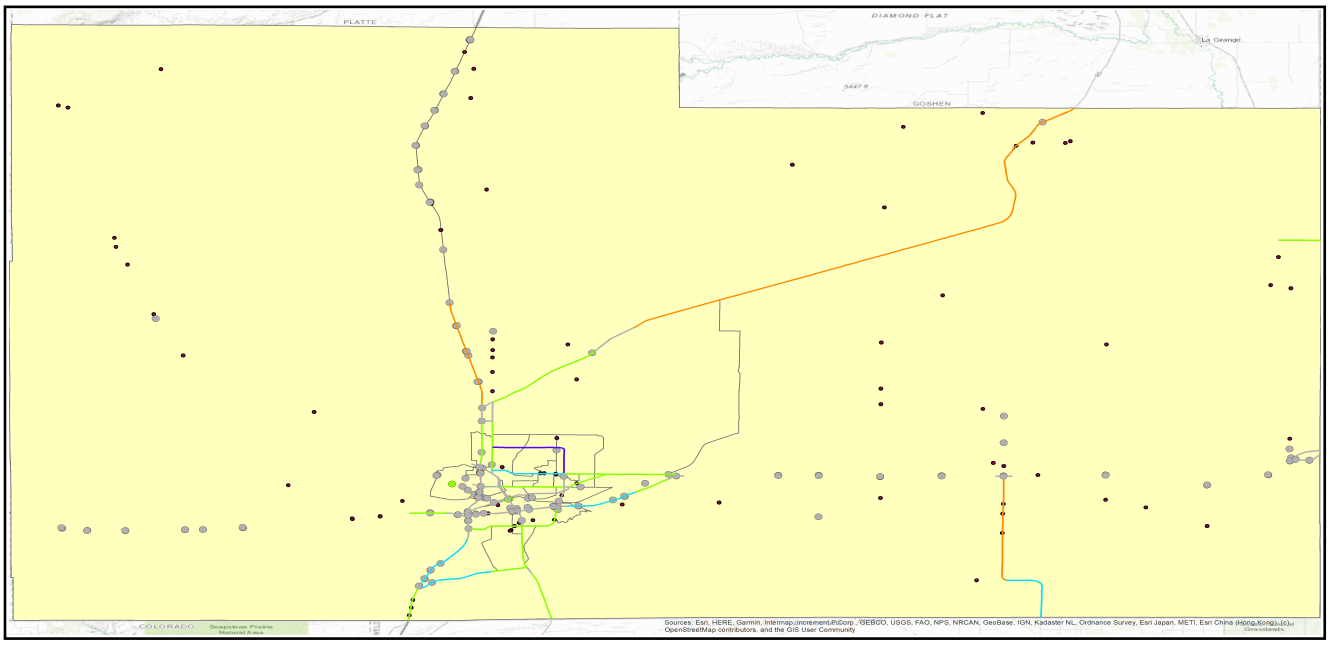


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	125	0	0	125	125
	Bridges	251	0	0	251	251
	Tunnels	0	0	0	0	0
Railways	Segments	417	0	0	417	417
	Bridges	105	0	0	105	105
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	3	0	0	3	3
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	8	0	0	8	8
Natural Gas	1	0	0	1	1
Oil Systems	1	0	0	1	1
Electrical Power	3	0	0	3	3
Communication	15	0	0	15	15

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	8,020	72	18
Waste Water	4,812	36	9
Natural Gas	121	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	37,576	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

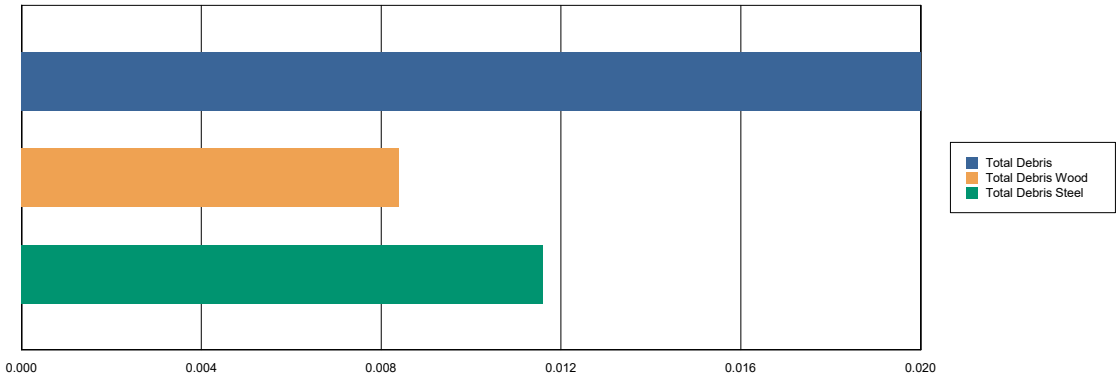
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 20,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 42.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 800 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



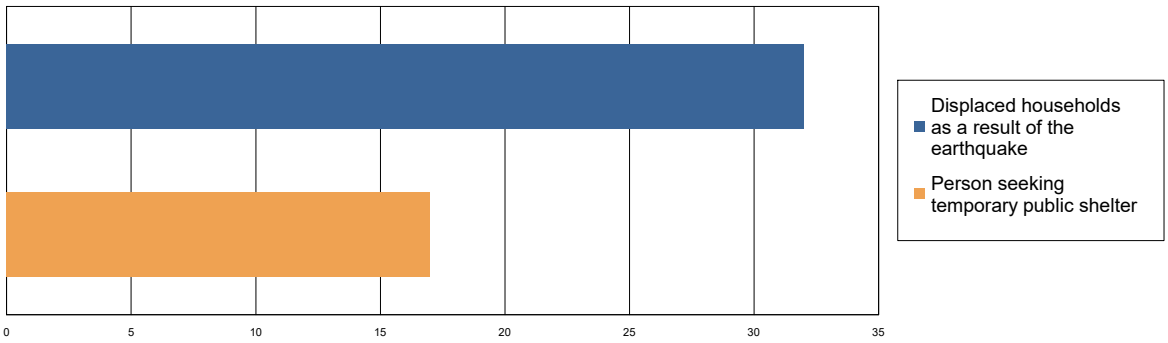
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.01	0.01	0.02	800 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 32 households to be displaced due to the earthquake. Of these, 17 people (out of a total population of 91,738) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
32	17

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.23	0.03	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.21	0.02	0.00	0.00
	Other-Residential	4.85	0.49	0.01	0.03
	Single Family	5.22	0.42	0.02	0.03
	Total	**11**	**1**	**0**	**0**
2 PM	Commercial	13.16	1.66	0.11	0.21
	Commuting	0.00	0.00	0.00	0.00
	Educational	3.42	0.42	0.03	0.05
	Hotels	0.00	0.00	0.00	0.00
	Industrial	1.53	0.18	0.01	0.02
	Other-Residential	0.85	0.09	0.00	0.00
	Single Family	0.90	0.08	0.00	0.01
	Total	**20**	**2**	**0**	**0**
5 PM	Commercial	9.57	1.22	0.08	0.16
	Commuting	0.00	0.01	0.01	0.00
	Educational	0.28	0.03	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.96	0.11	0.01	0.01
	Other-Residential	1.76	0.18	0.01	0.01
	Single Family	1.97	0.16	0.01	0.01
	Total	**15**	**2**	**0**	**0**

Economic Loss

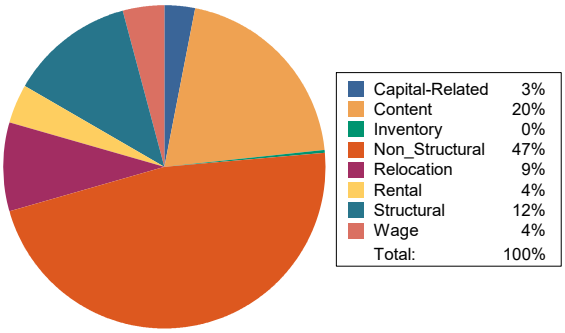
The total economic loss estimated for the earthquake is 130.79 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 92.08 (millions of dollars); 20 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 56 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

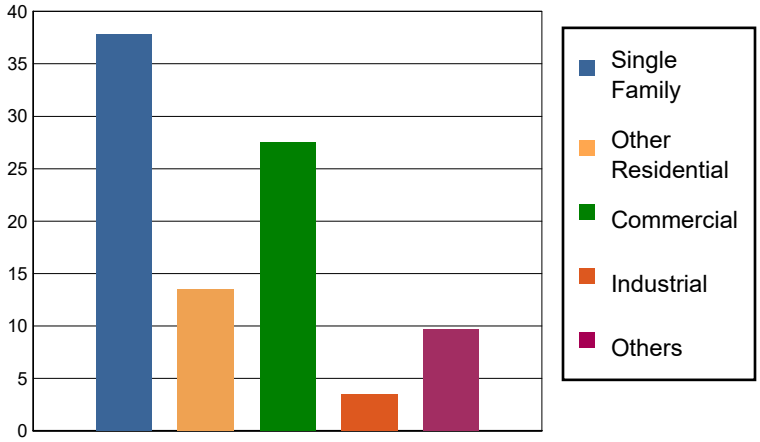


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.2074	3.0713	0.0703	0.5387	3.8877
	Capital-Related	0.0000	0.0884	2.6449	0.0429	0.0838	2.8600
	Rental	0.7339	0.8276	1.8849	0.0289	0.2722	3.7475
	Relocation	2.4744	1.0831	2.7842	0.2137	1.4408	7.9962
	Subtotal	**3.2083**	**2.2065**	**10.3853**	**0.3558**	**2.3355**	**18.4914**
Capital Stock Losses							
	Structural	4.3847	1.9771	3.2984	0.4613	1.2350	11.3565
	Non_Structural	21.9572	7.5047	8.5997	1.5127	3.7820	43.3563
	Content	8.2482	1.8568	5.1265	0.9553	2.3507	18.5375
	Inventory	0.0000	0.0000	0.1393	0.1779	0.0224	0.3396
	Subtotal	**34.5901**	**11.3386**	**17.1639**	**3.1072**	**7.3901**	**73.5899**
	Total	**37.80**	**13.55**	**27.55**	**3.46**	**9.73**	**92.08**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2614.5085	0.0000	0.00
	Bridges	605.3553	0.1351	0.02
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**3219.8638**	**0.1351**	
Railways	Segments	608.1597	0.0000	0.00
	Bridges	464.7391	0.0001	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**1072.8988**	**0.0001**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	1.4163	0.1171	8.27
	Subtotal	**1.4163**	**0.1171**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	26.7335	2.0048	7.50
	Runways	234.9473	0.0000	0.00
	Subtotal	**261.6808**	**2.0048**	
	Total	**4,555.86**	**2.26**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	258.1485	0.3218	0.12
	Subtotal	**258.1485**	**0.3218**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	1012.6886	11.9674	1.18
	Distribution Lines	154.8891	0.1617	0.10
	Subtotal	**1167.5777**	**12.1291**	
Natural Gas	Pipelines	117.9499	0.0000	0.00
	Facilities	1.5491	0.0305	1.97
	Distribution Lines	103.2594	0.0554	0.05
	Subtotal	**222.7584**	**0.0859**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0900	0.0025	2.78
	Subtotal	**0.0900**	**0.0025**	
Electrical Power	Facilities	1082.6208	23.8779	2.21
	Subtotal	**1082.6208**	**23.8779**	
Communication	Facilities	1.3500	0.0322	2.39
	Subtotal	**1.3500**	**0.0322**	
	Total	**2,732.55**	**36.45**	

Appendix A: County Listing for the Region

Laramie,WY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Wyoming					
	Laramie	91,738	7,355	2,226	9,581
Total Region		**91,738**	**7,355**	**2,226**	**9,581**

6 Meeting Agendas and Invites

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

HMP Kickoff Webinar

Tuesday, February 8, 2022 / 9:30-11:00 am:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 126 284 268#

Agenda:

1. Hazard Mitigation Overview
2. Project Scope & Schedule
3. Roles & Responsibilities
4. Public Involvement Strategy
5. 2018 HMP Input
6. Recent Community Planning
7. Hazards to Profile
8. Recent Hazard Events
9. Hazard & Risk Viewers
10. Mitigation Strategy
11. Lifelines
12. Mitigation Grant Funding
13. Mitigation Resources
14. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- 2017 Mitigation Action Reporting
- Best Available Hazard Data
- Recent Community Plans
- HMPC Roster Additions
- Help to Share Public Engagement Content
- Hazard / Disaster / Mitigation Photos

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

Mike Garner

From: Jeanine West <jeanine.west@laramiecountywy.gov>
Sent: Thursday, January 20, 2022 2:53 PM
To: kkrakow01@yahoo.com; jj4910@gmail.com; Burns (burnswy@hotmail.com); pcollins@cheyennecity.org; 'Holly Martinez'; 'cbloom@cheyennecity.org'; tcobb@cheyennecity.org; Eric Fountain; vnemecek@cheyennecity.org; Troy Thompson; Brian Lovett; Linda Heath; Gunnar Malm; Buck Holmes; Sandra Newland; Justin Arnold; Molly Bennett; Jordan Evans; jfornstrom@pinebluffswy.gov; kpatterson@pinebluffswy.gov; llovitt@pinebluffswy.gov; region21em@region21.net; tnewman@scottsbluff.org; Commissioners; aaron.stubbs.1@us.af.mil; HILKER, CHRISTOPHER B MSgt NG WYANG WYOMING ANG HQ/COMMO; 'Jason Land'; aworshek@cheyennecity.org
Cc: Matthew Butler; Beth Harris; Mike Garner
Subject: WY Region 7 Hazard Mitigation Plan Update 2022– Hazard Mitigation Planning Committee Invitation and Kickoff Meeting
Attachments: WY R7 Hazard Mitigation Plan - HMPC Kickoff Webinar.ics

Hello,
You are invited to the first of three planning meetings to update the Wyoming Region 7 Hazard Multi-Jurisdictional Mitigation Plan. The current plan was developed in 2018 in accordance with the Disaster Mitigation Act of 2000, which requires all local governments to develop a plan to assess their risks to hazards and identify actions that can be taken in advance to reduce future losses. Hazard mitigation plans are to be updated every five years in order to maintain eligibility for Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) grants. The Region 7 Hazard Mitigation Plan includes Goshen, Laramie, and Platte Counties and their municipalities, in addition to any special districts that would like to participate.

The hazard mitigation planning process is heavily dependent on the participation of representatives from local government agencies and departments, the public, and other stakeholder groups. A Hazard Mitigation Planning Committee (HMPC) is being re-vitalized to support this project and will include representatives from the counties, incorporated cities and towns, and districts. Other interested stakeholders, including local and regional agencies involved in hazard mitigation activities or agencies that regulate development, are also invited. This includes private-non-profit entities, business partners, academic institutions, and other local, state, and federal agencies in the Region.

At the HMPC kickoff webinar, we will discuss the benefits of updating the hazard mitigation plan, the project schedule & scope, public engagement opportunities, and all of the hazards that affect the Region, such as wildfires, floods, winter storms, and more.

Appropriate persons to be a part of the HMPC include, but are not limited to: county and municipal planners, public works directors, floodplain managers, economic development directors, GIS staff, first responders, local government administration, elected officials, business partners, private-non-profit representatives, and special district representatives. Each plan adopting entity must have at least one representative at all meetings to meet FEMA participation requirements. We request your assistance in forwarding this invitation to others in your organization, as needed. There will be 3 total HMPC meetings held during the update process over the next 6 months, with submittal of the updated plan for State and FEMA review late in 2022.

As the County Emergency Management Director, I will be taking the lead in coordinating the update of this plan. The Wyoming Office of Homeland Security has hired a consultant, Synergy Disaster Recovery, to manage this planning project. Synergy will facilitate the planning process, collect the necessary data, and perform other technical services, including updating the risk assessment and plan document. However, to successfully complete this project and ensure your organization is eligible for FEMA HMA funding, we need your participation and input.

A meeting invitation/calendar item for the webinar will be shared soon. I look forward to your input and participation during the process.

Region 7 Multi-jurisdictional Hazard Mitigation Plan Update
HMPC Kickoff Webinar
Date: 2/8/2022
Time: 9:30-11:00 am
Webinar link:

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting (https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTY3ZGRiYzMtNDlhMi00NzBiLWE0OTEtMTUzN2U1Mzg3MGYx%40thread.v2/0?context=%7b%22Tid%22%3a%2293508cfd-0e9e-4186-bbc9-15f48c5d31aa%22%2c%22Oid%22%3a%22e2a7596a-fe00-4ee4-9d18-d68d9e2ce0f4%22%7d)

Or call in (audio only)

+1 872-242-8065,,126284268# United States, Chicago

Phone Conference ID: 126 284 268#

Find a local number | Reset PIN

Jeanine West
Director
Cheyenne/Laramie County Emergency Management
307-633-4333
307-274-5800 Cell
EMA On Call: 307-775-7360
Jeanine.West@laramiecountywy.gov

February 8, 2022 Kick Off WY Region 7

GID (Guest)9:37 AM

goshen irrigation district

Chuck Kenyon (Guest)9:37 AM

Jeff Harkens, Director of Public Works, City of Torrington

Ritch (Guest)9:38 AM

Ritch Reyes, Town of Lingle

Laramie River Station (Guest)9:38 AM

Levi Mickelsen Plant Manager at the Laramie River station Wheatland WY

Caitlin Langmead9:38 AM

1681 4126
www.menti.com

Brislawn, Jeff P (External)9:39 AM

Jeff Brislawn, Hazard Mitigation Lead, Wood Environment & Infrastructure Solutions, Inc

Shelly Kirchhefer (Guest)9:39 AM

Shelly Kirchhefer Goshen Emergency Management

Wesley Bay (External)9:39 AM

Wes Bay, Deputy City Engineer, City of Cheyenne

Jeanine West (External)9:48 AM

The Teams link is not working for some

Caitlin Langmead9:49 AM

Thank you, let me see what I can do.

Wesley Bay (External)9:49 AM

What was the code for the website again?

Caitlin Langmead9:49 AM

1681 4126

Caitlin Langmead9:51 AM

Jeanine can you share this link, it's the same but not with a hyperlink https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTY3ZGRiYzMtNDlhMi00NzBiLWE0OTEtMTUzN2U1Mzg3MGYx%40thread.v2/0?context=%7b%22Tid%22%3a%2293508cfd-0e9e-4186-bbc9-15f48c5d31aa%22%2c%22Oid%22%3a%22e2a7596a-fe00-4ee4-9d18-d68d9e2ce0f4%22%7d

Caitlin Langmead9:54 AM

They may need to copy and paste into web address bar and not click the link.

Jeanine West (External)9:55 AM

Thank you

Ritch (Guest)10:00 AM

town website and facebook

Shamika McDonald, Wy SHMO (Guest)10:25 AM

Please feel free to contact me on current funding available through FEMA or any grant questions . 307.777.4914 or shamika.mcdonald1@wyo.gov

Thank you all for being here!

Val Hankins (Guest)10:42 AM

Val Hankins, Goshen County Road & Bridge

Planner (External)10:43 AM

Amy Clark - Planner for the Town of Wheatland and Platte County

Matt Butler CLCEMA (Guest)10:43 AM

Matt Butler, LCEMA

GID (Guest)10:43 AM

Tyson Gladson, Linda Keeran, Ryan Allen GID

Ryan (Guest)10:43 AM

Thanks for all of the information! Ryan Wunibald PHRC Goshen County

Chris Hilker (Guest)10:43 AM

Chris Hilker - 153d Air Wing

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

Laramie County Risk Assessment Webinar

Thursday, May 12, 2022 / 9:30-11:30 am:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 286 093 159#

Agenda:

1. Project Overview & Updates
2. Public Involvement Strategy
3. Risk Assessment Summary
4. Mitigation Strategy
5. Mitigation Grant Funding
6. Mitigation Resources
7. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- Mitigation Capabilities Assessment (outstanding)
- 2018 Mitigation Action Reporting (outstanding)
- Review draft HIRA
- Organizational Hazard Ranking Survey
- Help to Share Public Engagement Content (including survey)
- Hazard / Disaster / Mitigation Photos

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

5/12/2022 Laramie County Risk Assessment Workshop

Mike Garner 9:24 AM
Hello All - Please use this chat to introduce yourself and who you are representing. This is important to track so we can receive FEMA approval. Thanks

Beth Harris (External)9:24 AM
Hello, this is Beth Harris with Cheyenne/Laramie County EMA

Jordan Evans (External)9:25 AM
Hello, Jordan Evans, Laramie County Cheyenne GIS Cooperative

Molly Bennett9:30 AM
Molly Bennett - Laramie County Public Works

Brian Lovett (Guest)9:30 AM

Brian Lovett, Laramie County Commissioner

Linda Heath (Guest)9:30 AM

Linda Heath, Laramie County Commissioner

Buck Holmes (External)9:31 AM
Buck Holmes Laramie County Commissioner

Lori Pallak (Guest)9:31 AM

Lori Pallak with Laramie County Risk

Sam Berta (External)9:32 AM
Sam Berta with the City of Cheyenne

Beth Harris (External)9:37 AM
Jeanine West is here with Beth Harris

Linda Heath (Guest)10:22 AM

When identifying the high risk areas for wild fires, is the availability of fire equipment/ responders part of the calculation?

Justin Arnold11:02 AM

Justin Arnold, Laramie County Planning and Development, thanks Matt!

Tom Cobb (External)11:02 AM
Thomas Cobb, City Engineer, City of Cheyenne

WY R7 HMP - Laramie County Risk Assessment Webinar	
Meeting Start Time	5/12/2022, 9:16:28 AM
Meeting End Time	5/12/2022, 1:28:37 PM
Full Name	Join Time
Caitlin Langmead	5/12/2022, 9:16:28 AM
Buck Holmes	5/12/2022, 9:17:34 AM
Mike Garner	5/12/2022, 9:19:59 AM
Beth Harris	5/12/2022, 9:20:10 AM
Brian Lovett (Guest)	5/12/2022, 9:20:52 AM
Sam Berta	5/12/2022, 9:20:57 AM
Molly Bennett	5/12/2022, 9:26:39 AM
Sandra Newland (Guest)	5/12/2022, 9:27:28 AM
Lori Pallak (Guest)	5/12/2022, 9:28:34 AM
Linda Heath (Guest)	5/12/2022, 9:28:51 AM
Justin Arnold	5/12/2022, 10:38:55 AM
Jordan Evans	5/12/2022, 9:34:12 AM
Tom Cobb	5/12/2022, 10:34:27 AM

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

Laramie County Mitigation Strategy Webinar

Wednesday, June 22, 2022 / 9:00-10:30 am:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 985 522 695#

Agenda:

1. Project Overview & Updates
2. Local Government Participation
3. Plan Integration / Implementation
4. Past Mitigation Action Progress
5. Updated Mitigation Strategy
6. Mitigation Grant Funding
7. Mitigation Resources
8. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- New Mitigation Action Development
- Hazard Ranking Survey (outstanding)
- Mitigation Capability Assessment (outstanding)

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

6/22/2022 Laramie County Mitigation Strategy Workshop

Mike Garner9:00 AM
Please enter in your name and who you represent into the chat. This will help us to track participation, which is a FEMA requirement for this plan. Thanks

Linda Heath (Guest)9:01 AM

Linda Heath, County Commissioner, Laramie County

Charles Bloom (External)9:02 AM
Charles Bloom, Cheyenne Planning and Development Director

Jordan Evans (External)9:03 AM
Jordan Evans, Cheyenne Laramie County GIS Cooperative

Sandra Newland (Guest)9:03 AM

Good Morning Everyone!

Tom Cobb (External)9:05 AM
Thomas Cobb, City Engineer, City of Cheyenne

Shamika McDonald, WY SHMO (Guest) was invited to the meeting.
Buck Holmes (External) was invited to the meeting.

Linda Heath (Guest)9:25 AM

Love the comment about educating the developers about the Plan contents

Justin Arnold9:26 AM
Maybe another handout!!

Linda Heath (Guest)9:27 AM

Or a well worded bullet statement?

Jeanine West (Guest)9:43 AM

Lifeline Protection

Economic Considerations

Linda Heath (Guest)9:44 AM

Economic Considerations, Lifeline protection, Social Considerations

Sandra Newland (Guest)9:44 AM

With this day in age...economic Considerations, social considerations and legal considerations.

Shamika McDonald, WY SHMO (Guest)10:28 AM

Once the adoption is signed, it can be sent via email. We don't need originals

Shamika McDonald, WY SHMO (Guest)10:30 AM

On 07/15 at 10am our new Resilience Officer and I will be in Wheatland presenting on available FEMA grant programs and providing info and tips on the application process. It is open to anyone interested. Here is the link for additional info: https://www.eventbrite.com/e/mitigation-consultation-wheatland-tickets-370589522237?utm-campaign=social&utm-content=attendeeshare&utm-medium=discovery&utm-term=listing&utm-source=cp&aff=escb

Sandra Newland (Guest)10:34 AM

Thank you for the presentation and information.

Justin Arnold10:34 AM
Thanks all!

Jordan Evans (External)10:34 AM
Have a good day!

WY R7 HMP - Laramie County Mitigation Strategy Webinar	
Meeting Start Time	6/22/2022, 8:52:40 AM
Meeting End Time	6/22/2022, 10:41:25 AM
Full Name	Join Time
Mike Garner	6/22/2022, 8:52:40 AM
Caitlin Langmead	6/22/2022, 8:52:51 AM
Jeanine West	6/22/2022, 8:56:54 AM
307-286-5885	6/22/2022, 8:58:49 AM
Linda Heath	6/22/2022, 9:00:01 AM
Charles Bloom	6/22/2022, 9:01:24 AM
Sandra Newland	6/22/2022, 9:01:35 AM
Tom Cobb	6/22/2022, 9:04:27 AM
Jordan Evans	6/22/2022, 9:05:02 AM
Shamika McDonald, WY SHMO	6/22/2022, 9:24:31 AM
Buck Holmes	6/22/2022, 9:10:55 AM
Justin Arnold	6/22/2022, 9:22:02 AM

7 Adoptions

Resolution # 230502-12

RESOLUTION ADOPTING THE WYOMING REGION 7 HAZARD MITIGATION PLAN 2023 UPDATE FOR LARAMIE COUNTY, WYOMING

Whereas, Laramie County recognizes the threat that natural hazards pose to people and property within our community; and

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

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Region 7 Hazard Mitigation Plan 2023 Update is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, Laramie County fully participated in the FEMA-prescribed mitigation planning process to prepare this Region 7 Hazard Mitigation Plan 2023 Update; and

Whereas, the Wyoming Office of Homeland Security and the Federal Emergency Management Agency Region VIII officials have reviewed the "Region 7 Hazard Mitigation Plan 2023 Update", and approved it contingent upon this official adoption of the participating governing body;

Whereas, Laramie County desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the "Region 7 Hazard Mitigation Plan 2023 Update",

Whereas, adoption by the governing body for Laramie County, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Region 7 Hazard Mitigation Plan 2023 Update.

Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

NOW THEREFORE BE IT RESPOLVED BY THE GOVERNING BODY OF Laramie County, Wyoming, that the "Region 7 Hazard Mitigation Plan 2023 Update", as attached to this resolution is hereby adopted.

PRESENTED, READ, AND ADOPTED this 2 day of May, 2023.

BOARD OF LARAMIE COUNTY COMMISSIONERS

Chairman

ATTEST:

Debra K. Lee
Debra Lee, Laramie County Clerk

May 2, 2023
Date

Reviewed and Approved as to form:

Laramie County Attorney's Office

4/27/2023
Date

APPROVED as to form only:
By Stefanie Boster at 9:29 am, Mar 22 2023

RESOLUTION NO. 6317

ENTITLED: "A RESOLUTION ADOPTING THE WYOMING REGION 7 HAZARD MITIGATION PLAN 2023 UPDATE."

WHEREAS, the City of Cheyenne, with the assistance from Wyoming Office of Homeland Security, has gathered information and prepared Wyoming Region 7 Hazard Mitigation Plan 2023 Update; and

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6;

WHEREAS, the City of Cheyenne is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan;

WHEREAS, the City of Cheyenne has reviewed the Plan and affirms that the Plan will be updated no less than every five years; and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update is shown in Exhibit A consisting of four hundred and nineteen (419) pages which is attached hereto and incorporated herein.

NOW, THEREFORE, be it resolved that the Governing Body of the City of Cheyenne adopt the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

BE IT FURTHER RESOLVED, that the Laramie County Emergency Management Agency submit this Resolution to the Wyoming Office of Homeland Security and Federal Emergency Management Agency, Region 7 officials to facilitate final approval of the Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan 2023 Update; and,

BE IT FURTHER RESOLVED, that the Wyoming Region 7 Hazard Mitigation Plan 2023 Update replaces the previous hazard and flood mitigation plans adopted through Resolution Nos. 4691, 4699, and 5468.

PRESENTED, READ AND ADOPTED this 10th day of April, 2023.

Patrick Collins, Mayor

(SEAL)

ATTEST:

Kristina F. Jones, City Clerk

Town of Albin
PO Box 188 430 5th Ave
Albin, WY 82050

RESOLUTION 230309-01

WHEREAS, the Town of Albin, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Albin is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *the Town of Albin has* reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by *the governing body of* the *Town of Albin* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 9th day of March, 2023 at the meeting of the *Albin Town Council*

Insert appropriate signature lines and dates

_____
(Mayor, Village Clerk, County Board Chair, Tribal Council, etc.)

(TOWN OF BURNS)
BURNS TOWN COUNCIL
327 S MAIN STREET
BURNS WY 82053

RESOLUTION

WHEREAS, *TOWN OF BURNS* with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, *TOWN OF BURNS* is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, *THE BURNS TOWN COUNCIL* has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by *THE BURNS TOWN COUNCIL* that *THE TOWN OF BURNS* adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 27 day of Feb., 2023 at the meeting of the *(Insert the name of the governing body).*

Insert appropriate signature lines and dates

Richard L Lakin

MAYOR JAMES F. CLARK

RESOLUTION 2023-05

A RESOLUTION ADOPTING THE WYOMING REGION 7 HAZARD MITIGATION PLAN - 2023 UPDATE

WHEREAS, the Governing Body for the Town of Pine Bluffs with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update;** and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Pine Bluffs is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Town of Pine Bluffs has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE TOWN OF PINE BLUFFS WY, that the Town of Pine Bluffs adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan and resolves to execute the actions in the Plan.

PASSED, APPROVED AND ADOPTED THIS 13th DAY OF MARCH 2023.

Justin Fornstrom, Mayor

ATTEST:

Jacklyn Fornstrom, Clerk

Eastern Laramie County Landfill
P.O. Box 310
4990 County Rd 216
Burns, WY 82053

RESOLUTION

WHEREAS, Eastern Laramie County Landfill, with the assistance from **Wyoming Office of Homeland Security**, has gathered information and prepared **Wyoming Region 7 Hazard Mitigation Plan 2023 Update**; and,

WHEREAS, the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, Eastern Laramie County Landfill is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, Eastern Laramie County Landfill has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the governing body of the Eastern Laramie County Landfill, that the Eastern Laramie County Landfill adopts the **Wyoming Region 7 Hazard Mitigation Plan 2023 Update** as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 30th day of March 2023 at the meeting of the Eastern Laramie County Landfill.

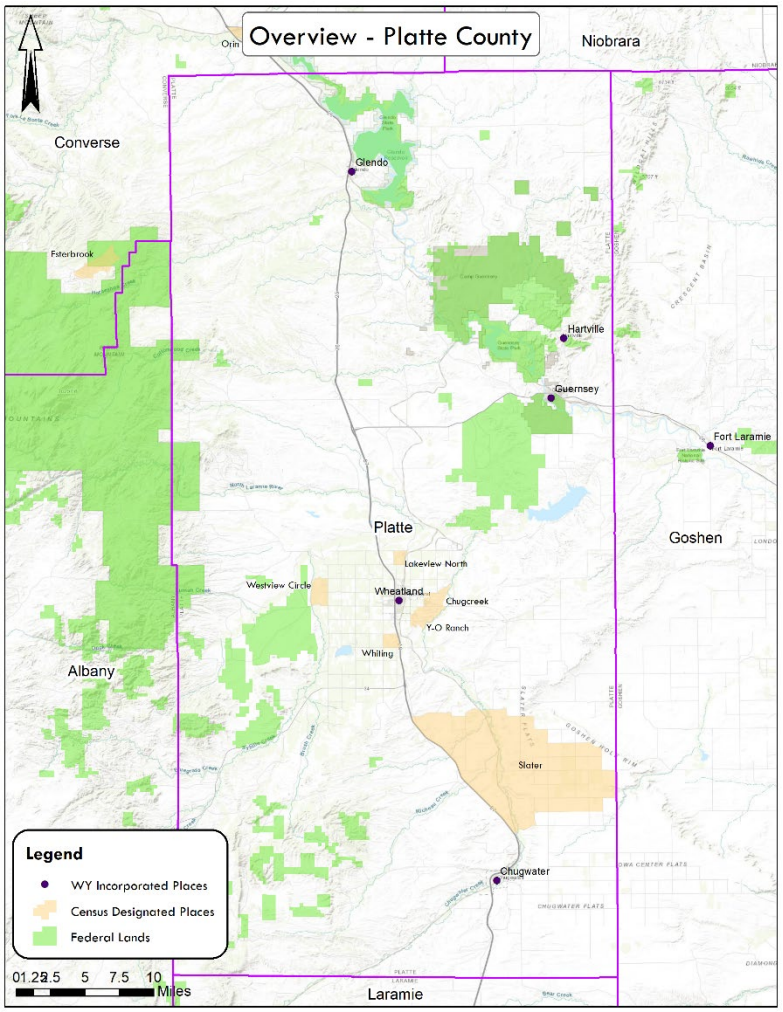
Insert appropriate signature lines and dates

Mike Reynolds Manager ELCSWD
(Mayor, Village Clerk, County Board Chair, Tribal Council, etc.)

Appendix C: Platte County

Wyoming Region 7 Hazard Mitigation Plan

Platte County Annex - 2023 Update



PLATTE COUNTY GOVERNMENT

Contents

Professional planning services for this plan update provided by:

SYNERGY DISASTER RECOVERY

1 Mitigation Strategy

1.1 Overview

The intent of the Mitigation Strategy is to help organizations identify implementable mitigation actions that will guide future mitigation policy and project administration. The Mitigation Strategy includes a list of proposed actions deemed necessary to meet those mitigation goals and objectives identified in the updated HMP and reduce the impact of hazards. The actions identified in this Appendix are specific to Platte County and its participating organizations.

1.2 Mitigation Action Plan

1.2.1 Progress on Previous Mitigation Actions

As part of the 2023 HMP planning process, Platte County and participating jurisdictions were tasked with reviewing mitigation projects that were identified in the existing Region 7 Hazard Mitigation Plan. Each jurisdiction reviewed their individual actions and reported on the status of those actions, shown in Table 1.1. Mitigation actions that have not yet been completed at the time of this plan's writing are listed as 'On-Going,' 'In Progress,' or 'No Progress – Continue Action.' Those actions identified as either 'In Progress' or 'No Progress – Continue Action' will be tracked and reported on, along with new actions, as part of future plan maintenance activities.

Recognition of mitigation successes when reviewing the status of the last plan's actions is important for continued progress. In Platte County, Hartville was successful in establishing an emergency shelter. The other 2017 actions across the county are either on-going, in progress, or being continued, with the exception of a water mitigation project that was determined to no long be a priority for Hartville.

Table 1.1 2017 Mitigation Action Status

ID	Lead Jurisdiction	Title	Description	2022 Status
2017- Platte County-1	Platte County	Floodplain Deadfall Assessment	Assessment for targeted removal of deadfall, reducing damage during high water flows	No Progress - Continue Action
2017- Platte County-2	Platte County	Platte County Address Location Project	Contain exact locations of addresses in a GIS database to enhance response times, mitigate damage to property and decrease harm to people	On-Going
2017- Platte County-3	Platte County	Floodplain Assessment	Complete assessment to allow for long term planning for roads, bridges, and other construction	No Progress - Continue Action
2017- Platte County-4	Platte County	YO Ranch Water Supply	Create water supply for times of drought	No Progress - Continue Action
2017- Chugwater-1	Chugwater	GPS Location Project	Contain exact locations of addresses in a GIS database to enhance response times, mitigate damage to property and decrease harm to people	In-Progress
2017- Glendo-1	Glendo	Drought Education	Educate residents on implementation of demand reduction measures	No Progress - Continue Action

ID	Lead Jurisdiction	Title	Description	2022 Status
2017- Glendo-2	Glendo	Wildfire in Area Surrounding Glendo	Mitigate areas surrounding Glendo	On-Going
2017- Glendo-3	Glendo	Severe Wind and Dead Trees	Removal of potential high wind debris	On-Going
2017- Guernsey-1	Guernsey	Wildfire Assessment	Perform assessment to identify areas of deadfall to reduce wildfire risk to Guernsey	In-Progress
2017- Guernsey-2	Guernsey	Hail Education and Awareness	Provide informational handouts at Town Hall, send out notes on utility bills and teach children how to take cover and be safe.	In-Progress
2017- Guernsey-3	Guernsey	Protect Power Lines and Infrastructure	Implement measure to protect power infrastructure to increase reliability during storms	In-Progress
2017- Hartville-1	Hartville	Wildfire Mitigation	Complete wildfire mitigation assessment to identify areas of deadfall to reduce wildfire risk to Hartville	In-Progress
2017- Hartville-2	Hartville	Water Mitigation Project	Implement mitigation measures to reduce loss of water supply for drinking water and the fire department	No Progress - No Longer a Mitigation Priority
2017- Hartville-3	Hartville	Emergency Shelter	Establish a shelter to assist and house residents during potential evacuation	Complete
2017- Wheatland-1	Wheatland	Flood study and updated planning and zoning practices	Create an accurate flood study to influence future construction and improve function of storm water system.	No Progress - Continue Action
2017- Wheatland-2	Wheatland	Improve storm water management planning	Implement a storm water management plan to reduce flooding in residential and commercial districts.	No Progress - Continue Action
2017- Wheatland-3	Wheatland	Xeriscape education and incentives	Educate people on how the structure of their landscaping could retain water for essential community purposes	No Progress - Continue Action

1.2.2 Continued Compliance with National Flood Insurance Program (NFIP)

Given the importance of the NFIP in mitigating flood losses and the degree of flood risk in certain parts of Region 7, an emphasis will be placed on continued compliance with the NFIP by participating communities (Platte County, Towns of Chugwater, Guernsey, and Wheatland). As NFIP participants, the county and participating jurisdictions have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining the floodplain zoning ordinance

1.2.3 Updated Mitigation Action Plan

Platte County and participating jurisdictions selected and completed worksheets for a number of mitigation actions for this 2023 HMP. Each action worksheet was completed by a jurisdictional representative, and includes the following information:

- Project ID
- Local Government
- Project Title
- Issue / Background
- Benefits (Losses Avoided by Implementing Action)
- Priority
- Goals Met
- Lead and Support Organization(s)
- Hazard(s) Mitigated
- Potential Funding Source
- Expected Completion Year

Table 1.2 presents a summary of these new mitigation actions, in addition to the 2017 continued actions in Table 1.1, that were identified to be included in this updated HMP.

Table 1.2 2023 Mitigation Actions

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-P Multi-01	Platte County Wheatland Chugwater Hartville	Hail Protection Canopy/ Solar Panel Assembly for Off-Grid Backup Power	Evaluate priority locations to construction canopy structures over existing parking areas, with photovoltaic solar panels on the surface, connected to utility interface equipment and power storage equipment	M	1, 2, 3	Platte County EM, All Wheatland Departments, Chugwater, Hartville	Hail	Unknown	Local Budgets, State and Federal Grants	2028
2023-P Multi-02	Platte County Wheatland Chugwater Glendo Hartville	Wildfire	Assess town assets and mitigate risk for wildfire, especially wind driven. Perform assessment to identify areas of deadfall to reduce wildfire risk.	M	1	Platte County EM, Wheatland EM, Chugwater, Town of Glendo Fire Dept, Hartville	Wildfire	Unknown	Town Budget	2026
2023-P Multi-03	Wheatland Chugwater	Wind Mitigation	Assess waste, wastewater, and electric systems to determine those most at risk from wind losses and mitigate the risk to those most vulnerable components.	M	1, 2, 3	Wheatland EM, Chugwater	Wind	Unknown	Town Budget, FEMA HMA Grants	2026

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-P Multi-04	Wheatland Chugwater Glendo	Emergency Generator for Shelters	Install emergency backup power to enhance the capabilities of the main sheltering facilities for each local government	H	1,2	Wheatland EM, Chugwater, Glendo	Winter Storm, Tornado, Wind, Other Emergencies	$100,000 each	Local, FEMA HMA	2027
2023- Platte County-01	Platte County	Laramie River/ Palmer Canyon Bridge Upgrade	Upgrade the bridge to mitigate possible flooding damage and preserve a critical route to the west for emergency vehicles	H	1,2	Platte County Commissioners	Flooding, Wildfire	Unknown	Local, FEMA	2028
2023- Chugwater-01	Town of Chugwater	Upgrading Town of Chugwater Water System	Work with funding agencies and engineering to create a more reliable water source for the future	H	1	Town of Chugwater SLIB, WWDC	Drought	Unknown	SLIB, WWDC, Infra-structure Funding	2033
2023- Glendo-01	Town of Glendo	Cyber Hazards	Improve ability to create effective cyber security measures	H	1	Town of Glendo	Cyber Hazards	$20,000	Town Budget	2023
2023- Glendo-02	Town of Glendo	Public Health Hazard	Continue planning for power outages and sheltering, including sanitation and water availability	L	3	Town of Glendo, Homeland Security	Public Health Hazards, Winter Storm	$180,000	Grant and Town Budget	2023
2023- Glendo-03	Town of Glendo	Tornado Mitigation	Identify facilities that could serve as tornado shelter and assess required retrofits necessary to meet required wind loading	M	1, 2	Town of Glendo	Tornado	Unknown	Town Budget, Emergency Grants	2028

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- Guernsey-01	Town of Guernsey	Emergency Shelter	Establish shelters, equipping with generators and educate public on availability of resources in emergency events	H	1, 2, 3	Town of Guernsey/ Guernsey-Sunrise School	All Hazards	Unknown	Local, FEMA	2028
2023- Guernsey-02	Town of Guernsey	Need/ Assistance identification	Identify the persons who are more likely to need assistance in an emergency and the resources needed to respond to those needs.	M	1, 2, 3	Town of Guernsey	All Hazards	Unknown	Local	2028
2023- Guernsey-03	Town of Guernsey	Blanket/ Clothing Drive	Community effort to gather and store blankets and clothing for distribution to citizens for emergency use	M	1, 2, 3	Town of Guernsey, Fire Department/ Police Department	All Hazards	Unknown	Local	2028
2023- Guernsey-04	Town of Guernsey	Food and Water Supply/Meal Provision	Work with community partners to establish a process for use and distribution of available food and water resources should an emergency occur. Advance plan and coordinate large-scale preparation of meals	M	1, 2, 3	Town of Guernsey, Guernsey Sunrise School, Guernsey Food Pantry, Senior Citizens Center	All Hazards	Unknown	Local	2028
2023- Guernsey-05	Town of Guernsey	Mayor-Appointed Citizen Corps	Creation and training of a Citizen Corp to respond to needs of community and provide support in emergency event	H	1, 2, 3	Town of Guernsey Administration / Mayor	All Hazards	Unknown	Local	2028

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023- Guernsey-06	Town of Guernsey	Xeriscape education and incentives	Educate people on how the structure of their landscaping could retain water for essential community purposes	M	3	Town of Guernsey	Drought	Staff Time, Local Budgets	Local	2027
2023- Hartville-01	Town of Hartville	Water System Power and Security	Secure Generators and other back-up power sources, and perimeter fencing for water system	H	1, 2	Platte County EM	Lightning, Tornado, Wind, Winter Storms	Unknown	WIIN, Homeland Security Act, DWSRF Drinking Water State Revolving Fund	2023
2023- Hartville-02	Town of Hartville	Back-up Power for Community Center	Secure back-up generator for Community Center, for residents to use during power failures and severe storm outages	H	1, 2	Platte County EM	Winter Storm, Lightning, Hail, Tornado, Wind	Unknown	WIIN, Homeland Security Act	2023
2023- Wheatland-01	Town of Wheatland	Water Supply	Repair Black Mountain Water Tower. Identify and assess other areas of concern in water system	H	1, 2, 3	Emergency Management, Water/Waste water Dept	Cyber Hazards, Flood Hail, Lightning, Tornado, Wind, Winter Storm	Unknown	Town Budget, Emergency Grants	2028

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-Wheatland-02	Town of Wheatland	Wastewater Lagoons	Identify and implement actions to eliminate potential for sewer lagoon leaks or overflows - eliminate contamination into Wheatland Creek	H	1, 2, 3	Emergency Management, Water/Wastewater Dept	Hail, Lightning, Tornado, Wind, Winter Storm	Unknown	Town Budget, Emergency Grants	2028
2023-Wheatland-03	Town of Wheatland	Wastewater Ponds	Identify and implement actions to eliminate potential for sewer pond leaks or overflows - eliminate contamination onto neighboring property	M	1, 2, 3	Emergency Management, Water/Wastewater Dept	Hail, Lightning, Tornado, Wind, Winter Storm	Unknown	Town Budget, Emergency Grants	2028
2023-Wheatland-04	Town of Wheatland	Wheatland Creek Flooding	Identify options to reduced flood risk for Wheatland	M	1, 2, 3	Emergency Management	Hail, Lightning, Tornado, Wind, Winter Storm, Debris Flow, Flood, Hazardous Material Release	Unknown	Town Budget, Emergency Grants	2028
2023-Wheatland-05	Town of Wheatland	Electrical System Maintenance	Provide safe, reliable power by maintaining electrical system and mitigate against hazards	H	1, 2, 3	Emergency Management, Electric Department	Cyber Hazards, Flood, Hail, Lightning, Tornado, Wind, Winter Storm	Unknown	Town Budget, Emergency Grants	2028

ID	Local Government	Title	Description	Priority	Goals Met	Lead & Support Org.	Hazard(s) Mitigated	Estimated Project Cost	Potential Funding Source	Expected Complete Year
2023-Wheatland-06	Town of Wheatland	Tornado Mitigation	Identify facilities that could serve as tornado shelter and assess required retrofits necessary to meet required wind loading	M	1, 2	Emergency Management Water/ Wastewater Dept/Electric Dept	Tornado	Unknown	Town Budget, Emergency Grants	2028
2023-Wheatland-07	Town of Wheatland	Storrmwater Planning - Flood Mitigation	Develop a drainage and stormwater management plan to address drainage issues	M	1, 2, 3	Emergency Management Street Dept, Planning Dept	Flood	Unknown	Town Budget, Emergency Grants	2028

1.3 Mitigation Capabilities Assessment

As part of the plan update, the county and its jurisdictions conducted a mitigation capability assessment. Capabilities are those plans, policies, and procedures currently in place that contribute to reducing hazard losses. There are multiple categories of capabilities and all of them are powerful tools for implementing hazard mitigation. It is crucial that these tools are reviewed regularly and opportunities for further risk reduction efforts are identified.

By collecting information about each jurisdiction's capabilities, the strengths, weaknesses, and resources of each jurisdiction are identified.

Planning and regulatory capabilities are foundational to an informed mitigation strategy and successful implementation of actions. Table 1.3 shows those mitigation capabilities specific to planning and regulatory tools across the county.

Table 1.3 Planning & Regulatory Capabilities

Mitigation Capability	Platte County	Town of Chugwater	Town of Glendo	Town of Guernsey	Town of Hartville	Town of Wheatland
Comprehensive, Master, or General Plan	X	X		X		
Capital Improvement Program or Plan (CIP)		X	X	X		
Floodplain Management Plan		X				
Stormwater Program / Plan		X	X	X		
Community Wildfire Protection Plan (CWPP)		X	X	X		
Erosion / Sediment Control Program		X				
Economic Development Plan		X		X		
Other:				Airport Master Plan		
Building Codes (Year)			2010	2015		2021
Site Plan Review Requirements	X	X	X	X		X
Other:			Glendo Lake Lots	Fire Marshal Review		
Zoning Ordinance (Land Use)	X	X	X			X
Subdivision Ordinance	X		X	X		X
National Flood Insurance Program (NFIP) Participant	X	X				X
Flood Insurance Study / Flood Insurance Rate Map / DFIRM	X	X				X
Floodplain Ordinance	X	X				X
Elevation Certificates for Floodplain Development						

Mitigation Capability	Platte County	Town of Chugwater	Town of Glendo	Town of Guernsey	Town of Hartville	Town of Wheatland
Community Rating System (CRS) Participant						
Open Space / Conservation Program						
Growth Management Ordinance						
Stormwater Ordinance				X		
Other Hazard Ordinance (steep slope, wildfire, snow loads, etc.)				2015 IBC, IRC		
Other:						

Administrative and technical capabilities are all vital for a community to be able to implement hazard mitigation. Table 1.4 provides an overview of these capabilities across the county.

Table 1.4 Administrative & Technical Capabilities

Mitigation Capability	Platte County	Town of Chugwater	Town of Glendo	Town of Guernsey	Town of Hartville	Town of Wheatland
Planning Commission	X			X		X
Mitigation Planning Committee	X					
Maintenance Programs (tree trimming, clearing drainage, etc.)		X	X	X		
Emergency Manager	X	X		X	X	X
Building Official		X		X		X
Floodplain Administrator	X	X				X
Community Planner	X			X		X
Transportation Planner						
Civil Engineer	X	X	X			
GIS Capability	X			X		
Other:						
Warning Systems / Services (flood)	X		X	X		
Warning Systems / Services (other / multi hazard)	X		X	X		
Grant Writing / Management	X	X				X
Other:						

The ability of a community to implement a comprehensive mitigation strategy is largely dependent on available funding. These related municipal capabilities are outlined in Table 1.5 and show that the county and towns utilize a number of these financial tools that can support mitigation activities.

Table 1.5 Financial Capabilities

Mitigation Capability	Platte County	Town of Chugwater	Town of Glendo	Town of Guernsey	Town of Hartville	Town of Wheatland
Levy for Specific Purposes with Voter Approval	X	X	X	X	X	X
Utilities Fees		X	X	X	X	X
System Development / Impact Development Fee						
General Obligation Bonds to Incur Debt						
Special Tax Bonds to Incur Debt			X			
Open Space / Conservation Fund						
Stormwater Utility Fees						
Capital Improvement Project Funding		X	X	X		X
Community Development Block Grants (CDBG)	X		X	X		X
Other:						

Education and outreach are important capabilities that allow a community to continue the conversation with their public regarding hazard risk and opportunities to mitigate. Table 1.6 shows that while the county leverages some of these capabilities the communities do not.

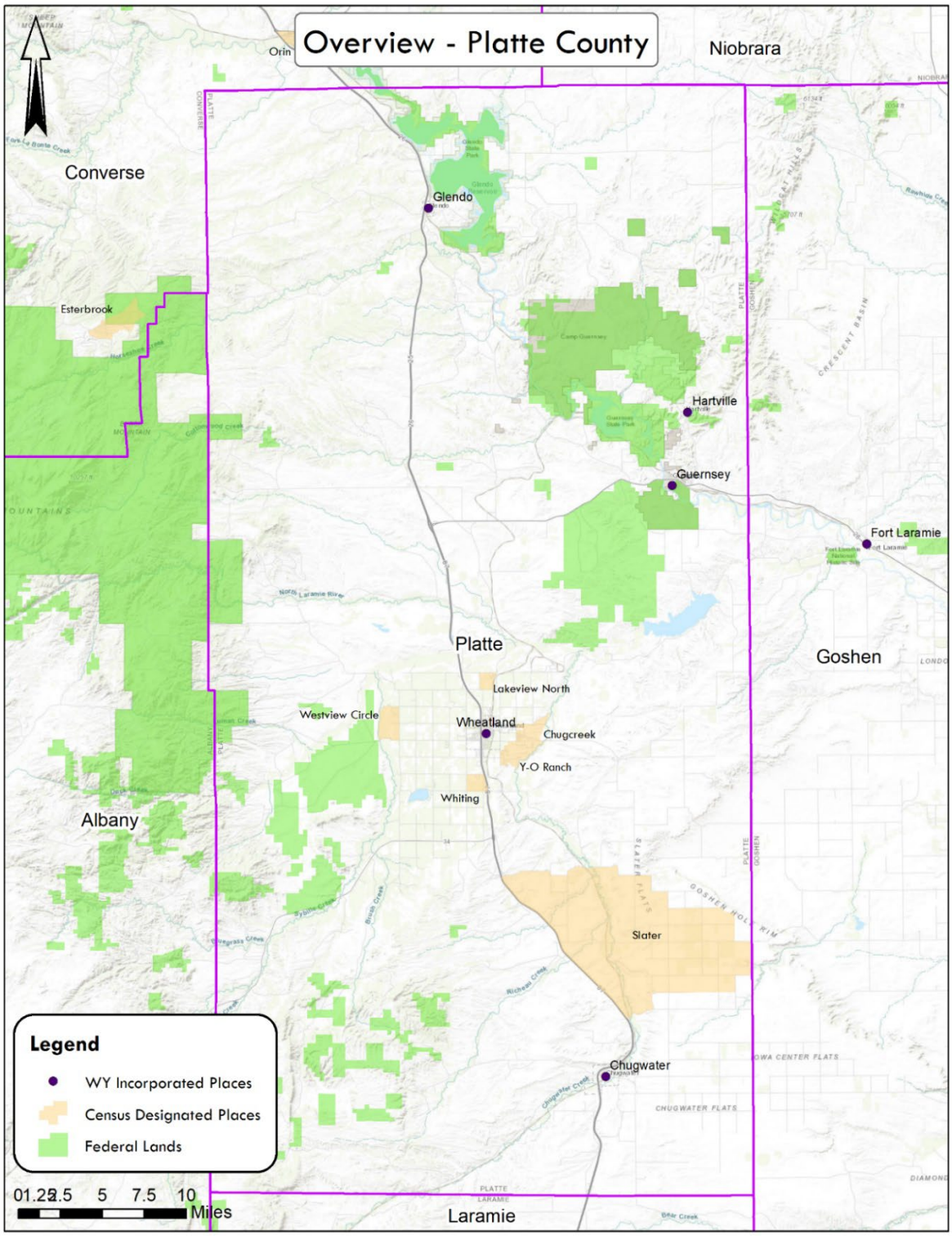
Table 1.6 Education & Outreach Capabilities

Mitigation Capability	Platte County	Town of Chugwater	Town of Glendo	Town of Guernsey	Town of Hartville	Town of Wheatland
Public Hazard Education / Outreach Program						
Local Citizen Groups That Communicate Hazard Risks	X					
Firewise						
StormReady	X					
Other:						

2 County Profile

Platte County is comprised primarily of private land, with approximately 11% Federal land.

Figure 2.1 Platte County Overview



2.1 Population

2.1.1 Projections

According to the 2021 Headwaters Economics Profile, which looks at demographics, economics, and social characteristics of communities, Platte County grew more than 7% in population between 2000 and 2020. The population of the county, as of the 2020 Census, is 8,605 people.

A 2019 report from the Wyoming Department of Administration & Information, Economic Analysis Division (EAD), shows population projections for all counties and jurisdictions through 2040. The county population projection for 2040 is approximately 4% growth to 8,990 people. The Town of Wheatland will see a similar percentage of growth, from the current census of 3,588 people to a projected 3,736. U.S. Census data is not available for the other jurisdictions, as the populations are below the counting threshold of 2,500 people. However, the EAD 2040 projected population growth for the other jurisdictions is between 3% and 7%.

2.1.2 Demographics

The composition of a community is critical information when identifying risks and understanding the demographics creates more holistic planning. Table 2.1 illustrates a high-level overview of some of the characteristics of Platte County and Town of Wheatland residents. Data for the other municipalities is not available from the U.S. Census Bureau due to collection thresholds.

Information worth noting in these areas are the percentage of the populations living in poverty and populations who have identified as having a disability. In comparison to the state's figure for those living in poverty (7.0%), these vary considerably, with persons in poverty being 3.2% and 7.4% for Wheatland and the county respectively. Based on the disability demographics, Wheatland and the county have significantly higher percentages of those with a reported disability than the state, a difference of 5.1% and 3.5% respectively.

Recognition of the differences in demographics across the county allows resources to be directed to the residents with highest need, such as the elderly, children, and those with access and functional needs. Populations vary greatly in communication abilities, financial means to respond on their own, and resource needs.

Table 2.1 Demographic Snapshot

Demographic	Wheatland	Platte County	Wyoming
Population (April 2020)	3,588	8,605	576,851
Persons under 5 years of age	3.2%	4.8%	6.0%
Persons under 18 years of age	13.1%	18.1%	23.1%
Persons 65 years of age and older	21.2%	23.9%	17.1%
Persons with a disability, under age 65 years	9.6%	10.6%	8.9%
Persons with a disability	18.5%	16.9%	13.4%
Language other than English spoken at home	7.5%	8.3%	7.4%
Median Household Income	$60,061	$57,784	$65,304
Persons living in poverty	3.2%	7.4%	7.0%

Source: 2019 American Community Survey (ACS), U.S. Census Bureau 2020

2.1.3 Health

Similar to the demographics snapshot, an understanding of the health of communities can inform preparedness and response actions. For example, in Platte County and Wheatland, of those who identified as having a disability, the highest percentages of people have ambulatory and cognitive difficulties. Responders may need

training to better assist residents in an event and the public should be educated on what would happen during a potential disaster event, to minimize any additional fears during a stressful situation.

Chronic illness and health condition data may seem unnecessary, but awareness of a community's overall health is important, especially considering potential public health hazards. For example, beyond the risk of pandemics, wildfire smoke can worsen asthma conditions for children and adults, and if sheltering is needed during an event diabetics will likely need insulin provided onsite. Platte County and Wheatland have notably higher percentages of those with coronary heart disease than the state, however with the majority of other health indicators they align closely to state reporting.

Table 2.2 Health Indicator Snapshot

Demographic	Wheatland	Platte County	Wyoming
Adults with Asthma, over age 18	9.3%	9.0%	9.2%
Adults with Coronary Heart Disease, over age 18	5.4%	5.8%	3.9%
Adults with Diagnosed Diabetes, over age 18	7.8%	8.3%	9.1%
Adults with Obesity, over age 18	*	29%	30.7%
Disability Type			
Hearing Difficulty	9.4%	8.4%	8.8%
Vision Difficulty	6.2%	3.6%	4.2%
Cognitive Difficulty	2.3%	2.7%	10.1%
Ambulatory Difficulty	9.9%	9.5%	11.3%
Self-care Difficulty	2.0%	2.4%	2.8%
Independent Living Difficulty	5.7%	4.7%	6.2%

*Source: CDC 2018-2021, Behavioral Risk Factor Surveillance System (BRFSS), 2019 American Community Survey (ACS) *Data unavailable*

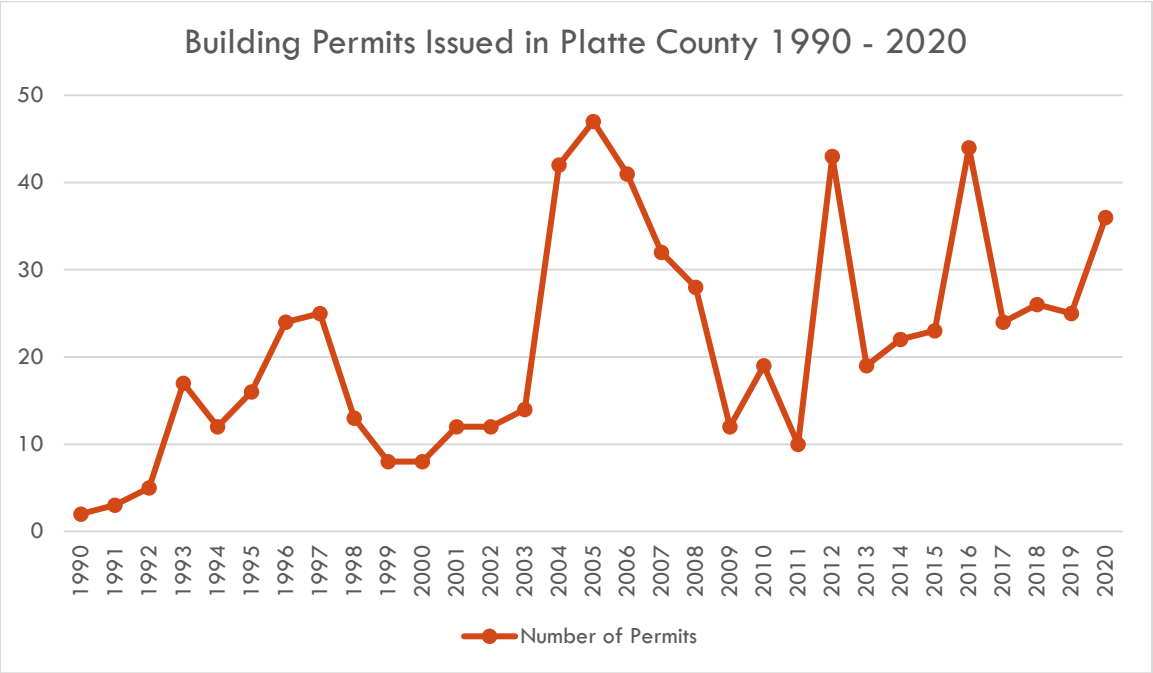
2.2 Development

2.2.1 Land

Platte County has seen fluctuating periods of growth and development. According to the U.S. Census Bureau between 1990 and 2020, there were 664 new private housing structure building permits issued. The years with the most permits issued were 2005 with 47 and 2016 with 44. The year with the least number of permits issued was 1990 with 2 permits, followed by 3 in 1991, and 5 in 1992. Overall, the number of permits issued each year has had a positive trend.

Figure 2.2 illustrates these details and the trends that occurred between 1990 and 2020.

Figure 2.2 Platte County Building Permits 1990-2020



2.2.2 Economic Overview

According to data from the U.S. Bureau of Economic Analysis, Platte County's highest gross domestic product since 2000, was in 2018 and was more than $620 million.

The unemployment as of February 2022 was 3.8%. Approximately 200 jobs were lost between 2010 and 2020, a quarter of which are in the finance and insurance sector. Of the almost 5,500 jobs in Platte County, approximately 2,800 are in the services industry followed by roughly 1,000 in the government sector. The table below shows the industries that hold the highest number of total jobs and the change in growth in number of jobs between 2010 and 2020.

Table 2.3 Top 5 Industries by Number of Jobs

Industry	Number of Jobs (2020)	Change 2010-2020
Government	1,009	-3%
Farm	633	6%
Retail Trade	598	17%
Accommodation and Food Services	491	No change
Health Care and Social Assistance	373	-3%

U.S. Department of Commerce. 2021. Bureau of Economic Analysis

3 Hazard Identification and Risk Assessment (HIRA)

3.1 Hazard Ranking

As discussed in Section 3.1 in the main body of the HMP, Platte County conducted a risk ranking exercise. Meeting participants ranked the identified hazards risk to property / environment, people, and the economy, as well as the probability of future damaging events on a scale of high, medium, or low. The table below shows the results of this exercise with a breakdown by community of the perceived level of risk for each identified hazard. It can be seen that Drought, Hail, and Wildfire scored the highest, whereas Earthquake, Landslide, and Public Health Hazards scored the lowest.

Table 3.1 Hazard Ranking Exercise Results

Hazard	Platte County	Chugwater	Glendo	Guernsey	Hartville	Wheatland
Cyber Hazards	Medium	Medium	High	Medium	Medium	High
Dam/Levee Incident	Medium	Low	Low	Medium	Low	Medium
Drought	High	High	High	High	Medium	High
Earthquake	Low	Low	Low	Low	Low	Medium
Flood	Medium	Medium	Medium	Medium	Low	High
Hail	High	High	Medium	Medium	High	High
Hazardous Material Release	Medium	Medium	Medium	Medium	Low	Medium
Landslide	Low	Low	Low	Low	Low	Low
Lightning	Medium	Medium	Medium	Medium	Medium	Medium
Public Health Hazards	Low	Medium	Low	Medium	Low	Low
Tornado	Medium	Medium	High	Medium	Medium	High
Wildfire	High	High	High	High	High	High
Wind	Medium	High	Medium	Medium	Medium	High
Winter Storm	Medium	High	High	Medium	High	High

The following county-specific hazard profiles each include five subsections that cover; previous occurrences, inventory exposed, potential impacts, probability of future occurrences, and land use and development. The following hazard profiles are specific to Platte County and their participating communities.

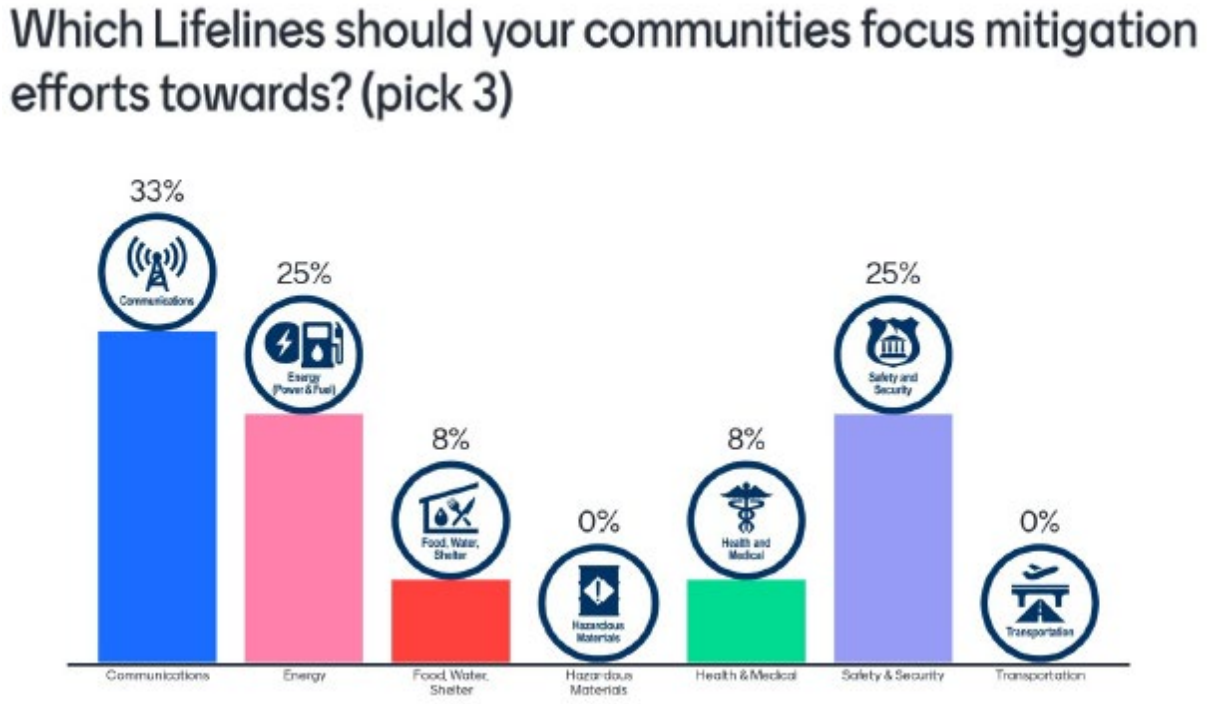
3.2 Lifelines

The Lifelines framework is used in this plan as a base for emergency management planning, preparedness education, and mitigation planning. It is important to consider cascading effects when Lifelines are affected and how those effects will impact the community and other Lifelines. The Lifelines are shown in the following graphic.

Lifelines are essential to a community's long-term disaster resilience, each one providing diverse critical services and resources. As part of the HMP planning process, the Hazard Mitigation Planning Committee identified Lifelines utilizing the best available data, supplemented by Laramie County geographic information system (GIS) data for the region. Within each hazard profile the specific Lifeline exposure data for Platte County is highlighted, as applicable.

The HMPC was surveyed to determine which Lifelines communities should focus mitigation efforts towards. Figure 3.1 illustrates the results of this poll, showing Communication as the priority for mitigation. This is followed by Energy and Fuel and Safety and Security.

Figure 3.1 Lifeline Mitigation Efforts



3.3 Hazard Viewers

The rapid evolution of hazards data creates the need for tools which present the most recent data in a useful way. The maps included in this plan are helpful to serve as an overview of the various hazard and risk information, but ultimately are static snapshots of the best available data at the time of this plan's writing. Additionally, the large size of Region 7's counties make it difficult to present many of the maps at a scale useful to the local communities.

With these disclaimers noted and as hazard and risk data is constantly evolving, it is important to utilize the latest and greatest hazard data available. Fortunately, the State of Wyoming and federal government have recently developed a number of hazard data viewers that present much of the same information contained in this plan. When possible, this plan directs readers to these online resources to ensure the most accurate information is being referenced and utilized.

Hazard Data Viewers:

- FEMA's National Risk Index for Natural Hazards
- FEMA's Resilience Analysis and Planning Tool
- WY State Geological Survey's Wyoming Geologic Hazards Map
- WY State Forestry Division's Wildfire Risk Assessment Portal
- United States Forest Service's Wildfire Risk to Communities Portal

3.4 Cyber Hazards

3.4.1 Previous Occurrences

Platte County experienced an event with cyber security in December 2017 when county servers were attacked with ransomware. The response to this attack was successful as the county began planning for potential events and strengthening IT processes in 2013. Coordinating with the Cybersecurity and Infrastructure Security Agency (CISA) and due to the implementation of daily backups and improved security processes the county was approximately 98% recovered within a few days of the incident.

In neighboring Goshen County, Eastern Wyoming College was the victim of an attack in June 2021, which impacted their communications and computing systems for months.

According to the 2020 FBI Internet Crime Complaint Center (IC3) crime report, Wyoming residents were victim to more than $5 million in losses through a variety of cyber crime techniques. The majority of which was lost to victims more than the age of 60.

3.4.2 Inventory Exposed

All systems, people, and entities are exposed to cyber hazards, including individuals, small businesses, healthcare facilities, local governments, schools, and large infrastructure. Those perpetrating these attacks are indiscriminate and will take control of whatever they are able to. Those organizations with older technology, hardware or software, and minimal or no information technology (IT) support are especially at risk.

3.4.3 Probability of Future Occurrences

It is possible that Platte County technology operations may be compromised and community members could fall victims to malicious acts. The majority of technology users, including individuals, businesses, and organizations are using inadequate cyber security and this creates a large pool of potential victims.

3.4.4 Future Development Trends

Cyber hazards are unlikely to affect future development.

3.4.5 Climate Change Impacts

Cyber hazards are not likely to be immediately impacted by climate change.

3.5 Dam / Levee Incident

3.5.1 Previous Occurrences

According to the USGS, "failure of Wheatland Irrigation District's No. 1 Dam on July 8, 1969, caused floods on Sybille Creek and the upper reaches of the Laramie River. The U.S. Bureau of Reclamation (USBR) estimated the

peak discharge at the dam to be 28,000 cubic feet per second (cfs). The dam impounded about 9,000- acre-feet and the reservoir emptied in about 2 hours. The peak discharge of 13,400 cfs on the Laramie River at 1-25 crossing near Wheatland, Wyo., was 1.5 times a 50-year flood. The flood peak passed the station at about 1100 hours July 8. Thirty miles farther downstream, due to attenuation, the peak discharge was only 1,740 cfs on the Laramie River at Fort Laramie, Wyo., and the recurrence interval was 4 years. Total flood damage to the dam, canal works, roads, homes, and agricultural lands was estimated at $750,000. Of this sum, $624,000 was for damage to the dam and canal works."

3.5.2 Inventory Exposed

In 1981, the U.S. Army Corps of Engineers (USACE) completed an inspection program for nonfederal dams under the National Dam Inspection Act (P.L. 92-367). This was a four-year work effort and included compiling an inventory of about 50,000 dams and conducting a review of each state's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams. Part of the inspection included evaluating the dams and assigning a hazard potential based on the effects downstream should one of the dams fail. The dams were rated (1) high, (2) significant, and (3) low hazard. The Corps of Engineers based the hazard potential designation on such items as acre-feet capacity of the dam, distance from nearest community downstream, population density of the community, and age of the dam. High hazards dams would, in case of failure of the dam, likely cause loss of life. Significant hazard dams would, in case of failure, likely cause significant property damage, but no loss of life. Failure of a low hazard dam would likely cause only minimal property damage. Hazard potential classification is no guarantee of safety.

The Wyoming State Engineer's Office (SEO) inspects dams more than 20 feet high or with a storage capacity of 50 acre-feet or more, although smaller dams are also regulated if the potential for failure indicates a need. In 2018, the SEO regulated 1,553 dams. Of those dams, 88 were rated high hazard, 104 were rated significant hazard, and 1,361 were rated low hazard. The SEO inspects these dams once every five years.

There is a total of 49 dams in Platte County, according to the USACE National Inventory of Dams. Table 3.2 shows the five high and one significant hazard dams. Of these seven dams, four are owned by the U.S. Bureau of Reclamation (USBR), while the others are owned by a public utility and a private entity. The nearest downstream community is also identified, as is the fact that all of the high hazard dams currently have Emergency Action Plans (EAPs). Emergency Action Plans are used to create a common understanding of what a response to a dam/levee incident would entail and they are developed by the owner, in collaboration with local response agencies and other key stakeholders.

Table 3.2 High and Significant Hazard Dams in Platte County

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Glendo	USBR	North Platte River	High	Casso	0	**Y**
Grayrocks	Basin Electric Power	Laramie River	High	Fort Laramie	20	**Y**
Glendo Dike No. 1	USBR	North Platte River	High	Guernsey	20	**Y**

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Glendo Dike No. 2	USBR	North Platte River	High	Guernsey	20	**Y**
Glendo Dike No. 3	USBR	North Platte River	High	Guernsey	20	**Y**
Wheatland No. 1	Wheatland Irrigation District	Sybille Creek Offstrea	Significant	Wheatland	-	**N**

Figure 3.2 illustrates where the high hazard dams are located in relation to the Platte County boundary. This map also includes the locations of other, national level inventoried dams. Four high hazard dams are seen as being located within Platte County; Glendo, Guernsey, Grayrocks, Glendo Dike No. 1, Glendo Dike No. 2, and Glendo Dike No. 3. Two additional high hazard dams, located in nearby Goshen County, could potentially impact Platte County communities and their resources.

Figure 3.2 Locations of Dams, Platte County

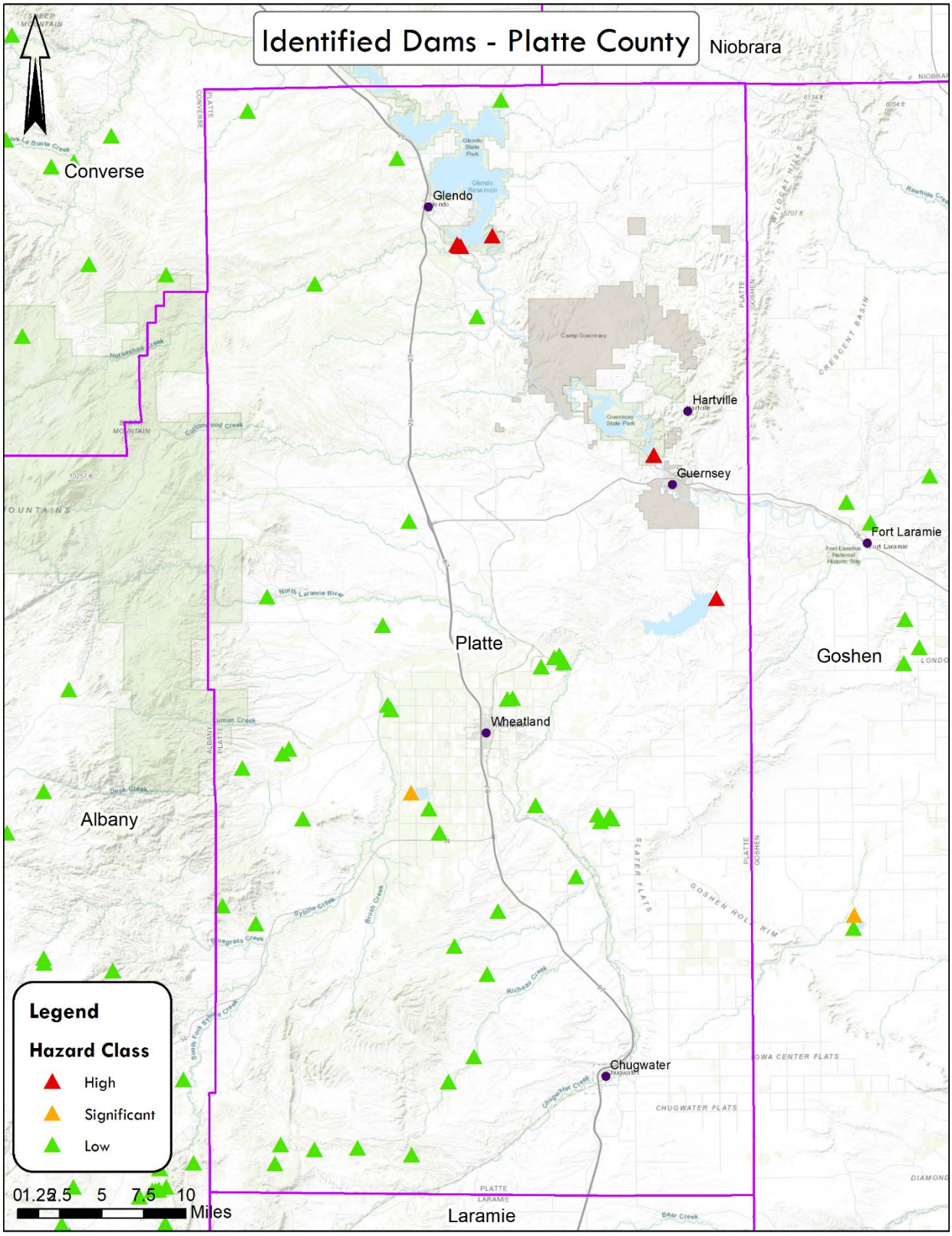


Table 3.3 shows the parcels exposed to the potential dam inundation areas, both of which are located in unincorporated areas of the county. These two exposed residential properties have a value of approximately $100,000, per Wyoming Department of Revenue data.

Table 3.3 Parcels Exposed to the Potential Dam Inundation Area

Jurisdiction	Total Count	Residential	Improved Value ($)
Unincorporated County Areas	2	2	99,507
County Total	**2**	**2**	**99,507**

The transportation lifeline is the only exposed lifeline to the dam inundation areas and the exposure consists of a single roadway bridge.

3.5.3 Probability of Future Occurrences

Although the chances of a dam incident occurring are perceived as being low, the magnitude of damage should an event occur is significant. The structural integrity of dams depends on regular inspections and maintenance, which do not always happen and could increase the likelihood of a dam failure event. In the past, a number of the dam failures in Wyoming and other Rocky Mountain states have occurred due to snow melt flooding exceeding the capacity and strength of dams. Wyoming's dams will continue to be tested by snow melt, heavy rains, and other types of floods every year. Thus, dam incidents have the potential to threaten Platte County's communities in the future.

3.5.4 Future Development Trends

Although Platte County is not expecting any planned new development, the risk and impacts of a dam failure event are still prevalent to existing infrastructure. If an event occurs, there is greater risk for communities located closer to the dam or those are who are not notified. Communities with higher population densities and large numbers of structures, utilities, and critical facilities, are expected to experience greater damage and loss. As populations expand and new structures are built, it is important for jurisdictions to enforce building codes and standards to reduce future loss should a dam incident occur.

3.5.5 Climate Change Impacts

The lack of predictability in weather patterns, due to climate change, is a concern in the possibility of future dam incidents. As seasons change rapidly, snow melt flooding can exceed the capacity and strength of dams, as well as increase water levels in waterways testing levees. The expected increased size and intensity of future severe storms pose a risk as well, as prolonged precipitation is a major factor in incidents, especially overtopping and spillway discharges.

3.6 Drought

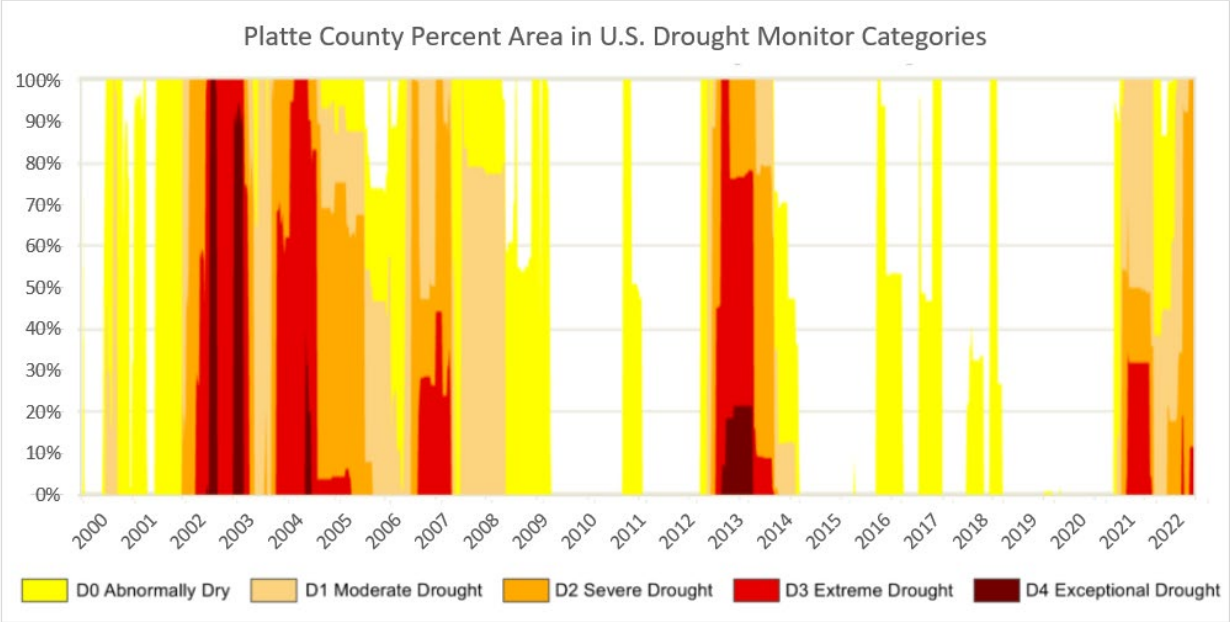
3.6.1 Previous Occurrences

Platte County has experienced several multi-year droughts over the past several decades. Most recently, the county has been included in several regional United States Department of Agriculture (USDA) disaster declarations for droughts and designated as a primary county in 2007, 2009, twice in 2012 and once each in 2013, 2020, and 2021.

Figure 3.3 illustrates drought type, by time and exposure of Platte County from 2000 to 2021. Based on data from the U.S. Drought Monitor, 100% of the county was in either Extreme or Exceptional drought for weeks to months between 2002 and 2003. Another period in 2004 is shown as having 100% of the county in Extreme Drought. This Extreme drought is seen to a lesser extent in 2012, however there was approximately 20% of the

county experiencing Exceptional Drought during that time. There were minimal drought events recorded from 2014 to 2020, all of which were categorized as moderately dry. However, drought activity increased in 2021, including an extended period of Extreme drought affecting 30% of the county.

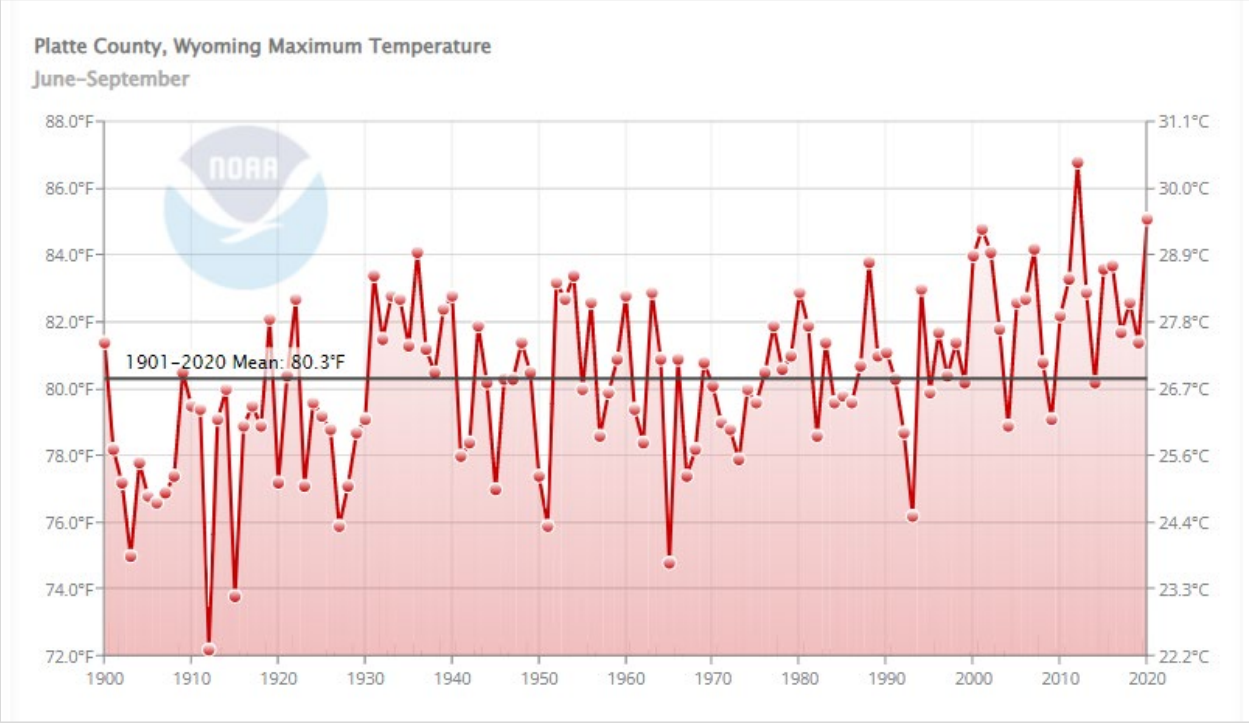
Figure 3.3 Platte County Percent Area in Drought 2000-2021



Source: U.S. Drought Monitor

While high temperatures do not directly cause drought, they can greatly impact the effects, likelihood, and duration of occurrence. The average maximum temperature between June and September, from 1900 to 2020, can be found in Figure 3.4. Note the peak temperature for this period of 87°, which occurred in 2012 and correlates with the Exceptional Drought of that same year.

Figure 3.4 Average Maximum Temperature between June and September 1900-2020



Source: National Oceanic and Atmospheric Administration (NOAA)

3.6.2 Inventory Exposed

In Platte County, data from the USDA shows disaster assistance payments have totaled more than $16.2 million between 1995 and 2020. The majority of this, more than $10.8 million, were payments issued for livestock disaster assistance, and another $4.8 million was issued for crop disaster and non-insured assistance. While these numbers seem substantial, it is likely that not all producers took advantage of these programs after a USDA declared disaster and designation for a multitude of reasons. Approximately half ($8 million) of the overall total was paid out in 2014 alone, which is reflective of the impact of back-to-back drought declarations, both contiguous and primary, in 2012 (two declarations during the crop year) and 2013.

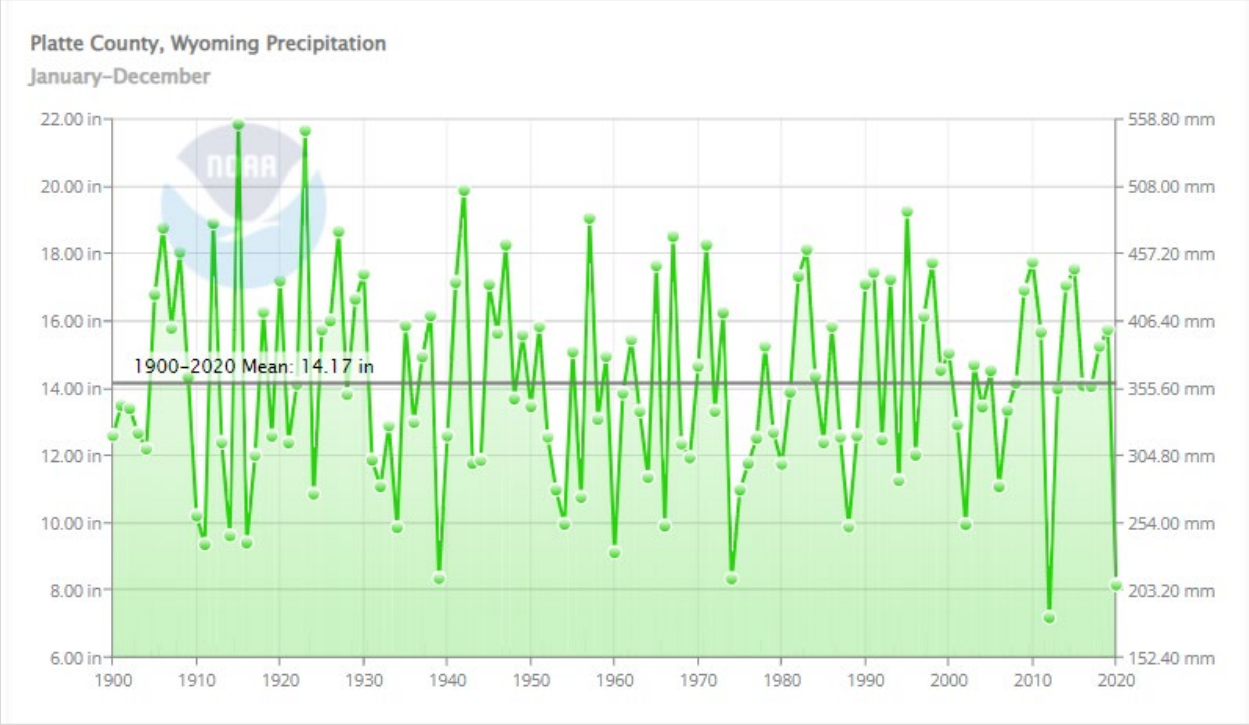
The USDA issues declarations for a number of other disasters and the available data does not distinguish between the cause of declaration for the payments in this time period. However, it is likely that a considerable portion of these payments were necessary due to the effects of multiple drought specific declarations.

From an agricultural perspective all crops, grazing lands, and livestock in the county are exposed to drought. The population of the county is also exposed to the indirect economic impacts of drought, which can be difficult for community members to cope with long term.

3.6.3 Probability of Future Occurrences

Drought is often difficult to predict, but based on historical records, it is reasonable that Platte County will be impacted by drought conditions in the future. The county is located in an arid region and based on National Oceanic and Atmospheric Administration (NOAA) data since 1900, shown in Figure 3.5, receives approximately 14.2 inches of precipitation annually. Droughts are typically regional events, impacting multiple counties and states simultaneously. Drought is expected to be a normal occurrence due to the county's natural climate and therefore will likely continue to occur.

Figure 3.5 Average Annual Precipitation 1900-2020



Source: National Oceanic and Atmospheric Administration (NOAA)

3.6.4 Future Development Trends

A community's vulnerability to drought is affected largely by population growth, urbanization, demographic characteristics, technology, water use trends, government policy, social behavior, and environmental awareness. These factors are continually changing, and society's vulnerability to drought may rise or fall in response to these changes. In scenarios where a community's population is increasing or shifting, increased pressure on water and other natural resources can be seen causing a shortage of water availability. Although Platte County is not currently experiencing much growth, the risk and impacts of an extended drought are still prevalent to existing populations.

Any future growth will greatly impact drought hazards by stressing both surface and ground water resources. Agricultural and industrial water users consume large amounts of water and expansion of existing water services is limited when a drought occurs. In rapidly growing communities, new water and sewer systems or significant well and septic sites could use up more of the available water, particularly during periods of drought. Public water systems are monitored, but individual wells and septic systems are not as strictly regulated.

Related to both current land use and future development trends, the use of turf grass affects the available water supplies. Urban lawn watering is the single largest water demand for many municipal supplies.

Future water use regulations may be able to mitigate this trend. If Platte County should grow, it is recommended that staff revisit existing standards for determining the impacts of drought .

3.6.5 Climate Change Impacts

The presence of droughts across the nation is due to the changing climate, which affects weather patterns and temperature fluctuations. As hotter weather increases in duration and precipitation is less predictable, droughts will likely continue to be a common occurrence, potentially being experienced more regularly.

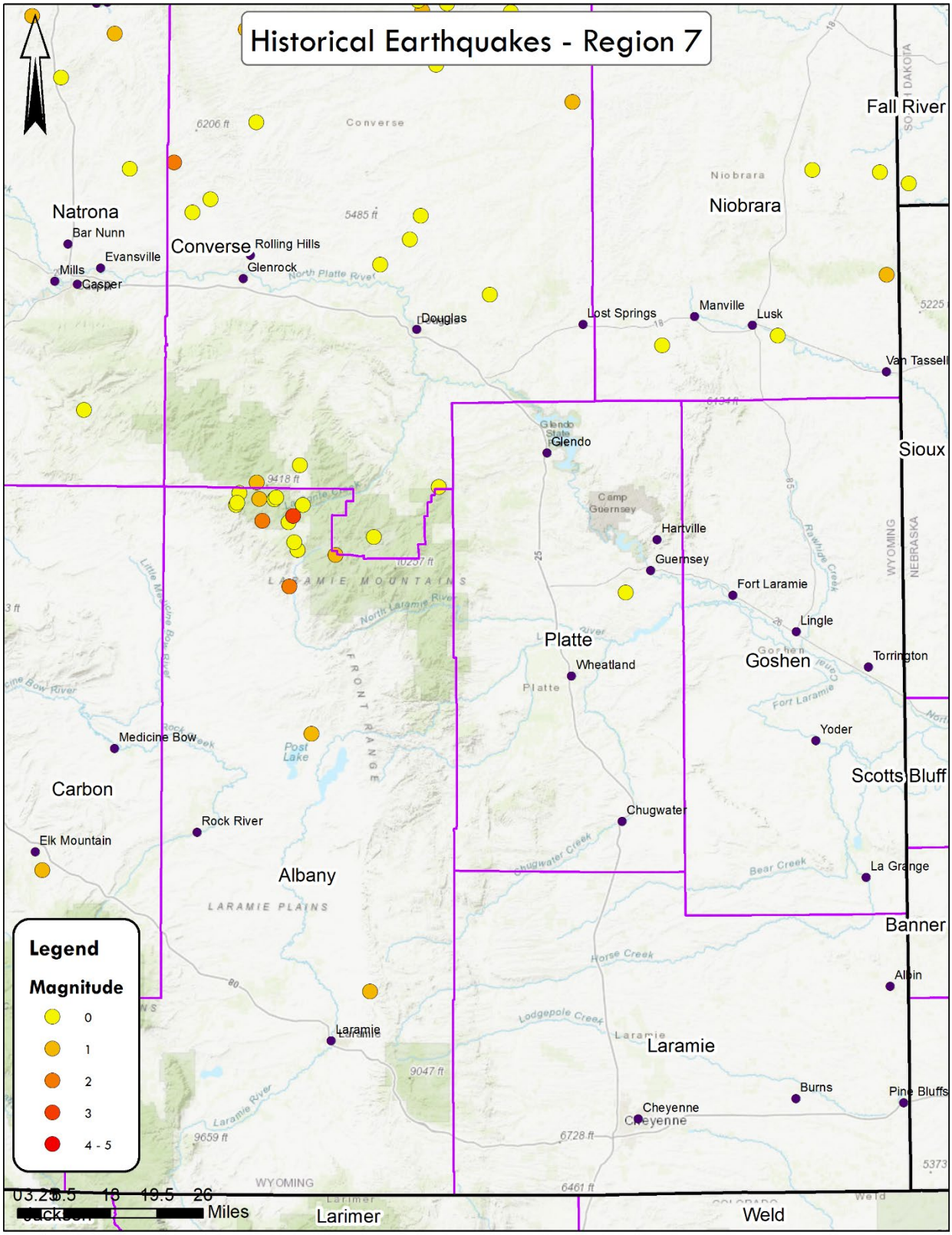
3.7 Earthquake

3.7.1 Previous Occurrences

Historically, earthquakes have occurred across much of Wyoming. The first reported event was in Yellowstone National Park in 1871. Yellowstone National Park is one of the more seismically active areas in the United States but is on the opposite corner of the state from Platte County. Figure 3.6 shows the location of seismic events identified, with a magnitude of 0 or higher, within Region 7.

It is important to note that while only one earthquake has been recorded in the county, several historical earthquakes epicenters have occurred in neighboring counties.

Figure 3.6 Region 7 Historical Earthquakes



3.7.2 Inventory Exposed

For this risk assessment, a 2,500-year, magnitude 5.0 earthquake scenario was modeled in FEMA's Hazus v5.0 software. This scenario was used to represent the "worst case scenario" for the county and loss estimates were gathered through analysis of the modeled earthquake data at the census tract level.

In Platte County, there are an estimated total of 4,000 buildings, with a total building replacement value of more than $900 million. This value represents the estimated costs to repair or replace the damage caused to a building and does not include building contents.

The total economic loss estimated for this modeled earthquake event is more than $106.3 million, which includes building and Lifeline related losses. Building-losses include both the direct loss of a building and its contents and business interruption costs. These costs of business interruption are the losses from the inability to operate a business due to earthquake damages.

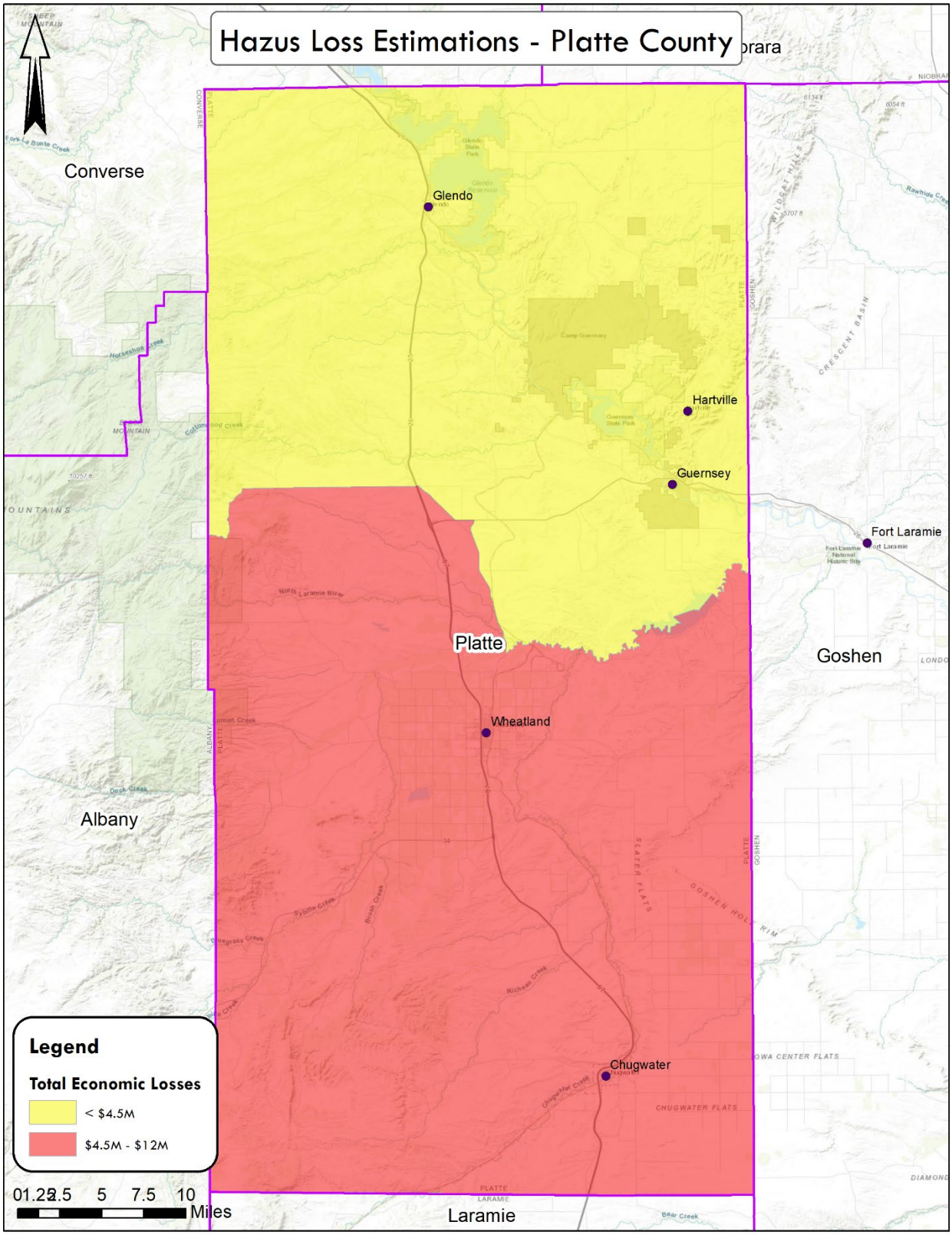
Further notable loss estimations from Hazus include:

- $2.9 billion –Transportation Lifeline system replacement value, 160 bridges and 194 miles of highway,
- $1.9 billion –Utility Lifeline system replacement value, 9,380 miles of pipeline (water, waste water, natural gas, oil systems, electrical power, communications)
- 20 – Utilities Lifeline system pipeline breaks
- $16.5 million – estimated total building-related losses, including business interruption which makes up 19% of the total building related losses
- 53% – percent of total build-related losses that were residential properties
- 266 – buildings at least moderately damaged, no buildings are estimated to be damaged beyond repair
- 30 – number of days for essential facilities to be 100% operational (hospitals, police and fire stations, EOC, and schools)

Figure 3.7 illustrates the breakdown of Hazus economic loss estimation by census tract.

For more detailed information from the Hazus scenario model, see the Earthquake Hazus Risk Report.

Figure 3.7 Hazus Loss Estimations



3.7.3 Probability of Future Occurrences

The likelihood of a future occurrence of an earthquake is very low, but not impossible. Since the historic record is limited, it is not feasible to determine when a 2,500-year event last occurred in the county. This type of event was used for loss estimation analysis because of the uncertainty involved and based upon the fact that the International Building Code utilizes 2,500-year events for building design. This conservative approach is in the interest of public safety.

3.7.4 Future Development Trends

Although Platte County is not currently experiencing much growth, the risk and impacts of an earthquake are still prevalent to existing infrastructure. With the unpredictable nature of earthquake epicenter locations, there is potential for significant structural damage to occur anywhere in the county. Due to the nature of earthquake hazards, communities in the county with higher population densities and larger numbers of structures and critical facilities are expected to experience greater damage and loss from an earthquake event. If population and development should occur, continued enforcement of the unified construction code has great potential to mitigate increasing vulnerability and development pressure .

3.7.5 Climate Change Impacts

There is no evidence currently that climate change will influence earthquake activity.

3.8 Flood

3.8.1 Previous Occurrences

Numerous floods have occurred in the county and some events to note are:

- In June 1987, the Rock Creek flood caused more than $300,000 in damage to lagoons in the Town of Wheatland. An old lagoon was abandoned and a new one built outside of the flood plain due to this event.
- In 1992, more than $70,000 in damage was incurred by the county due to flooding along local roads that are adjacent to creeks.
- On June 27, 1995, a flash flood washed out approximately 100 feet of water line in the Town of Hartville. The National Guard assisted with cleanup and recovery efforts.
- On September 14, 1996, heavy rainfall from thunderstorms, washed out Iron Mountain Road, which is southwest of Chugwater. Two feet of water was flowing over the road. The event caused $100,000 in property damages.
- Rock Creek flooding can be a yearly event during normal weather conditions.

The Wyoming State Hazard Mitigation Plan (2021-2026) lists 25 flood events and associated damages from 1960-2019 for Platte County. The damages from flood events, according to the state HMP, were $393,000 in property damages and $225,000 in crop damages. No deaths or injuries were reported.

The National Centers for Environmental Information (NCEI) lists a total of 19 flood and flash flood events in Platte County between 1996, when records started, and 2021. These events have $107,000 in reported property damages, no crop damages, and no deaths or injuries.

The Spatial Hazard Events and Losses Database for the United States (SHELDUS) data shows 12 reported damage causing flood events between 1965 and 1997. The total property damages are more than $1.3 million and the crop damages are listed as $332,000. There were no injuries or fatalities reported. These event details are included in the Table 3.4.

Table 3.4 Damaging Flood Events, 1965-1997

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1965	411,356	0	0	0
1966	86,941	0	0	0
1970	417,452	0	0	0
1976	22,773	0	0	0
1983	43,366	434	0	0
1984	104	103,928	0	0
1987	125,471	228,129	0	0
1990	4,957	0	0	0
1991	9,514	0	0	0
1995	17,005	0	0	0
1996	168,475	0	0	0
1997	8,073	0	0	0
Total	**1,315,488**	**332,490**	**0**	**0**

3.8.2 Inventory Exposed

Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Specific examples of negative impacts from flooding on Platte County span a comprehensive range. Flooding causes:

- damage to private property that often creates financial hardship for individuals and families;
- damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- loss of personal income for agricultural producers that experience flood damages;
- loss of income to businesses relying on recreational uses of county waterways;
- emotional distress on individuals and families; and
- harm to people and animals

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the "event of record." The flood of record is almost always correlated to a peak discharge at a gage, but that event may not necessarily have caused the worst historic flood impact in terms of property damage, loss of life, etc. The June 1987 Rock Creek flood is considered to be the flood of record for Platte County. This was the costliest flood in Platte County's history, causing more than $300,000 of damage.

The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year. Emergency management protocols, public emergency notification improvements, and development/land use codes will all help mitigate future impacts of floods.

Table 3.5 shows the parcels that are exposed to the 1% annual chance floodplain, also called the 100-year floodplain. The 1% annual chance flood has a one in 100 chance of being equaled or exceeded in any one year. While the recurrence interval is 100 years, this is an average and a flood of that magnitude may occur more than once within 100 years.

The 500-year floodplain, also called the 0.2% annual chance floodplain, which has a one in 500 chance of being equaled or exceeded in a given year exposes no additional parcels beyond those same parcels exposed to the 1% Annual Chance Floodplain.

The floodplains used for this vulnerability assessment are the result of FEMA Hazus software modeling. Figure 3.8 illustrates this floodplain, which determined the parcels exposed to the 1% annual chance floodplain.

Parcels exposed to the 1% Annual Chance Floodplain are approximately 90% residential, with a total overall parcel value across the county of almost $37.4 million. Approximately half of the exposed residential parcels in the county are located in Guernsey and are worth more than $11.3 million. Guernsey has the highest value of exposed commercial parcels across the county, with 6 parcels valued at $2.3 million. The unincorporated county areas hold the highest value for exposed residential parcels and the 88 parcels are valued at more than $19 million.

Table 3.5 Parcels Exposed to the 1% Annual Chance (100-year) Floodplain

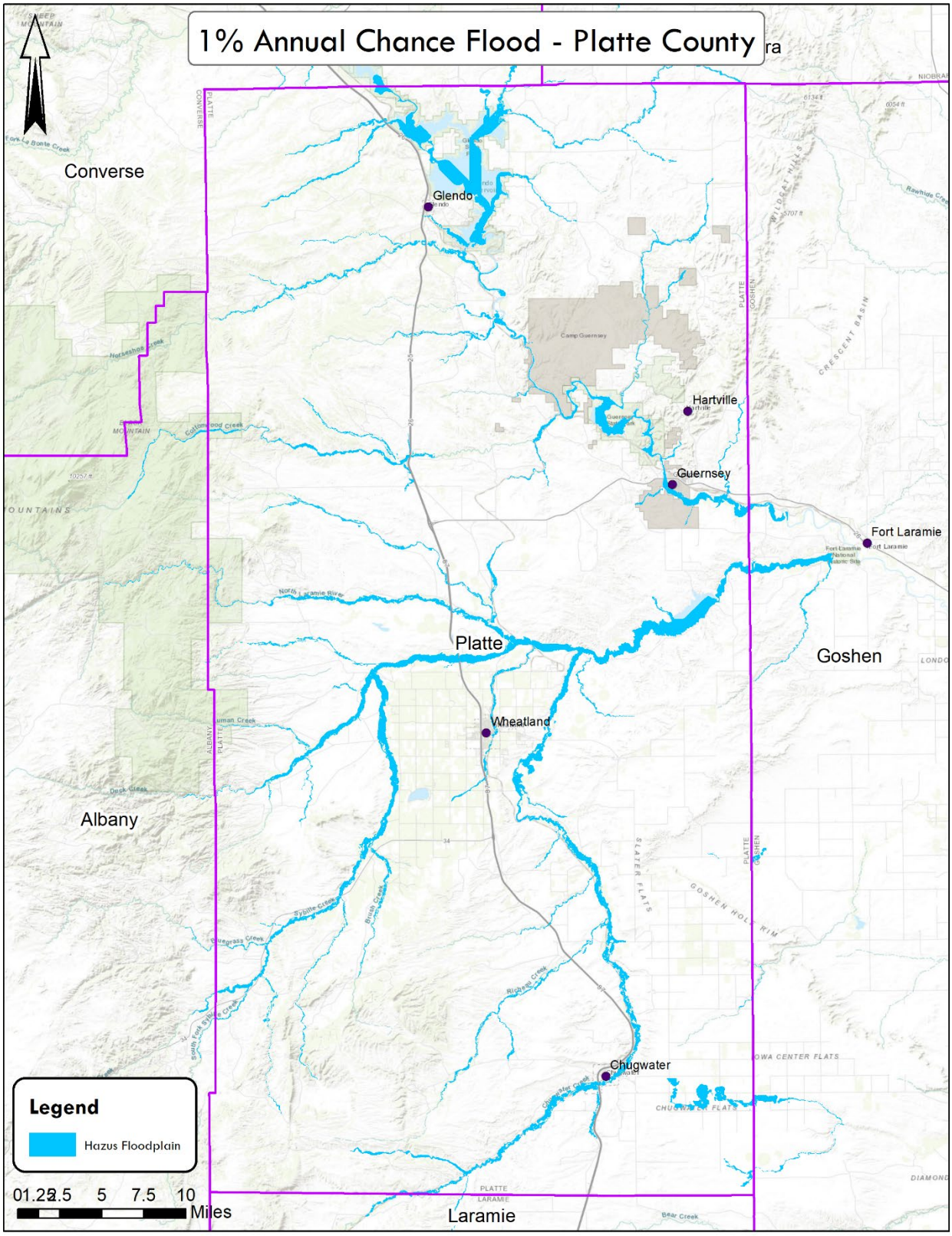
Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Chugwater	1	-	-	1	1,070
Guernsey	110	104	11,308,601	6	2,294,965
Wheatland	33	22	2,912,880	11	404,718
Unincorporated	94	88	19,000,091	6	1,520,327
County Total	**238**	**214**	**33,221,572**	**24**	**4,221,080**

Lifeline exposure to the 1% Annual Chance Floodplain is relatively minimal. The transportation lifeline has the most exposure with 32% of infrastructure exposed. The energy and food, water, and shelter lifelines also have exposure, both of which fall below 10% of total infrastructure.

Table 3.6 Landline Exposure to 1% Annual Chance Floodplain

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Energy	45	1	2 %
Energy (miles)	681	18	3 %
Food, Water, & Shelter	29	2	7 %
Transportation	249	79	32 %

Figure 3.8 1% Annual Chance Floodplain



3.8.3 Probability of Future Occurrences

While the probability that the county will experience a flood event can be difficult to predict or quantify, the frequency of previously reported flood events in Platte County shows that localized flooding will likely be experienced yearly. Flooding in general has the potential to cause moderate property and crop damage within the county and severe flooding has the potential to inflict significant damage to people and property. Mitigating flood damage requires that communities remain diligent and notify local officials of potential flood (and flash flood) prone areas near infrastructure such as roads, bridges, and buildings.

3.8.4 Participation in National Flood Insurance Program (NFIP)

According to the NFIP's Community Information System (CIS) all participating jurisdictions participate in NFIP, except for the Town of Glendo. None of the jurisdictions participate in the Community Rating System (CRS), which is a program within NFIP that can discount insurance rates of participating jurisdictions.

The Town of Guernsey's Flood Hazard Boundary Map (FHBM) was rescinded, which can occur for numerous reasons but is typically due to an engineering analysis and determination that the community will not be inundated by a 100-year flood or the map may not be accurate. While the town is a participant in the NFIP, it is listed as having no special flood hazard area and there is no Flood Insurance Rate Map (FIRM) on record.

None of the jurisdictions are home to repetitive loss properties. Table 3.7 details local jurisdiction NFIP participation status. The Town of Chugwater is the only jurisdiction, participating in the NFIP, without a policy in force currently.

Table 3.7 NFIP Participation

Jurisdiction	Date of Entry	Initial FIRM ID	Initial FHBM ID	Policies in Force	Number of Paid Claims since 1978	Total Coverage	Claims Paid since 1978
Platte County	7/1/2011	3/23/2001	3/28/1978	3	0	$980,000	$0
Town of Chugwater	9/1/2000	9/01/2000	12/13/1974	0	0	$0	$0
Town of Guernsey	7/15/1992	-	11/12/1976*	1	0	$280,000	$0
Town of Wheatland	4/16/1979	4/16/1979	4/12/1974	1	1	$250,000	$0

*FHBM Rescinded

3.8.5 Future Development Trends

Platte County is not currently experiencing any major growth, but the risk and impacts of a flooding event are still prevalent to existing infrastructure. Any redevelopment must take into account which parcels are within the 100-year floodplain. Floodplain management ordinances, zoning and subdivision ordinances, and state regulations address methods and practices to minimize flood damage to new and substantial home improvement projects. Quality construction and compliance with local ordinances, which exceed NFIP requirements, are the greatest protection against flooding. The county along with the Towns of Chugwater, Guernsey, and Wheatland participate in the National Flood Insurance Program (NFIP) and support floodplain management activity at the local scale. Code adoption by local jurisdictions, compliance by builders, and local government inspection of new homes can greatly reduce the risk of flooding. Platte County and its municipalities should continue to look into monitoring, analysis, modeling, and the development of decision-support systems and geographic information applications for floodplain management activities.

In addition to land-use planning, zoning, and codes applicable to new development, flood mitigation measures include structural and non-structural measures to address susceptibility of existing structures. Flood mitigation measures such as acquisition, relocation, elevation-in-place, wet/dry flood proofing, and enhanced storm drainage systems all have the potential to effectively reduce the impact of flood in the county.

3.8.6 Climate Change Impacts

The impacts of climate change on weather patterns and temperature fluctuations and these impacts contribute to the potential for increased extent and frequency of floods in the future. The unpredictable nature of precipitation patterns and drought creates conditions conducive for flooding from heavy rains and/or rapid snowmelt. Wildfires are occurring more often due to drier conditions and the effects of these fires on the landscape also lead to more severe and frequent flooding.

3.9 Hail

3.9.1 Previous Occurrences

According to the NCEI database, 338 hail events have occurred in Platte County between 1950 and 2020. These events resulted in more than $221,300 in property damage. The largest reported hail is 4.25 inches, which has fallen in storms in 2009, 2013, 2017, and 2019. These size hailstones were recorded in Bordeaux, Cassa, Chugwater, and Wheatland. There are no reported deaths or injuries for a recorded hail event in the county.

Based on SHELDUS records, there were 18 damage causing events between 1962 and 2009, resulting in more than $971,800 in property damage and more than $291,500 in crop damage (2019 USD). These events are detailed in Table 3.8.

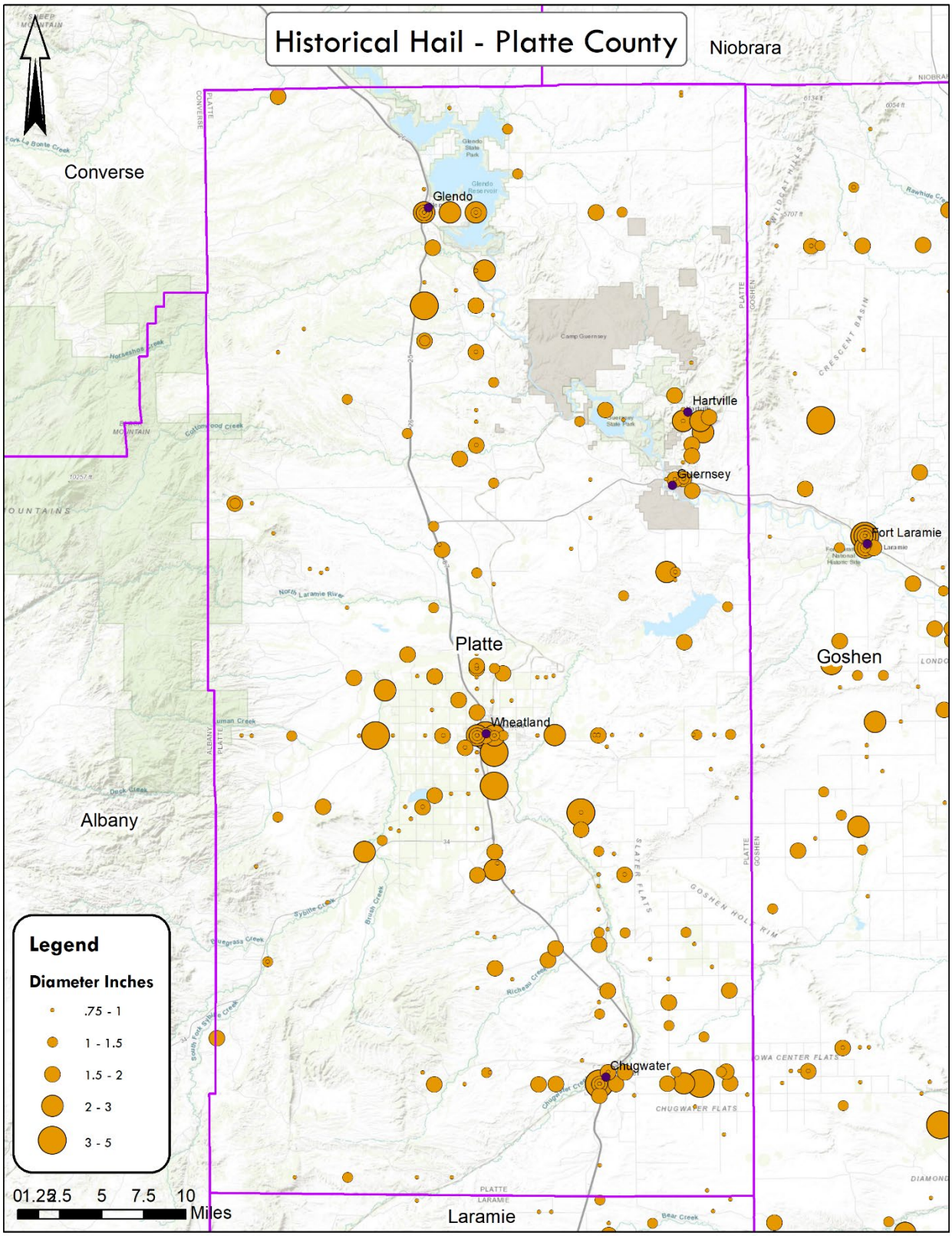
Table 3.8 SHELDUS Reported Hail Damage by Year 1960-2009

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1962	21,453	0	0	0
1966	19,996	0	0	0
1968	0	37,235	0	0
1971	0	31,994	0	0
1975	401,416	0	0	0
1977	22,452	2,138	0	0
1978	29,811	99,369	0	0
1984	173	103,928	0	0
1986	11,823	0	0	0
1987	114,064	11,406	0	0
1988	54,766	5,477	0	0
1990	991	0	0	0
1994	874	0	0	0
1996	33,530	0	0	0
1997	16,147	0	0	0
1999	48,222	0	0	0
2000	45,149	0	0	0
2009	150,996	0	0	0
Total	**971,865**	**291,547**	**0**	**0**

Historical hail events for the county are illustrated in Figure 3.9, as well as the diameter of hailstones reported.

It is worth noting reports of hail are typically higher near populations centers, which can be seen in the clustering of events near the jurisdictions, shown on the map. Based on this trend, it is likely that many hail events go unreported and records of events may be considerably lower than what is actually occurring in the county.

Figure 3.9 Historical Hail Events, Platte County



3.9.2 Inventory Exposed

Platte County has the sixth highest number of hail storm events across the state, per the 2021 State of Wyoming Hazard Mitigation Plan. The entire county is exposed to hail events, as they are regional and travel. All structures, infrastructure, property, people, crops, and livestock could be damaged or harmed by a hail storm.

3.9.3 Probability of Future Occurrences

The frequency of previously reported hail events in Platte County provides an acceptable framework for determining the probability of future hail storm occurrence in the area. The probability that the county will experience a damaging hail event can be difficult to predict or quantify, but it is expected that hail events will be experienced yearly and may result in damage. Severe hail storms have the potential to inflict significant damage to people and property in the county. Mitigating damage requires that communities remain diligent about building structures that meet current building codes in order to be able to withstand damage.

3.9.4 Future Development Trends

Although Platte County is not currently experiencing any growth, the risk and impacts of a hail event are still prevalent to existing infrastructure. All structures built in Platte County will likely be exposed to hailstorm event. Because these events are not typically isolated to one geographical area, the location of structures does not increase or reduce the risk necessarily. Platte County must continue to adhere to building codes and development should be built to current standards in case of adverse weather.

3.9.5 Climate Change Impacts

As humidity is lowered, due to rising temperatures, extended drought, and extreme heat events, convective instability increases. The movement of dry air into thunderstorms can increase the likelihood and size of hail due to evaporate cooling which lowers the elevation of the freezing level in thunderstorm clouds. This creates an opportunity for hailstones to grow larger and become more dangerous, as well as appear in areas where hail was uncommon previously, due to unpredictable weather patterns.

3.10 Hazardous Material Release

3.10.1 Previous Occurrences

Hazardous material release incidents have the potential to occur in Platte County each year, due in part to the transportation routes for both railroad and highways that traverse the county. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) records hazardous material transportation incidents based on reports submitted by businesses and responders. Between 1990 and 2020, there have been 9 transportation incidents reported in the county. Total damages for these incidents are approximately $461,000, which includes the cost of the material lost, carrier damage, property damage, response costs, and remediation clean-up costs. Of these incidents, one was a derailment, four were vehicular or rollover accidents, and the others were related to spillage or equipment deterioration.

According to the PHMSA, four of these incidents were listed as ‘serious’. PHMSA defines a ‘serious’ incident as those that involve at least one of the following: a fatality or major injury caused by the release of a hazardous material, the evacuation of 25 or more employees or responders or any number of the general public due to release or exposure to fire, a release or exposure to fire resulting in the closure of a major transportation artery, and the release of a bulk quantity (more than 119 gallons or 882 pounds) of a hazardous material.

Two of these were ‘serious’ due to the closure of a major transportation artery. The other two incidents were serious bulk releases, with one involving the release of 5,440 pounds of ammonium nitrate fertilizers and the other a release of 400 gallons of fuel oil.

According to the PHMSA, there have been no fatalities as a result of a hazardous material incident in the county.

3.10.2 Inventory Exposed

A significant portion of the county is affected by hazardous materials risk. Most communities and some unincorporated areas of Platte County are exposed to potential hazardous material release incidents due to proximity to major roadway transportation corridors, such as Interstates 26 and 85. Burlington Northern Santa Fe (BNSF) has railroad lines that run through the county, as well as a holding station, which also provides risk for communities located near the tracks.

A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a single location. Fixed facilities include companies that store hazardous waste at their facility and also all hazardous waste sites. Some of these facilities contain extremely hazardous substances and are required to generate Risk Management Plans (RMP). An accident resulting in the release of chemicals from those facilities could pose a significant problem to Platte County.

The hazardous materials release exposure data was calculated based using a 1-mile buffer from major highways and rail. This captures the infrastructure along transportation routes throughout the county that could be most impacted by a transportation related hazardous materials release.

All lifeline infrastructure has high exposure in the county. As infrastructure is typically located in populated areas, the large percentages of exposure are reasonable and with the majority of infrastructure is exposed it is important to acknowledge that hazardous materials release incidents vary drastically in severity and impacts. For example, high exposure to communication infrastructure has much less consequence than exposure to health and medical or food, water, and safety. The data in Table 3.9 illustrates the importance of public education regarding hazardous materials release incident risks and how widespread the effects could be.

Table 3.9 Lifeline Exposure to Hazardous Materials Transportation Routes

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	229	142	62 %
Energy	45	26	58 %
Food, Water, & Shelter	29	28	97 %
Hazardous Materials	2	2	100 %
Health & Medical	5	5	100 %
Safety & Security	17	16	94 %
Transportation	249	218	88 %

3.10.3 Probability of Future Occurrences

Predicting hazardous material release incidents in Platte County is difficult due to the numerous variables of any given event, such as location, weather conditions, type and amount of chemical, quantity released, and whether the incident happens in transit or stationary. Based on those variables, the potential impacts and losses that could be incurred are extremely varied.

There is potential for an incident to occur, however with the low number of previous occurrences over approximately two decades the probability is likely low. It should be noted that even a single event could have devastating effects and possible consequences to life safety. Any possible future occurrences will be minimized through proper supervision, protocols, inspections, and procedures.

3.10.4 Future Development Trends

Although Platte County is not currently experiencing large growth, the risk and impacts of a hazardous materials incident are still prevalent to existing infrastructure. All structures located near identified hazardous material sites or major transportation corridors within Platte County have the highest probability of being impacted should a hazardous material incident occur.

3.10.5 Climate Change Impacts

Climate change effects on transport and handling of hazardous materials could manifest in multiple ways. The U.S. DOT Climate Action Plan published in 2021, explains the effects of climate change are increasing over time and this climate variability and change pose threats to transportation systems. Highlights in the report of potential notable impacts include increased risk of vehicle crashes in severe weather, increased temperatures damaging infrastructure (asphalt degradation, expansion of paved surfaces, and railroad tracks buckling), and more frequent / severe flooding due to more intense precipitation damaging drainage infrastructure.

In 2022, the U.S. Government Accountability Office (GAO) released a report informing the U.S. Environmental Protection Agency (EPA) of the importance for the Risk Management Plan (RMP) rule to receive an update to include the consideration of facility risks due to climate change and natural hazards. The GAO report concluded:

> Climate change may exacerbate natural hazards, such as flooding, storm surge, and wildfires, which could potentially lead to accidental releases at RMP facilities. EPA has the opportunity to reduce the risk of accidental releases and minimize the consequences of such releases by ensuring that RMP facilities are managing risks from natural hazards and climate change.

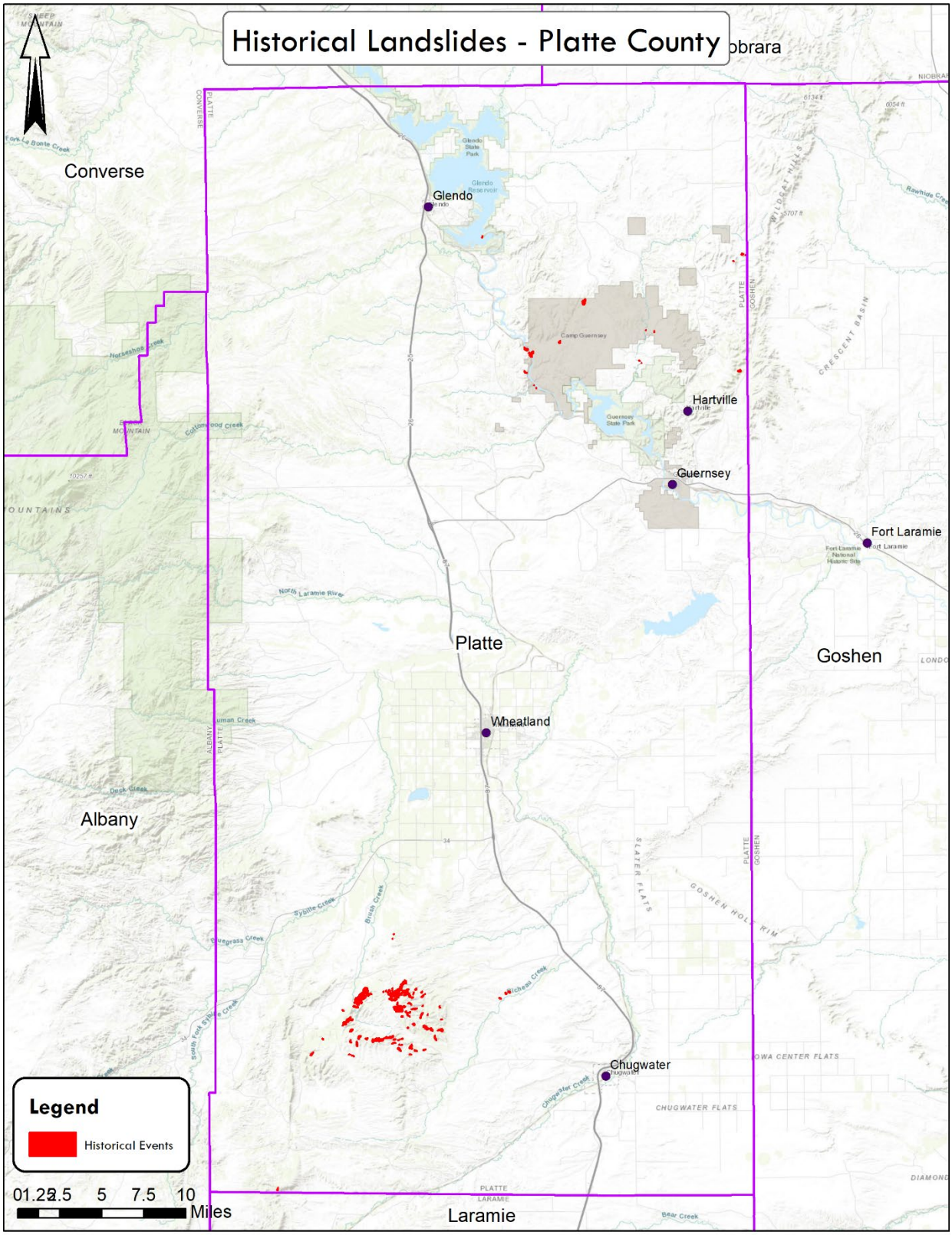
Many hazardous materials are unsafe if not within specific temperature ranges. Extreme temperatures can therefore pose a risk during transport and handling.

3.11 Landslide

3.11.1 Previous Occurrences

Landslides in Platte County have occurred and areas with recorded incidents can be seen in Figure 3.10. There have potentially been more landslides, however they often happen in unpopulated areas and therefore go unnoticed.

Figure 3.10 Historical Landslides



3.11.2 Inventory Exposed

Exposure in a landslide incident is localized and the risk to life safety and property is dependent on the proximity of people, structures, and infrastructure to an event. Landslides have the potential to be very large and a large landslide near a populated area or near Lifeline infrastructure, such as transportation, power, or communications, could cause significant economic losses, damages, injuries, and deaths. Rockfalls are also localized and present a risk primarily to those on transportation corridors, as a rockfall could harm motorists, economic impacts from closed roads, or in some cases cause extended damage to the roadway.

Debris flows are less localized and capable of moving trees and boulders considerable differences. The rapid nature and immediate impacts of a debris flow create considerable risk to public safety and any property in its path. Lifelines have the potential to be affected if a debris flow damages roads or bridges, and power or communications systems. Water quality and delivery systems could be impacted by a debris flow.

Table 3.10 accounts for the exposure of parcels to the highest landslide susceptibility areas (highest 30% of risk statewide). These areas are where landslides are most likely to happen and therefore pose the highest risk to people and property. The parcels exposed to the highest risk are worth approximately $5.1 million and all but three are residential properties.

Table 3.10 Parcels Exposed to Areas with High Landslide Susceptibility

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Chugwater	1	1	54,112	-	-
Unincorporated	40	37	5,001,821	3	91,546
County Total	**41**	**38**	**5,055,933**	**3**	**91,546**

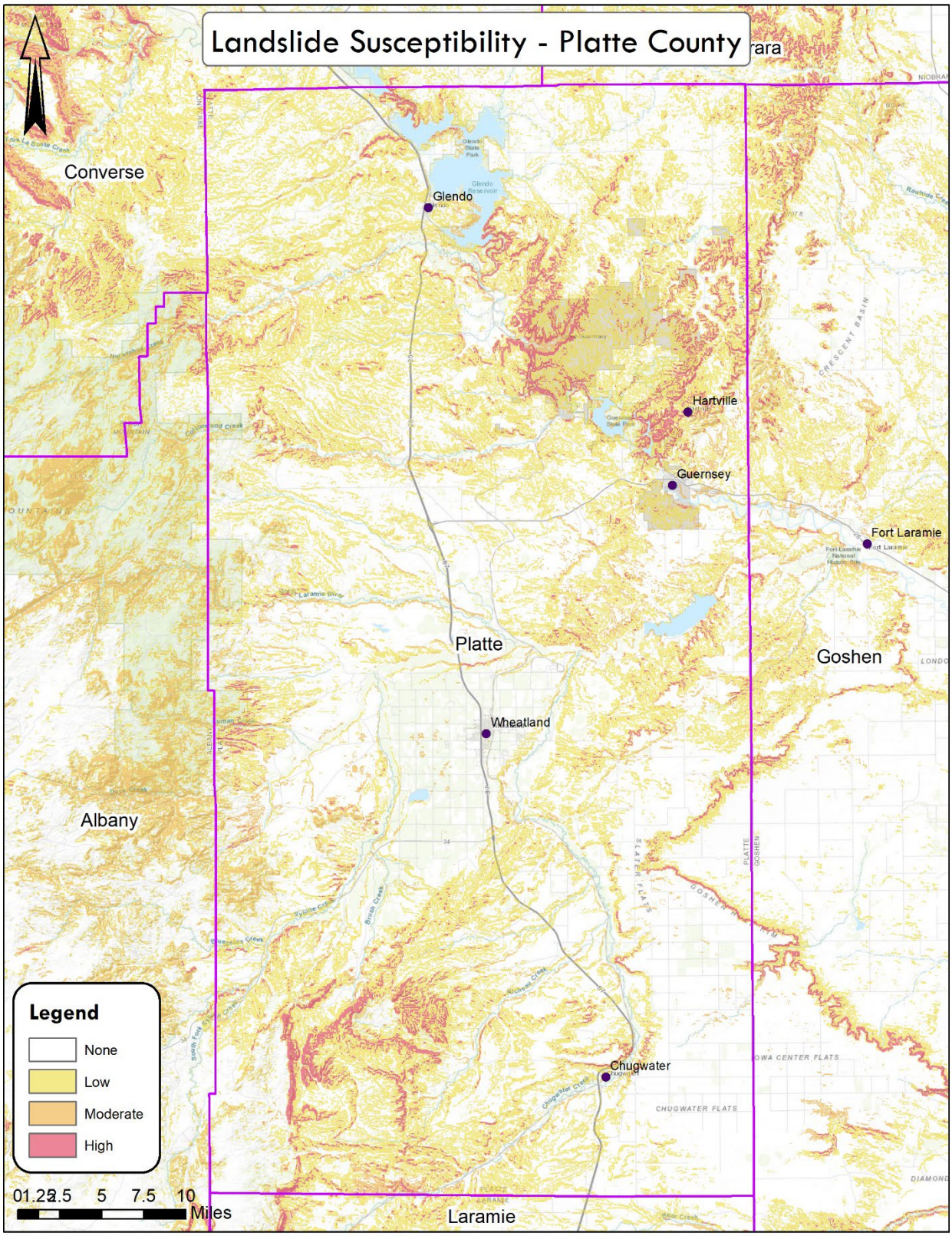
The communication, energy, and transportation lifelines are the only lifelines with infrastructure exposed to the high landslide susceptibility areas in the county. However, the infrastructure exposed is minimal.

Table 3.11 Lifeline Exposure to Areas with High Landslide Susceptibility

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	229	5	2 %
Energy	45	3	7 %
Transportation	249	1	<1 %

Figure 3.11 shows all areas of landslide susceptibility across Platte County. Note that the high susceptibility areas in the county are primarily away from municipalities and transportation routes.

Figure 3.11 Landslide Susceptibility



3.11.3 Probability of Future Occurrences

Landslides occur often, however the majority are not witnessed and therefore not reported. Landslides are most common in areas with previous landslide activity.

3.11.4 Future Development Trends

Development should be monitored to ensure no construction is occurring in potential landslide areas.

3.11.5 Climate Change Impacts

The conditions required for landslides and debris flows are greatly affected by climate, including the melt speed and level of snowpack, rapid temperature fluctuations, and erratic amounts of precipitation. The integrity of the soil and rock is affected with each freeze and thaw cycle, which are occurring more often and more rapidly due to unseasonable temperature swings. As landslides are more likely to occur after heavy precipitation and rapid snowpack melt, the unpredictable weather leads to dangerous conditions more frequently. The increased climate variability being experienced is expected to continue and with that the trend toward landslide and debris flow conducive situations will also.

3.12 Lightning

3.12.1 Previous Occurrences

According to SHELDUS data, in Platte County, there have been five damage causing events between 1962 and 1997. These events caused, combined, approximately $91,000 in property damages and $1,600 in crop damages (2019 USD). In 1962, one injury was reported and in 1977 there were six injuries reported. There have been no reported deaths due to lightning in the county.

The 2021 State of Wyoming Hazard Mitigation Plan, based on NCEI data, recorded six incidents of damaging lightning events in Platte County from 1960 to 2019. These events combined caused seven injuries, more than $31,000 in property damage, and $1,000 in crop damage.

The databases obtain data from various sources and the best available data may not include all lightning specific damage causing events. Events may not be reported, and damages may be estimated, however events occurring near populated areas are more likely to be recorded.

Community members of Platte County will likely say that a number of major lightning events happen each year. Thunderstorm wind events records from NCEI were also reviewed to give a better picture of potential lightning events. According to NCEI, 53 thunderstorm wind events have occurred within Platte County between 1950 and 2021 causing approximately $516,000 in property damage. While the damages for these events may be related to wind, thunderstorms often cause lightning events and are not reported as separate events.

3.12.2 Inventory Exposed

Property, structures, crops, people, and livestock outside during a thunderstorm is at risk of being struck by lightning. The unpredictability of lightning and the recorded instances of lightning strikes occurring miles away from an active thunderstorm illustrate the risk this hazard poses indiscriminately across the county. Lightning has the potential to cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It can also cause forest, brush, and structural fires. Damage from lightning typically occurs in four ways:

- Electrocution, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
- Power surges that can damage electrical and electronic equipment

3.12.3 Probability of Future Occurrences

Past events in Platte County indicate that the potential magnitude of lightning events will likely be limited. Based on recorded events, it is likely that future events will occur in any given year. While losses are dependent on each particular incident, damage to structures and potential loss of life and injury may occur. Adverse effects due to lightning, such as wildfires, have the potential to occur within Platte County in the future. Wildfire impacts to Platte County are described in further detail in the Wildfire profile section.

3.12.4 Future Development Trends

Although Platte County is not currently experiencing any growth, the risk and impacts of a lightning event are still prevalent to existing infrastructure. Because these events cannot be predicted, it is hard to determine which particular structures and areas will be impacted. Platte County should continue to adhere to building codes and development to mitigate future damage to structures should a lightning event occur.

3.12.5 Climate Change Impacts

The effects of climate change are seen across many hazards and lightning is not an exception. The unpredictable number of storms and their characteristics indicate the amount of lightning they bring could change significantly. With the changing weather patterns, the potential increase in thunderstorms events can result in increased lightning occurrences

3.13 Public Health Hazards

3.13.1 Previous Occurrences

The first case of COVID in Platte County was identified on May 21st, 2020. The County, at the time of this plan's writing, had more than 1,909 cases and 41 deaths.

The County also had H1N1 cases in 2009, however records differ as to the number. Statewide Wyoming had more than 700 cases.

3.13.2 Inventory Exposed

The whole population of Platte County is at risk to public health hazards, especially those with chronic health conditions or other risk factors including access and functional needs. The residents are exposed to public health hazards in multiple ways, whether it is illness through contagious pathogens, harm from poor air quality, or the dangers of poor water quality.

Mental and behavioral health are critical to include when discussing public health hazards and the whole population can be affected by an event.

See Table 2.1 and Table 2.2 for the demographics and health indicators of the population of Platte County, which help to keep a holistic view of needs in the communities when planning for potential events.

3.13.3 Probability of Future Occurrences

Platte County will likely have a public health hazard incident in the future, whether it is water quality, potential disease transmission, or the occurrence of a traumatic event in the community. Air quality is also an example of a prevalent hazard, as wildfire smoke can travel great distances and affect large populations.

The potential for an epidemic or pandemic outbreak is probable, as more novel pathogens are discovered around the world and infectious diseases evolve rapidly. Climate change can contribute to the spread of illness as the increased number of disaster events leads to more mass evacuations and the need for more disaster sheltering, increasing person-to-person interactions.

Mental and behavioral health will continue to be impacted after an incident and as a result of any future incidents. The assistance and support should not stop once the response or even recovery from an incident is over, but should considered for the community consistently going forward.

3.13.4 Future Development Trends

Future planning for land use and development should include review of water and sewer systems with public health partners in addition to typical entities. This ensures that should a water quality or environmental safety issue arise all partners are informed and prepared to address the issue.

Consideration of shelters is important when thinking of public health hazards and prioritizing access and functional needs populations is critical. Developing adequate sheltering where residents can be healthy and have hygienic accommodations can assist in slowing the effects of a public health hazard.

3.13.5 Climate Change Impacts

Climate change has affected disease transmission globally, according to the World Health Organization. Temperature fluctuations and extreme weather events create conducive conditions for diseases to manifest and spread. Around the world the movement of people out of cities, heat centers, into the rural areas leads to more interactions between humans and animals. These interactions will lead to the continued discovery of never-before-seen disease and will continue to be a concern. Climate change can also contribute to an increase of person-to-person interactions, as the increased number of disaster events leads to more mass evacuations and need for more disaster sheltering.

The impacts of climate change on wildfire and drought create indirect public health issues related to air and water quality. Research has shown exposure to wildfire smoke, even from great distances, has a long-term effect on people's health and drought can contribute to heavy metal concentration increases in water sources. The indirect impacts of climate change on public health are being studied around the world and as climate change continues, the negative effects on public health will likely increase rapidly

3.14 Tornado

3.14.1 Previous Occurrences

According to the Wyoming State Hazard Mitigation Plan (2021-2026), Platte County has experienced 13 tornadoes between 1960 and 2019. Due to these events, 2 injuries were reported along with more than $100,000 in property damage and more than $5,000 in crop damage. The fact that a moderate number of tornadoes were recorded in Platte County is unsurprising given that the county is somewhat near what is considered the nations "tornado alley."

NCEI records for Platte County include 49 tornado events from 1950 to 2019. The events that resulted in damages and injuries are detailed in Table 3.12. There have been no reported deaths attributed to tornado events in the county.

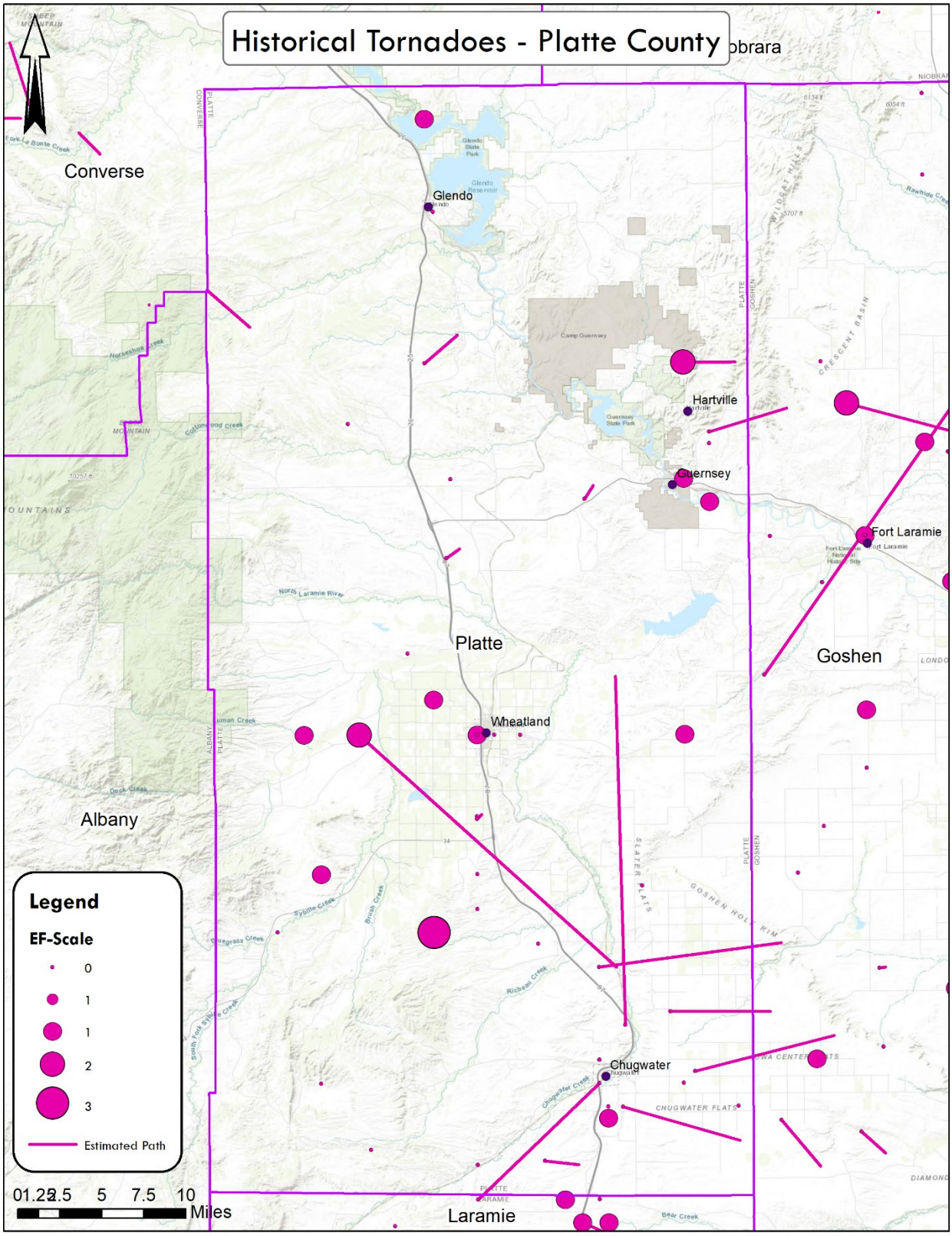
Two tornadoes in Platte County have each caused more than $250,000 in property damages. On September 18, 1986, according to the NCEI Storm Publication, a tornado 3 miles northwest of Wheatland uprooted 20 trees, overturned several campers and damaged garages and storage sheds. On June 2, 1991, a tornado touched down in the morning in Guernsey and damaged five homes, as well as numerous trees. Several vehicles were damaged and one was destroyed.

Tornadoes are an important example of best available data constraints, as multiple databases have highly differing information due to a lack of centralized, standardized reporting. Platte County is located near "tornado alley" making tornadoes an understandable risk, with any number of tornadoes posing significant hazard to the public and property. Figure 3.12 shows the identified historical tornadoes in the county.

Table 3.12 Damaging Tornado Events, 1950-2019

Date	Scale	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
6/27/1955	F3	0	3	2,500	0
6/14/1962	F1	0	0	25,000	0
6/21/1964	F1	0	0	25,000	0
6/28/1972	-	0	0	250	0
6/20/1977	F1	0	0	60	0
9/18/1986	F1	0	0	250,000	0
6/18/1987	F1	0	1	25,000	0
6/2/1991	F1	0	0	250,000	0
7/14/1994	F1	0	0	50,000	0
6/7/2012	EF2	0	1	0	0
	Total	0	*5*	$627,810	0

Figure 3.12 Historical Tornado Events, Platte County



3.14.2 Inventory Exposed

Historically, most tornadoes in Platte County between 1950 and 2020 were F0s or F1s with an F2 and EF2.

Exposure to tornadoes is the same for the whole county, as tornadoes can touch down randomly throughout. Therefore, all assets are exposed but the potential damages are dependent on the characteristics of the tornado and its location as well as: the age and type of buildings, construction material used, and condition of the structure.

Lifelines could potentially be impacted based on the location of the tornado, including damage to infrastructure leading to power and communications disruption, water and fuel shortages, transportation issues and damage to services such as hospitals, water treatment, and wastewater facilities.

The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. The population needs to be aware of how to seek shelter during a tornado and avoid behaviors or decisions that place them in greater danger.

3.14.3 Probability of Future Occurrences

Although tornadoes are hard to predict, based on previous occurrences, Platte County could anticipate significant property damages from a single tornado event in the future. Historical frequency suggests that there is a likely chance that a tornado could occur somewhere in the county each year.

The likelihood of a tornado occurring changes according to the time of year. Based on historical records, tornadoes occur most frequently in May and June with some occurring as early as April. Community members should maintain awareness of tornado watches and warnings throughout the year.

3.14.4 Future Development Trends

Although Platte County is not currently experiencing major growth, the risk and impacts of a tornado event are still a concern for existing infrastructure. All existing structures built in Platte County are potentially exposed to tornado and severe wind damage. Structures with limited foundations, such as mobile homes, are more at-risk than permanent structures. Platte County should adhere to current building codes and facilitate new development that is built to the highest design standards to account for tornadoes and severe wind.

3.14.5 Climate Change Impacts

The effect of climate change on frequency and intensity of tornadoes is being studied by scientists across the country. Tornadoes last for short durations, seconds to hours, and have a relatively small footprint compared to other weather-related hazards, making it difficult to model them. Scientists are using predictions of weather components that contribute to tornado occurrence and as weather shifts they can see trends in these components. The changes in weather patterns include increases in warm, moist air and wind shear, as well as an unstable atmosphere which create more favorable environments for tornadoes. These trends can possibly increase future occurrences and as climate change effects continue that likelihood grows.

3.15 Wildfire

3.15.1 Previous Occurrences

Platte County has seen numerous wildfires over the years, ranging greatly in size and location. The largest fires occurred in 2006, the Tracer fire, and 2012, the Sawmill Canyon fire, which each burned approximately 14,000 acres. The Tracer and Sawmill Canyon fires were ignited as a result of training exercises at Camp Guernsey, a Wyoming Army National Guard Training Site. The Sawmill Canyon fire resulted in the evacuation and closure of the east side of Glendo State Park, fortunately no property damages, deaths, or injuries were reported. Another of the largest fires, Old Chicago, also burned near Camp Guernsey but was ignited by a lightning strike.

Table 3.13 shows fires in the county, which are named fires and burned more than 500 acres. Figure 3.13 illustrates all historical fires within the county and large burn perimeters.

Table 3.13 Historical Fires in Platte County

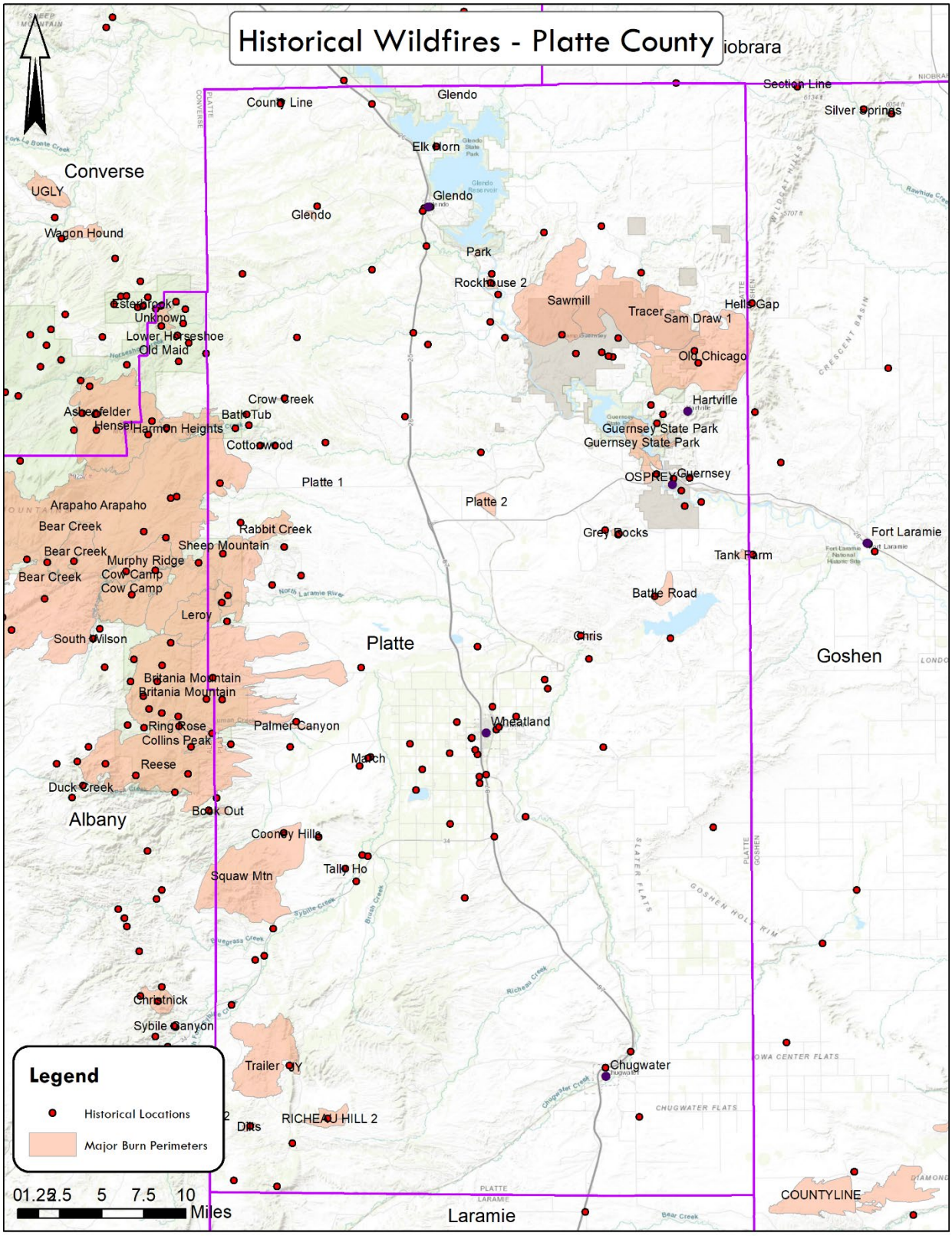
Year	Fire Name	Acres Burned
2021	Saw Mill	1,300
2020	Sheep Mountain	500
2012	Sawmill Canyon	14,000
2012	Guernsey State Park	2,700
2012	Fish Creek 2	1,100
2011	Platte 2	700
2011	Squaw Mountain	13,000
2006	Battle Road	850
2006	Tracer	14,000
2006	Old Chicago	13,300
2006	Trailer	8,400
2005	Windmill	1,100
2005	Richeau Hill 2	1,200
2005	Table Mountain	2,100
2003	Rabbit Creek	1,700
1996	Spring Creek	4,700

Regional awareness when assessing wildfire risk is critical to a holistic understanding of the hazard. There have been multiple fires in Albany county which have crossed over into eastern Platte County. The fires which crossed over and burned partially in Platte County are detailed in Table 3.14.

Table 3.14 Fires in Albany County

Year	Fire Name	Acres Burned
2018	Britania Mountain	32,000
2012	Arapaho	98,000
2002	Hensel	14,700
2002	Reese Mountain	19,300

Figure 3.13 Historical Wildfires, Platte County



3.15.2 Inventory Exposed

All structures, infrastructure, people, and exposed utilities are potentially vulnerable to damages from a wildfire event. Figure 3.14 presents the wildfire risk across Platte County. Structures that have not proactively mitigated wildfires are most at risk. Table 3.15 summarizes those parcels that are located within the highest (top 20% statewide). Readers are directed to the WY State Forestry Division's Wildfire Risk Assessment Portal to best review this information at a more user-friendly community scale.

Unincorporated areas of the county and all municipalities have some exposure to the highest wildfire risk areas. Guernsey has the largest number of parcels exposed, approximately 43% of the total in the county, and valued at more than $28.3 million. Residential properties make up the vast majority (93%) of the total exposed parcels across the county value at more than $73.7 million. Guernsey has the highest number of commercial properties exposed, follow by the unincorporated areas, with a value of approximately $3.6 million. Within the county, commercial properties are approximately 10% of the total value of parcels exposed in the highest risk wildfire areas.

Table 3.15 Parcels Exposed to Highest Risk Wildfire Areas

Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Chugwater	63	59	3,940,789	4	370,026
Glendo	81	76	7,811,949	5	639,925
Guernsey	257	242	24,722,776	15	3,599,936
Hartville	1	1	23,256	-	-
Wheatland	62	55	14,427,491	7	2,864,454
Unincorporated	132	122	22,785,610	10	621,700
County Total	**596**	**555**	**73,711,871**	**41**	**8,096,041**

The lifeline with the greatest exposure to the highest risk wildfire areas is food, water, and shelter, with 45% of infrastructure exposed. The communication and safety and security lifelines are the next highest exposures of infrastructure, with 22% and 24% respectively. These are followed by the infrastructure exposure of transportation (12%), energy (7%), and energy transmission (3%).

Table 3.16 Lifeline Exposure to Highest Risk Wildfire Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	229	51	22 %
Energy	45	3	7 %
Energy (miles)	681	18	3 %
Food, Water, & Shelter	29	13	45 %
Safety & Security	17	4	24 %
Transportation	249	30	12 %

There are no parcels or lifeline infrastructure exposed to the highest risk (top 33% statewide) Wildland Urban Interface (WUI) areas.

Figure 3.15 shows the areas covered by the Fire Protection Districts in Platte County. There are five districts within the county: Antelope Gap, Chugwater, Fire District 1 F, Fire District 2 F, and Guernsey Rural.

Figure 3.14 Wildfire Risk

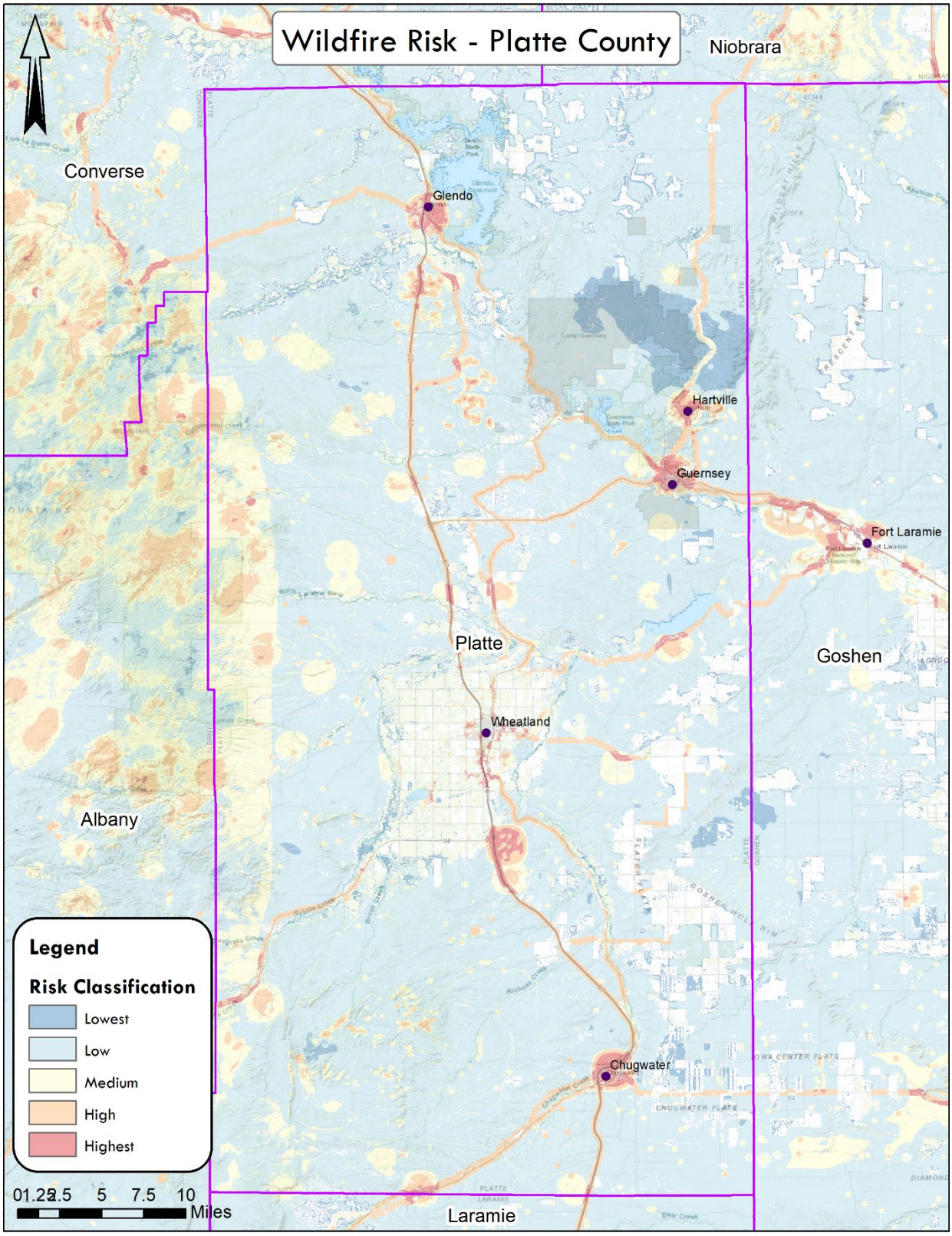
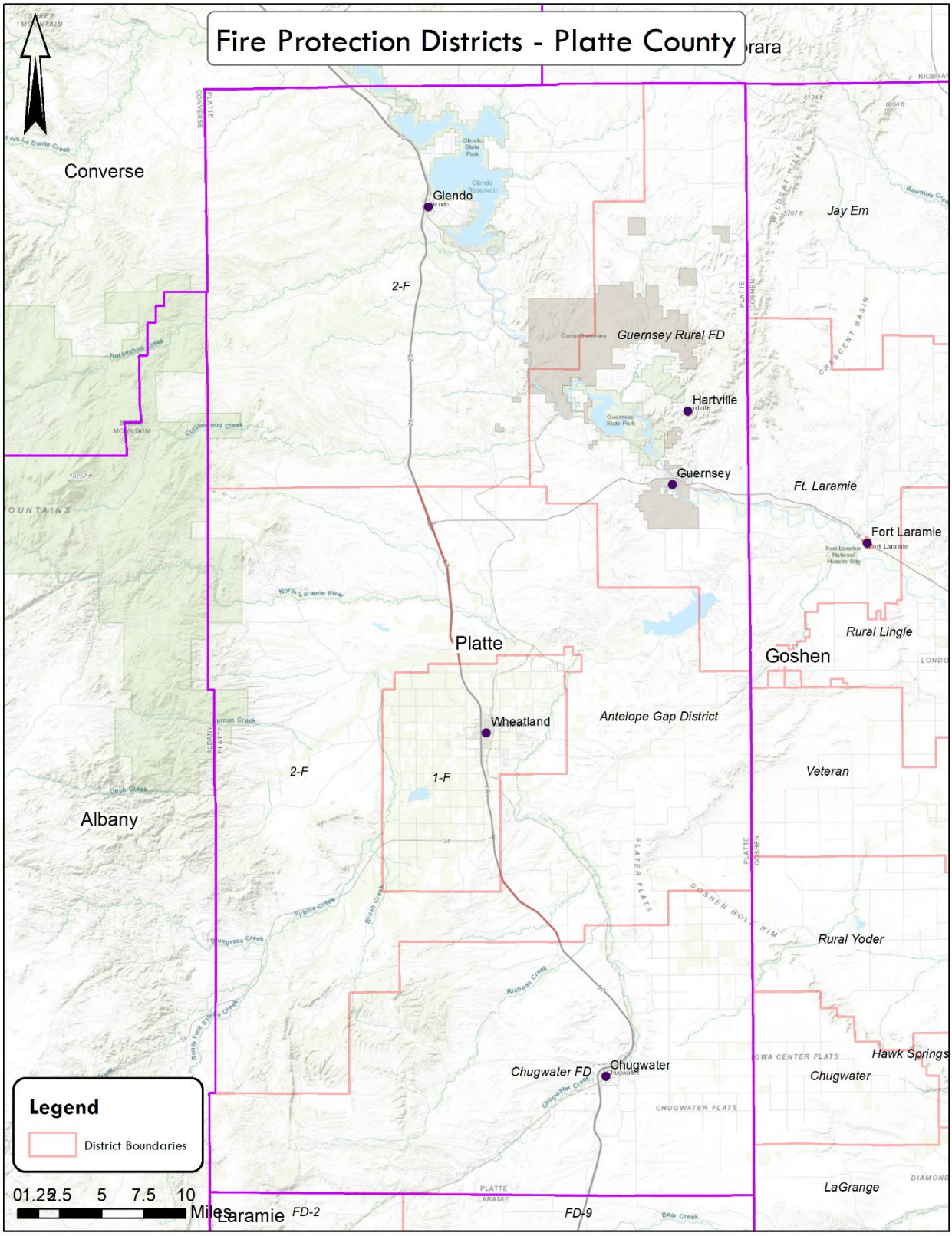


Figure 3.15 Fire Protection Districts



In Figure 3.16 and Figure 3.17, the United States Forest Service's (USFS) Wildfire Risk to Communities overview of risk to homes in Platte County and its communities can be seen. The portal allows for a closer look down to the community level and comparison of risk against other counties or communities. The risk to homes in the county, which is determined based on the likelihood and consequences of wildfire is illustrated in the portal snapshot. According to the assessment of data in the portal the populated areas in Platte County have, on average, greater risk to homes than 45% of the counties in Wyoming.

Figure 3.16 Wildfire Risk to Communities Portal – Platte County Level

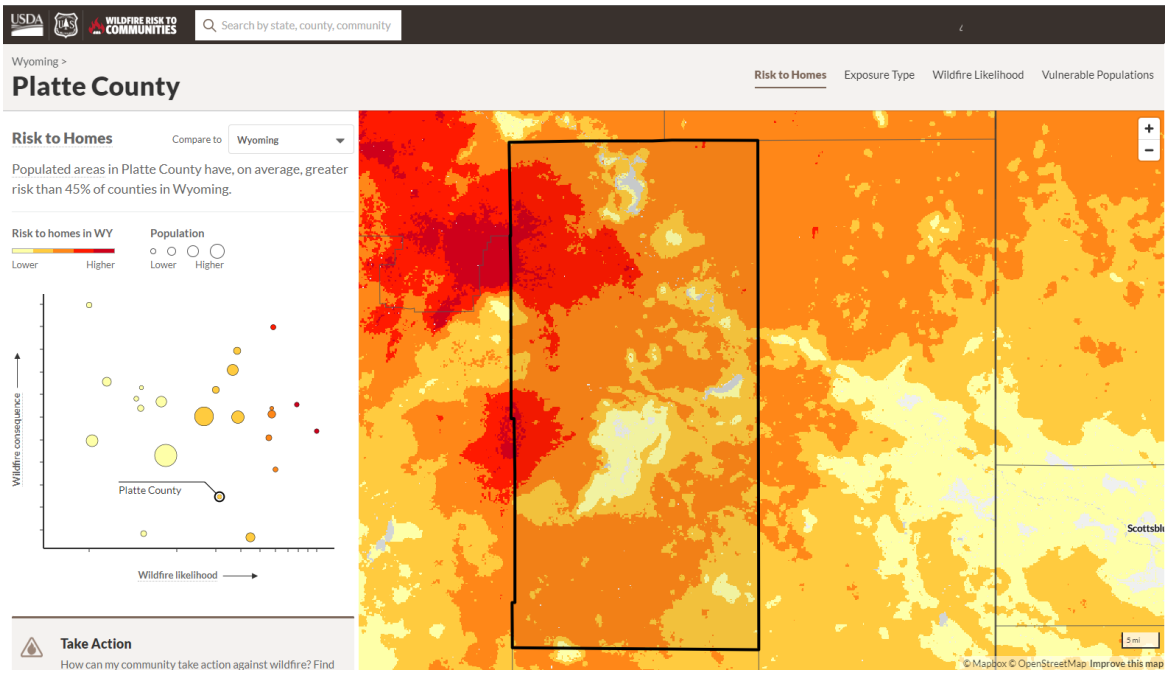
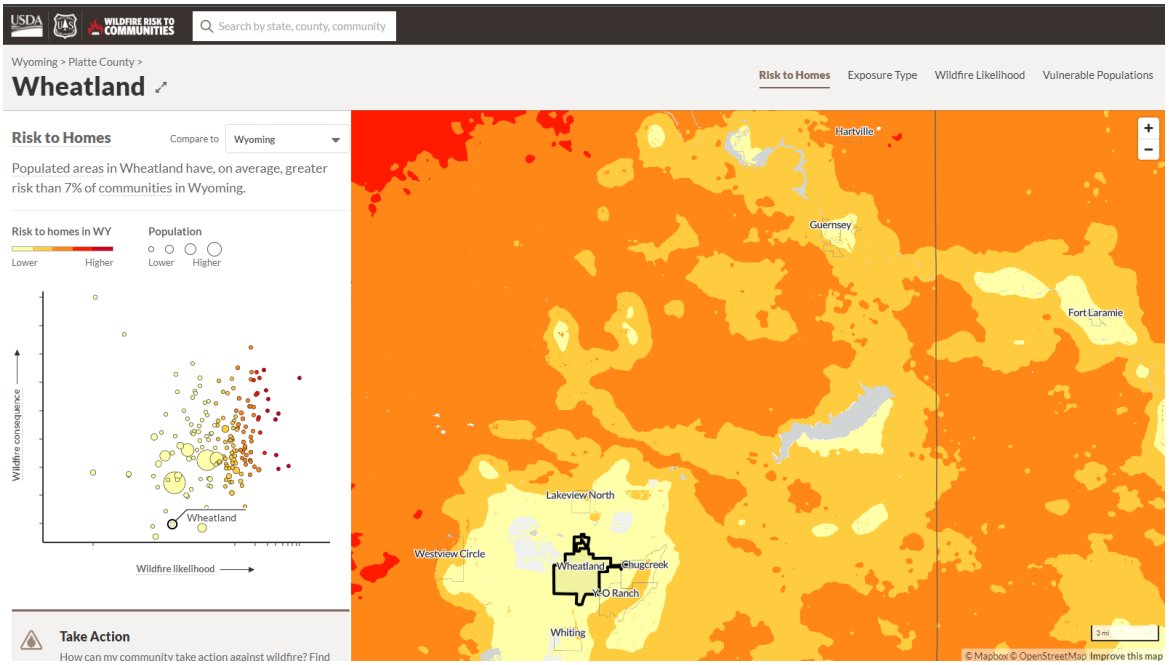


Figure 3.17 Wildfire Risk to Communities Portal – Community Level



3.15.3 Probability of Future Occurrences

Platte County's records of wildfire occurrences illustrate the potential for large scale fires to occur. Wildfires can occur year-round and that the risk of wildfires occurring may increase during times of drought, especially prolonged droughts. Most events are quickly contained and do not burn a large number of acres.

According to research by the National Park Service, 85% of wildfires are human caused, primarily due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson. Ultimately, the occurrence of future wildfire events will strongly depend on patterns of human activity.

3.15.4 Future Development Trends

Although Platte County is not currently experiencing major growth, the risk and impacts of a wildfire event are still prevalent to existing infrastructure. Subdivisions and other high-density developments can create a situation where wildland fires can involve more buildings than any amount of fire equipment can possibly protect. By identifying areas of higher density in high-risk areas, communities can identify areas of mitigation interest and reduce hazard risks associated with increased exposure.

Platte County has a Community Wildfire Protection Plan (CWPP), which includes plans from six Fire Protection Districts. In some cases, land use and building codes include and/or focus on mandatory mitigation measures. As a mitigation strategy, Platte County and its jurisdictions should continue to regulate building and future development in the WUI.

As development expands into these wildland areas, people and property are increasingly at risk from wildfire. Wildfire mitigation in the WUI has primarily been the responsibility of property owners who choose to build and live in vulnerable zones. In practice, successful wildfire mitigation strategies can be quite involved. The most important aspect of successful suppression is disruption of the continuity of fuels, achieved by creating breaks or defensible areas. For interface fires, where homes and other structures fill the space, fuel reduction is best accomplished before the fires begin. Some land use and building codes include and/or focus on mandatory mitigation measures. Platte County and its jurisdictions should regulate building and future development in the WUI in order to mitigation against wildfire risk.

Safety zones can be created around structures by reducing or eliminating brush, trees, and vegetation around a home or facility. FEMA recommends using a 30-foot safety zone; including keeping grass below two feet tall and clearing all fallen leaves and branches promptly. Additionally, only fire-resistant or non-combustible materials should be used on roofs and exterior surfaces. Firebreaks-areas of inflammable materials that create a fuel break and reduce the ability for fires to spread and roads and pathways-can be planned and designed to serve as wildfire mitigation.

3.15.5 Climate Change Impacts

Climate change has steadily increased the frequency and intensity of wildfires around the nation. Continued unpredictable precipitation and weather patterns will lead to increased occurrence, extended durations, and magnified severity. The patterns of drought, brought by drier and hotter climate, create conditions that wildfires thrive in, and these fires have begun to consistently spread faster and farther. Wildfires will continue to thrive on the lack of humidity and dry vegetation created by drought, often perpetual. Hotter conditions fuel fires, the extreme temperature fluctuations and unseasonable increases in heat have and will continue to create a longer wildfire season.

3.16 Wind

3.16.1 Previous Occurrences

Between 1950 up until 2021, NCEI recorded 433 high wind and thunderstorm wind events in Platte County . Cumulatively, these events have resulted in one death, three injuries, and $598,000 in property damage. The

number of recorded events increased dramatically starting in 2010. Potential damages due to high wind events usually include damaged roofs, toppled trees, broken branches, and blown-out windows.

Thunderstorm winds impact Platte County and are associated with 58mph winds or greater related to a thunderstorm event. Damages from these events may be due to hail or lightning and not wind in particular, but the best available data from NCEI extends further in the past than for high wind events. From 1950 to 2021, 53 thunderstorm wind events were recorded in Platte County. These events caused 1 injury and more than $516,000 in property damage.

Based on SHELDUS data, between 1960 and 2010, there were 33 reported damaging wind events. Most notable was an event in 1984 which led to $3.1 million (2019 USD) in property damages and $103,000 in crop damages. A total of 7 injuries have been reported, one in 1960, two in1961 and four reported injuries during an event in 2007. No deaths have been reported in the county due to wind events.

Table 3.17 shows the damages reported for each year due to a wind event. Figure 3.20 shows historical wind events across the county.

Windblown deposits, also called loess, are common in some parts of Wyoming. There are no recorded events in Platte County of windblown deposits causing structural damage, however it is possible such instances go unreported. Identified windblown deposit areas can be seen in Figure 3.21.

Table 3.17 Wind Damages per Year 1960-2010 (2019 USD)

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1960	43,776	0	1	0
1961	10,964	54,171	2	0
1964	72,694	0	0	0
1966	64,433	0	0	0
1972	283,037	0	0	0
1973	76,132	0	0	0
1974	80,476	0	0	0
1975	20,943	0	0	0
1977	4,648	0	0	0
1978	203,923	0	0	0
1979	77,600	0	0	0
1982	26,855	0	0	0
1983	5,979	0	0	0
1984	3,120,087	103,928	0	0
1985	1,204	0	0	0
1986	19,328	0	0	0
1987	60,558	570	0	0
1988	18,328	8,093	0	0
1989	140,217	0	0	0
1990	12,354	0	0	0
1993	44,836	0	0	0

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1994	43,717	0	0	0
1995	2,267	0	0	0
1996	9,989	0	0	0
1997	2,805	1,998	0	0
1998	4,240	0	0	0
1999	64,648	0	0	0
2002	122,447	0	0	0
2003	70,422	0	0	0
2006	19,282	0	0	0
2007	37,497	0	4	0
2008	27,684	0	0	0
2010	31,693	0	0	0
Total	**4,825,067**	**168,761**	**7**	**0**

A recent high wind event, occurred on April 21st, 2022, on Highway 34 just east of Hightower, caused significant damages which are shown in Figure 3.18. In addition to the destruction of the building, the damages included the downing of at least one pole and several spans of wire and crossarms. The highway closed for a couple of hours after the event due to the building debris strewn across the roadway. This location and structure can be compared to the initial condition, shown in the Google Map image in Figure 3.19.

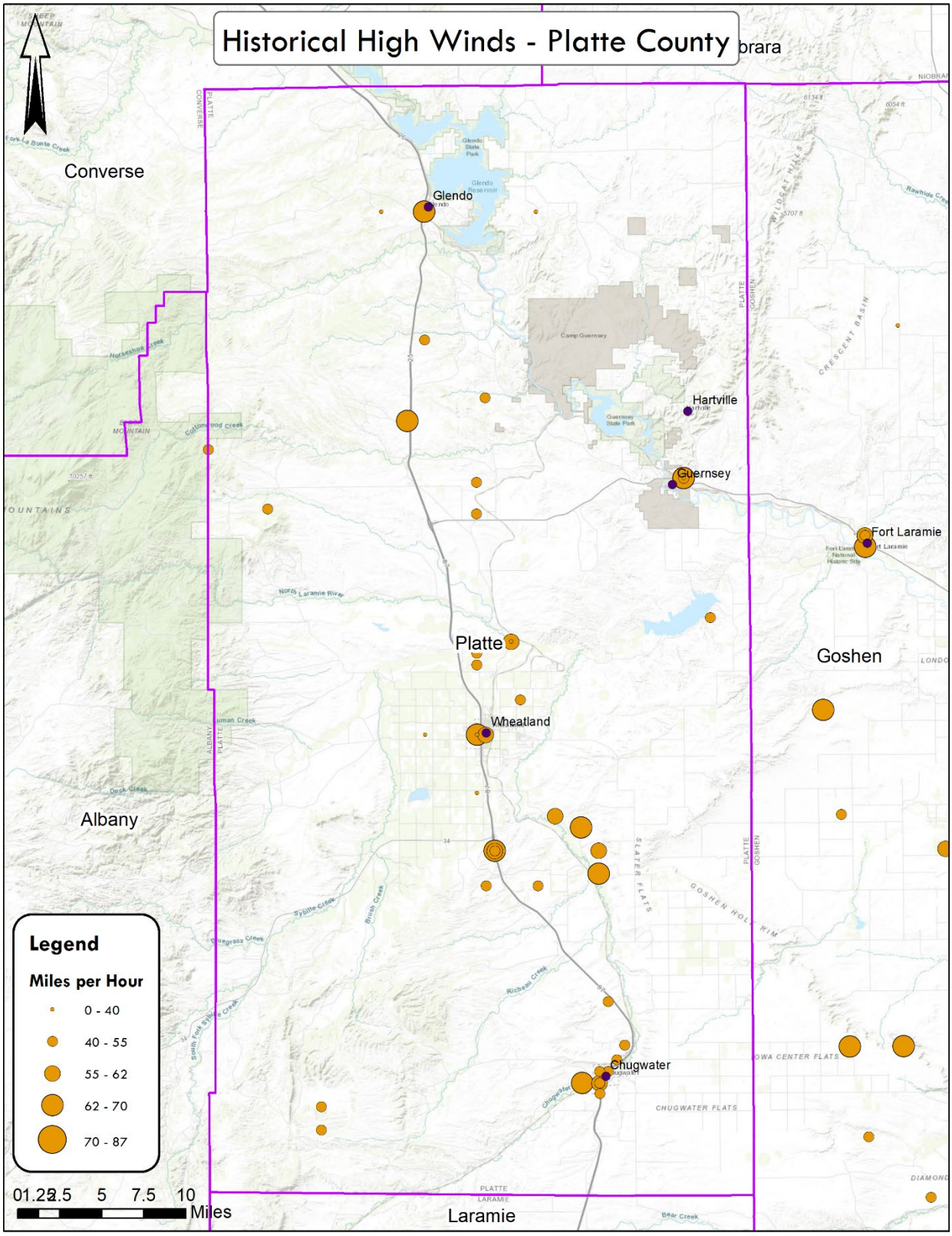
Figure 3.18 Wind Damage from Event on 4/21/2022

Source: Terry Stevenson

Figure 3.19 Image of Location Prior to Wind Event

Source: Google Maps

Figure 3.20 Historical High Wind Events, Platte County



3.16.2 Inventory Exposed

Platte County's topography can exacerbate high wind conditions. Platte County lies in the eastern plains of Wyoming, marked by miles of prairie without natural windbreaks. High winds can speed across the plains without any obstacles, adding to the velocity and force of the wind. Wind speeds of 60mph are not uncommon in the county. High winds that occur in combination with severe winter storms can be especially damaging.

All of Platte County may be affected by high wind events and events could potentially impact Lifeline function, such as damaging power and communications infrastructure.

According to the Wyoming State Geological Survey, windblown deposits are considered a hazard because they may damage property. These deposits may also impact infrastructure, crops, and water supplies. Table 3.18 shows the parcel exposure of properties in areas identified as locations of windblown deposits. Figure 3.21 illustrates the identified areas of windblown deposits in Platte County.

The parcels located in identified windblown deposits areas are all located in unincorporated areas of the county. Of the 198 parcels, 92% are residential and valued at approximately $18.8 million. The commercial properties exposed to windblown deposits areas are valued at more than $114.3.

Table 3.18 Windblown Deposits Parcel Exposure

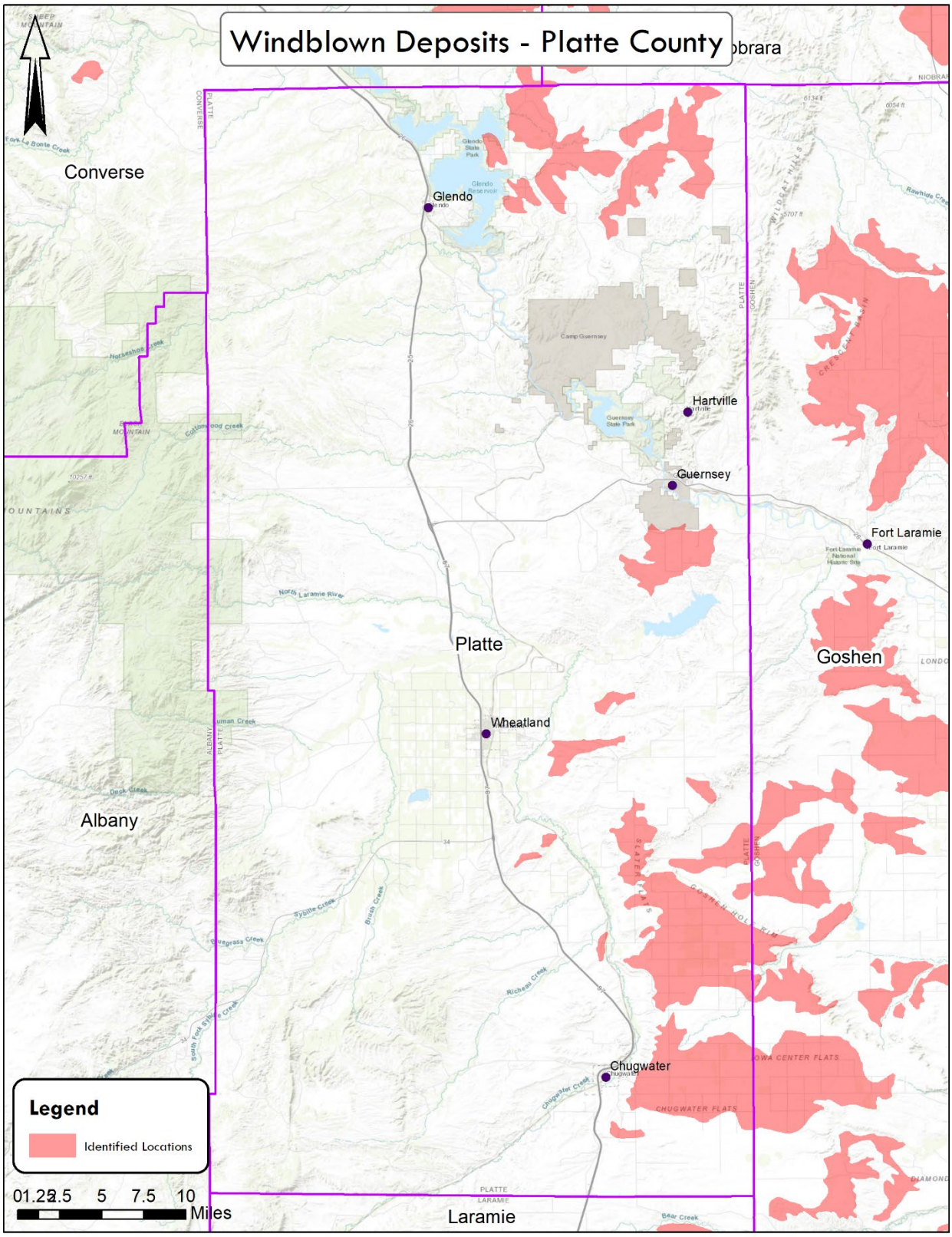
Jurisdiction	Total Count	Residential	Improved Value ($)	Commercial	Improved Value ($)
Unincorporated	198	183	18,767,325	15	114,382,122
County Total	**198**	**183**	**18,767,325**	**15**	**114,382,122**

Lifeline exposure is limited to communication and energy infrastructure. Energy infrastructure exposure is 11%, while communication exposure is less than 1%.

Table 3.19 Lifeline Exposure to Windblown Deposit Areas

Lifeline	Total Count	Count Exposed	Percent Exposed (%)
Communication	229	1	<1 %
Energy	45	5	11 %

Figure 3.21 Identified Windblow Deposits Areas



3.16.3 Probability of Future Occurrences

Historical records and the frequency of previously reported high wind events in Platte County indicate that high winds are likely to occur in any given year and have the potential to inflict costly damage to people and property. Mitigating damage requires that communities remain diligent about building structures that meet current building codes in order to be able to withstand damage.

Windblown deposits are consistently being carried to different areas and will likely continue for the foreseeable future.

3.16.4 Future Development Trends

Although Platte County is not currently experiencing any growth, the risk and impacts of a windstorm are still prevalent to existing infrastructure. Because these events are not typically isolated to one geographical area, the location of development does not increase or reduce the risk necessarily. Platte County must continue to adhere to building codes and development should be built to current standards in case of adverse weather.

Consideration of windblown deposit locations should be taken into account for any potential development sites. Destabilizing deposits can have longer term impacts on health, property, and infrastructure.

3.16.5 Climate Change Impacts

Climate change has increased global wind speeds according to a study in the journal Nature Climate Change. Analyzing data from 1978 to 2017 from more than 1,400 stations, revealed increasing wind speeds since 2010. This trend is expected to continue, as fluctuations in temperatures and unpredictable weather patterns will continue to alter the natural climate cycle. It is unknown whether this will impact the occurrence or severity of high wind events. It is unknown if climate change will affect windblown deposits.

3.17 Winter Storm

3.17.1 Previous Occurrences

According to NCEI storm events database, 219 blizzard/heavy snow/winter storm/winter weather/extreme cold events have occurred in Platte County between 1996 and 2021. Twelve of those were extreme cold or wind chill events with a range of -20 to -60 degrees below zero. No deaths, injuries, or crop damage were reported as a result of these events, however $1 million of property damage was reported in 2018.

According to SHELDUS data, winter weather caused $1.9 million in property damage between 1960 and 1998, as well as six injuries.

When discussing winter storms and winter weather it is important to address extreme cold and wind chill events as well. According to NCEI storm events database, eight extreme cold or wind chill events have occurred in Platte County between 2009 and 2021. Although these events take place as a result of winter weather, their primary feature was extreme cold. No deaths, injuries, or damages were reported as a result of these events. While none of these events had reported consequences, the potential for human and livestock injury or death is high and should be considered when planning for winter weather.

Table 3.20 lists the years and losses of reported damages and injuries from winter storm events.

Table 3.20 Winter Weather Damages per Year 1960-1998 (2019 USD)

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1960	547	0	1	0
1961	55,384	0	0	0
1965	210,493	0	0	0

Year	Property Damage ($)	Crop Damage ($)	Injuries	Deaths
1967	43,106	0	0	0
1968	28,642	0	0	0
1971	31,994	0	0	0
1973	12,689	0	0	0
1975	115,189	0	0	0
1977	58,104	0	0	0
1978	5,184	0	0	0
1979	199,821	0	0	0
1980	0	0	0	0
1982	16,800	0	1	0
1983	56,794	0	0	0
1984	208	208	0	0
1987	21	0	0	0
1988	6,085	609	0	0
1990	1,847	0	0	0
1995	8,502	0	0	0
1996	8,259	0	0	0
1997	1,029,352	2,018	0	0
1998	20,669	0	4	0
TOTAL	**1,909,692**	**2,835**	**6**	**0**

3.17.2 Inventory Exposed

Winter storms can cover a large geographic area, as the event travels. Therefore, all of Platte County is exposed to this hazard and could be impacted. However, the severity of these impacts on the people, property, crops, and livestock in the county is not uniform and is dependent upon numerous variables.

Damaged power lines and dangerous or impassable roadways may hinder the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or the provision of basic utilities, such as heat and running water.

Extreme cold poses a risk to all assets and the population located in Platte County. Most structures should be able to provide adequate protection if an extreme cold event occurs. Extreme cold can disrupt communications facilities and utility transmission lines, as well as the potential for water pipes to freeze. Extreme cold has the ability to impact livestock and crops if the event occurs during certain times of the year.

3.17.3 Probability of Future Occurrences

Severe winter storms and blizzards can be predicted with a reasonable level of certainty. Through the identification of various indicators of weather systems, and by tracking these indicators, warning time for snow storms can be as much as a week in advance. Understanding the historical frequency, duration, and spatial extent of severe winter weather assists in determining the likelihood and potential severity of future occurrences. The characteristics of past severe winter storms provide benchmarks for projecting similar conditions into the

future. The probability that participating communities will experience a severe winter storm event, based on historical records and frequencies, is highly likely and expected to occur at least once every year.

The probability that Platte County will experience another extreme cold event can be difficult to quantify. It is important to note that the limited amount of historical accounts for extreme cold temperatures does not necessarily indicate a low frequency of occurrence. Certain hazards occur more frequently in specific areas. Therefore, the residents of these areas are less likely to report events that seem commonplace, even though the events may be considered extreme in other locations.

3.17.4 Future Development Trends

Although Platte County is not currently experiencing major growth, the risk and impacts of a winter storm or blizzard event are still prevalent to existing infrastructure. Since the previous statement is assumed to be uniform for the county, the location of structures does not increase or reduce the risk necessarily. Participating communities should adhere to building codes, and therefore, new development can be built to current standards to account for adverse weather. Additionally, as homes go up in more remote parts of the county, accessing those rural residents may become impossible should sheltering or emergency services be needed in an extreme event.

3.17.5 Climate Change Impacts

As climate change unpredictably affects weather patterns, the types and numbers of winter storms is being impacted. Research from the National Climatic Data Center (NCDC) snowstorm database has shown "winter storms have increased in frequency and intensity since the 1950s." The impacts from climate change are likely to create more dangerous and damaging winter storms. The limited ability to consistently predict accurate conditions for winter storms can leave people exposed and infrastructure unprotected.

4 Plan Adoption, Implementation, and Maintenance

Having a plan for monitoring, evaluating, maintaining, and implementing this HMP is critical to maintaining its value and success. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continual basis.

4.1 Role of Hazard Mitigation Planning Committee

With adoption of this plan, the HMPC will be tasked with the plan's implementation and maintenance and will be led by the Platte County Emergency Management Department. The HMPC will act as an advisory body. Its primary duties will be to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. With the adoption of this plan, the HMPC agrees to:

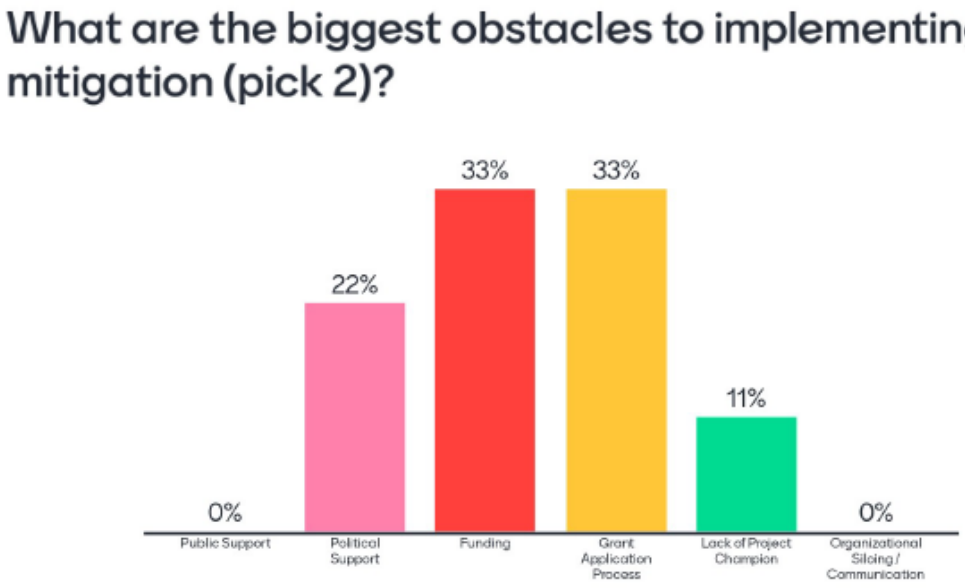
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision-making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the County Commissioners; and
- Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, coordinating with appropriate entities, and updating relevant information on the county's and Emergency Management Department's website, along with local newspapers and Emergency Management social media accounts.

4.2 Implementation

Upon updating and adopting this plan, it is intended to be implemented to reduce Platte County's vulnerability to natural hazards over time. Implementation is informed by multiple factors, including funding, project schedule, available personnel, and priority of completion. Figure 4.1 shows the barriers Platte County's HMPC see as impacting implementation, with the greatest identified as the grant application process, funding, and political support. A large part of implementing this plan is utilizing it to educate other stakeholders, government agencies, and potential partners to assist in accomplishing mutually beneficial mitigation projects.

Figure 4.1 Implementation Obstacles



Continuous, cooperative, and informed efforts to network and highlight the multi-objective benefits of each project to the community and its stakeholders is crucial to implementation. These efforts include the promotion of mitigation, collaboration, and the value to the community overall.

Simultaneous to these efforts, the HMPC will consistently monitor funding opportunities that could be leveraged to implement actions. Coordinating ahead of time on how to meet local match for grants, or to adapt projects to fit grant requirements are important proactive steps to obtain funding. When funding does become available, the HMPC will then be in a position to capitalize on the opportunity.

Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective projects.

While grant funding allows for many mitigation action projects to be funded, Platte County intends to diversify funding opportunities in an effort to be less reliant on grant monies. This allows for greater flexibility in implementation of projects that are important to communities.

4.3 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

4.3.1 Maintenance Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration has occurred. The Emergency Management Department is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. The annual review is recommended to occur in the month of January.

This plan will be updated, approved, and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. The County will inquire with the Wyoming Office of Homeland Security (WOHS) and FEMA for funds to assist with the update. Funding sources may include the Emergency

Management Performance Grants, Hazard Mitigation Grant Program (if a presidential disaster has been declared), Building Resilient Infrastructure and Communities grants, and Flood Mitigation Assistance grant funds.

4.3.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Such changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Based on plan implementation, the HMPC will use the following process to evaluate progress, note changes in vulnerability, and consider changes in priorities:

- A representative from the responsible entity identified in each mitigation measure will track and report on project status to the HMPC annually. The representative will provide input on whether the project meets the defined goals and objectives and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals and objectives, the HMPC will select alternative projects for implementation.
- New projects identified will require that an individual be assigned as responsible for defining the scope, implementation, and monitoring success of the project.
- Projects not ranked high priority but were identified as potential mitigation strategies will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to accommodate for projects that have failed or are not considered feasible after review of the established criteria, the time frame, priorities, and/or funding resources.

Updates to this plan will follow the most current FEMA and WOHS planning guidance and will consider the following:

- Changes in vulnerability due to project implementation;
- Documentation of
    - success stories where mitigation efforts have proven effective;
    - areas where mitigation actions were not effective;
    - any new hazards that may arise or were previously overlooked;
    - hazard events and impacts that occurred within the five-year period;
    - continued public involvement
    - changes to the planning process, which may include new or additional stakeholder involvement;
- Incorporation of
    - new data or studies on hazards and risks;
    - new capabilities or changes in capabilities;
    - growth and development-related changes to building inventories
    - projected development that could be vulnerable to hazards
    - new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to WOHS/FEMA; and
- Include re-adoption by all participating entities following WOHS/FEMA approval.

4.3.3 Plan Integration

Platte County maintains a comprehensive set of emergency management plans, developed in a multidisciplinary environment where county departments, jurisdictional agencies and representatives, nonprofit and community organizations, and the private sector are included in the planning process. This set of plans encompass all phases of emergency management and the work done on the Wyoming Region 7 HMP update will be integrated into these efforts moving forward.

By integrating the HMP with the county's comprehensive set of emergency management plans, a strong foundation for resilience can be set through smart emergency preparedness, mitigation, response, and recovery; before, during, and after an emergency or disaster event.

Additionally, considering hazard mitigation during all applicable future county, municipal, and regional planning efforts is crucial. Some of the larger opportunities for impactful integration involve comprehensive plans, transportation plans, building codes, community wildfire protection (and implementation) plans, and annual capital expenditure planning. The greater the investment of hazard mitigation planning into other plans, the more likely the success of implementation and achieving common goals across departments and jurisdictions.

HMPC members are responsible for promoting and advocating for integration of the findings and recommendations of this plan with other plans, policies, and studies, as appropriate. Due to the lack of available implementation resources in Platte County, this plan will be considered a core document that will help provide a plan and process for the county to mitigate against future hazard events. This plan may also initiate more in-depth analysis and reports (i.e. Wildfire Study) should funding become available.

Plans are only as informed and stable as the energy and knowledge put into them, which is why plan integration involves an intersectional approach to be successful. Identifying relevant and relatable plans to integrate is the first step, however the right people need to come to the table to coordinate, problem solve for any possible issues, and most importantly celebrate the strengths and progress of each plan.

There are a number of other community plans that will benefit from strategies and content within this updated HMP. Integrating components of this plan across other community planning efforts will be an ongoing effort and will help to ensure no strategic conflicts are created through other planning processes, and most critically that areas of mutual interests are identified.

This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs. Wherever possible it is recommended that project implementation be achieved through collaborative and collectively beneficial work with other programs, planning, and policy development.

4.3.4 Continued Public Involvement

The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, Local Emergency Planning Committee (LEPC) meetings, web postings, and press releases to local media.

It is important to share success stories with the community as mitigation actions are completed, to ensure the public understands the value of the plan and their input going forward. Sharing the plan with the communities often and consistently, throughout the planning cycle, provides opportunities to seek additional public comment.

A public hearing(s) to receive comment on plan maintenance and updating from residents will be held during the maintenance period and information will be taken into account for formal updates. When the HMPC reconvenes for the plan update, they will coordinate with all stakeholders participating in the planning process. This includes those that joined the committee during the maintenance period, those that were a part of the last planning process, and those who are new additions to the roster, to update and revise the plan.

Public awareness of the plan was thoroughly discussed by the planning committee and it was determined that wildfire outreach would be particularly effective in the late spring heading into summer, after runoff and any flooding. The fire district leadership spoke about their typical outreach and how to line these community efforts up in the future.

Developing individual flood mitigation strategies annually basis during public outreach each spring, before the runoff begins, can also occur in coordination with other relevant County public notification activities, such as wildfire.

Further discussion involved how to leverage these existing community outreach methods for other hazards, and just as importantly education about the plan.

5 Earthquake Hazus Risk Report

Hazus: Earthquake Global Risk Report

Region Name: PlatteEQm5

Earthquake Scenario: PlatteEQ2500m5

Print Date: February 21, 2022

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

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

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Wyoming

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,110.28 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 8,667 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 900 (millions of dollars). Approximately 89.00 % of the buildings (and 70.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,920 and 1,930 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 4 thousand buildings in the region which have an aggregate total replacement value of 900 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 64% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 25 beds. There are 13 schools, 10 fire stations, 3 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 20 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 4,850.00 (millions of dollars). This inventory includes over 193.87 miles of highways, 160 bridges, 9,379.60 miles of pipes.

Table 1: Transportation System Lifeline Inventory

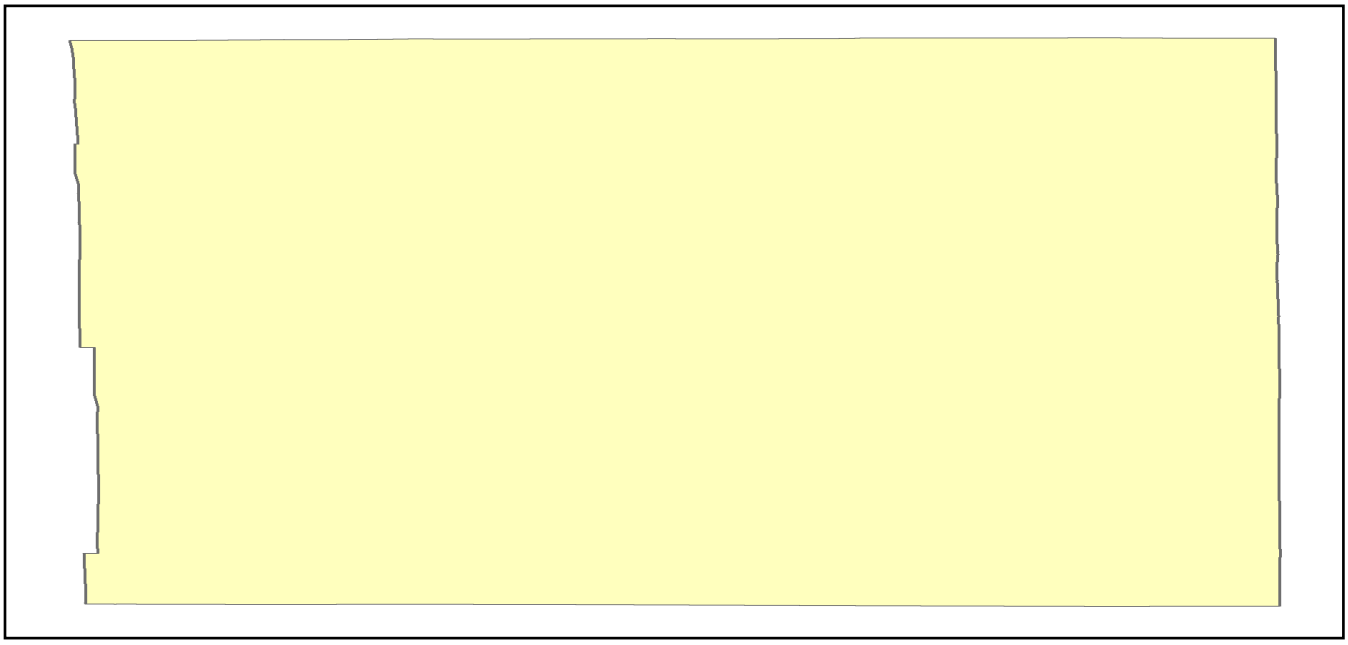
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	160	276.1425
	Segments	45	1846.4206
	Tunnels	0	0.0000
		Subtotal	**2122.5631**
Railways	Bridges	85	376.2173
	Facilities	0	0.0000
	Segments	163	305.8375
	Tunnels	0	0.0000
		Subtotal	**682.0548**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	1	1.4163
		Subtotal	**1.4163**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	3	13.2782
	Runways	3	101.3928
		Subtotal	**114.6710**
		Total	**2,920.70**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	186.1765
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**186.1765**
Waste Water	Distribution Lines	NA	111.7059
	Facilities	4	506.3443
	Pipelines	0	0.0000
		Subtotal	**618.0502**
Natural Gas	Distribution Lines	NA	74.4706
	Facilities	1	1.5491
	Pipelines	10	121.6459
		Subtotal	**197.6656**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	2	928.5930
		Subtotal	**928.5930**
Communication	Facilities	2	0.1800
		Subtotal	**0.1800**
		Total	**1,930.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	PlatteEQ2500m5
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	5.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 266 buildings will be at least moderately damaged. This is over 5.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

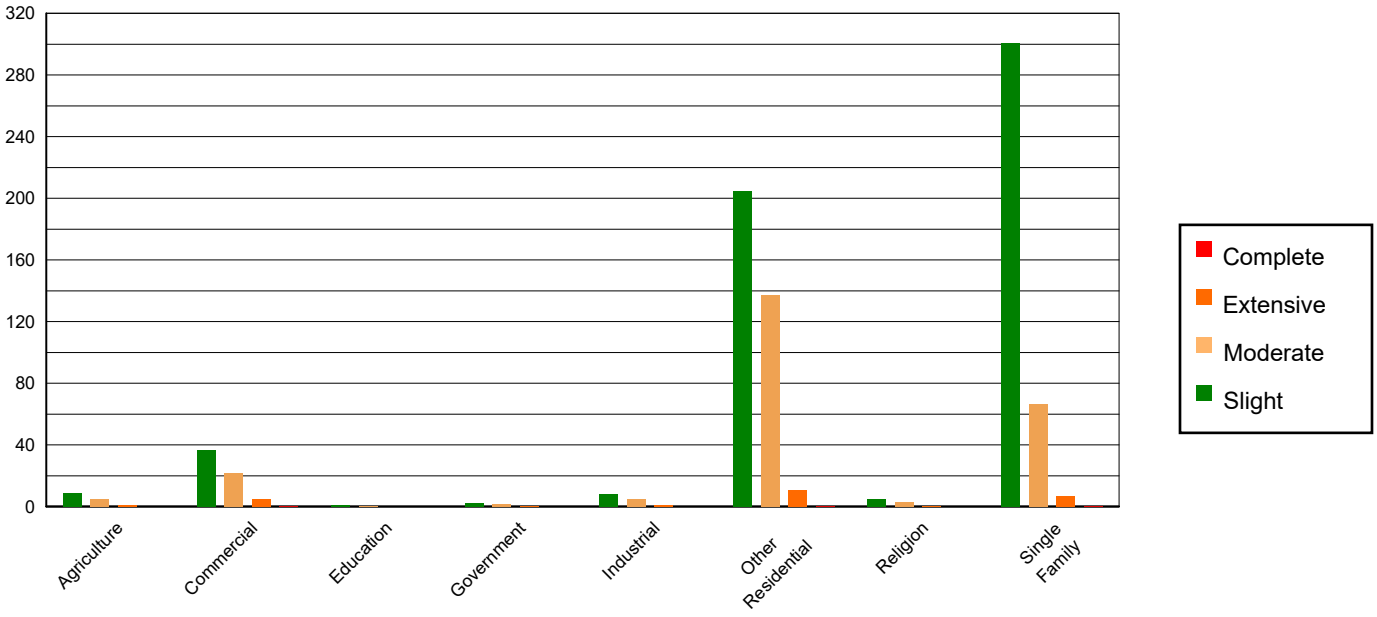


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	72.13	1.75	8.95	1.57	4.88	2.03	1.00	3.92	0.04	4.72
Commercial	258.82	6.29	36.86	6.48	21.49	8.96	4.62	18.08	0.22	26.54
Education	10.78	0.26	1.34	0.23	0.74	0.31	0.14	0.53	0.01	0.70
Government	19.79	0.48	2.59	0.45	1.39	0.58	0.23	0.89	0.01	1.13
Industrial	56.60	1.37	8.16	1.44	5.08	2.12	1.11	4.36	0.04	4.51
Other Residential	813.77	19.76	204.78	36.00	137.08	57.14	11.05	43.29	0.31	37.46
Religion	40.71	0.99	5.12	0.90	2.69	1.12	0.46	1.81	0.02	2.53
Single Family	2845.36	69.10	300.99	52.92	66.54	27.74	6.93	27.13	0.18	22.41
Total	**4,118**		**569**		**240**		**26**		**1**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2829.44	68.71	300.34	52.80	51.69	21.55	2.87	11.25	0.00	0.00
Steel	100.59	2.44	11.39	2.00	7.32	3.05	1.17	4.60	0.05	5.55
Concrete	78.65	1.91	12.40	2.18	6.33	2.64	0.82	3.20	0.01	1.38
Precast	70.73	1.72	10.70	1.88	10.08	4.20	3.00	11.74	0.06	7.69
RM	284.95	6.92	28.93	5.09	23.28	9.71	5.04	19.75	0.02	2.75
URM	45.82	1.11	12.06	2.12	7.92	3.30	2.21	8.67	0.40	49.02
MH	707.78	17.19	192.97	33.93	133.28	55.56	10.41	40.79	0.28	33.62
Total	**4,118**		**569**		**240**		**26**		**1**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 25 hospital beds available for use. On the day of the earthquake, the model estimates that only 18 hospital beds (75.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 95.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	1
Schools	13	0	0	13
EOCs	1	0	0	1
PoliceStations	3	0	0	3
FireStations	10	0	0	10

Transportation Lifeline Damage

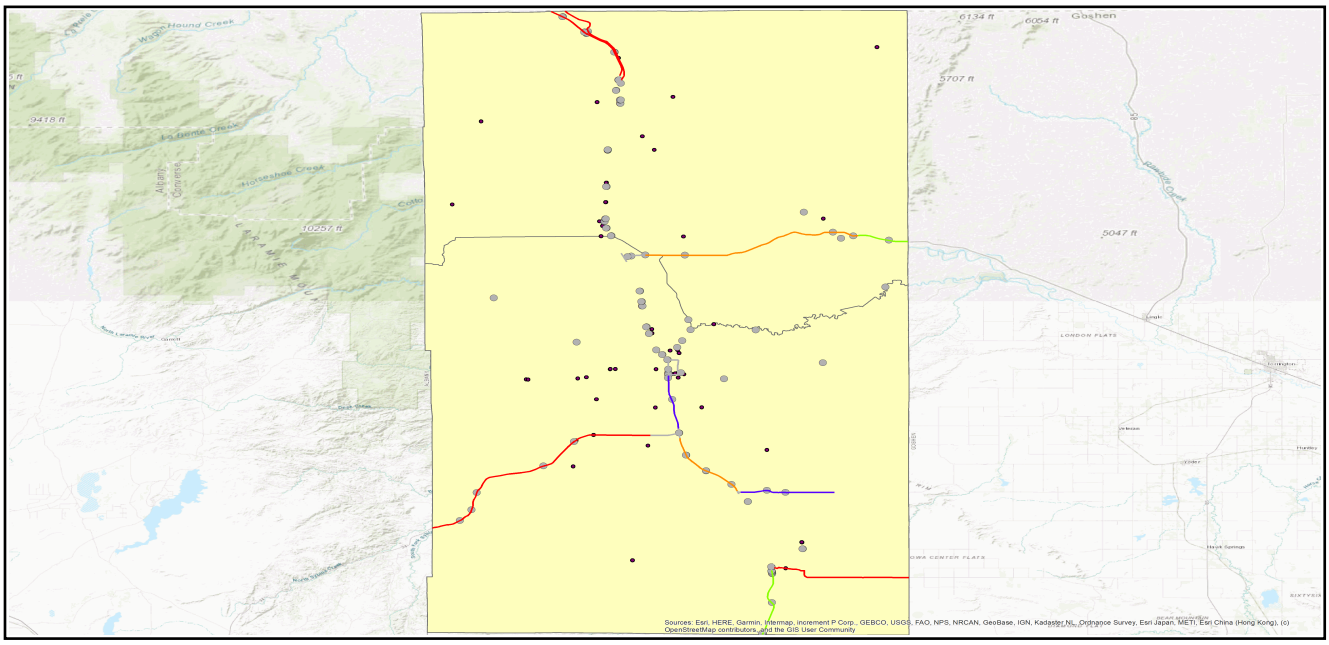


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	45	0	0	45	45
	Bridges	160	0	0	160	160
	Tunnels	0	0	0	0	0
Railways	Segments	163	0	0	163	163
	Bridges	85	0	0	85	85
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	3	0	0	3	3
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	4	0	0	4	4
Natural Gas	1	0	0	1	1
Oil Systems	0	0	0	0	0
Electrical Power	2	0	0	2	2
Communication	2	0	0	2	2

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	5,784	52	13
Waste Water	3,471	26	7
Natural Gas	125	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,838	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

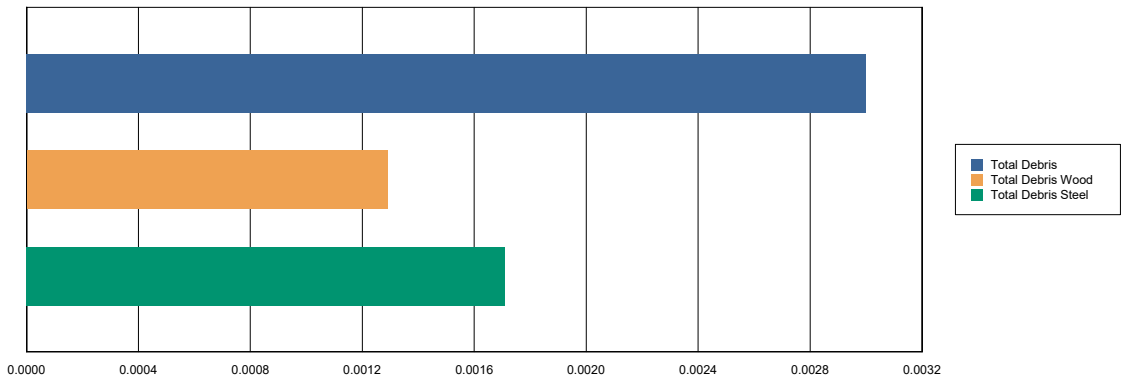
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 3,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 43.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 120 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



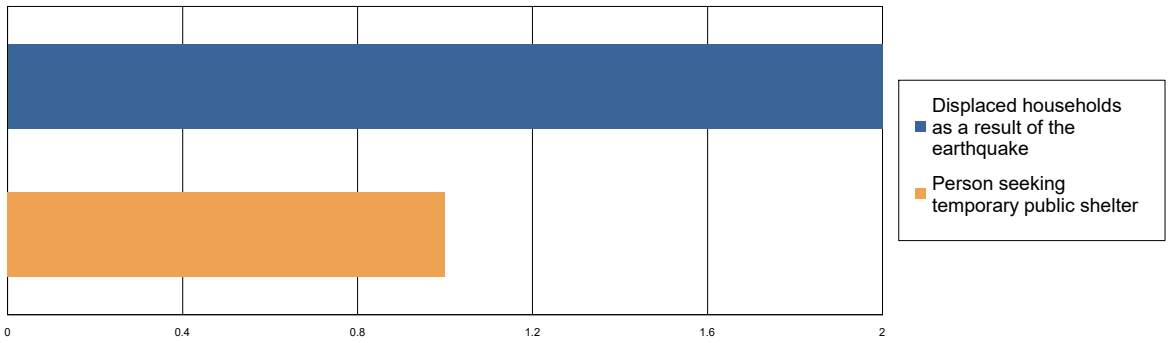
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	120 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 2 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 8,667) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
2	1

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.04	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.01	0.00	0.00	0.00
	Other-Residential	0.93	0.09	0.00	0.00
	Single Family	0.79	0.07	0.00	0.01
	Total	**2**	**0**	**0**	**0**
2 PM	Commercial	2.07	0.28	0.02	0.04
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.44	0.06	0.00	0.01
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.10	0.01	0.00	0.00
	Other-Residential	0.18	0.02	0.00	0.00
	Single Family	0.16	0.01	0.00	0.00
	Total	**3**	**0**	**0**	**0**
5 PM	Commercial	1.44	0.20	0.02	0.03
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.03	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.07	0.01	0.00	0.00
	Other-Residential	0.33	0.03	0.00	0.00
	Single Family	0.30	0.03	0.00	0.00
	Total	**2**	**0**	**0**	**0**

Economic Loss

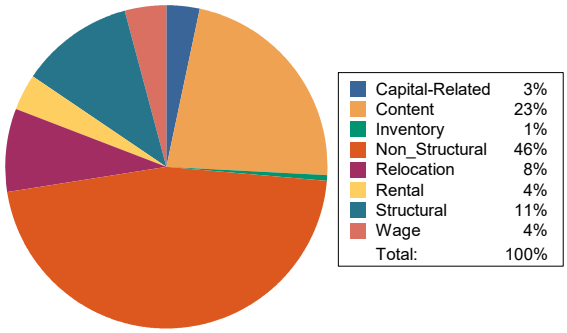
The total economic loss estimated for the earthquake is 106.34 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 16.46 (millions of dollars); 19 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 53 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

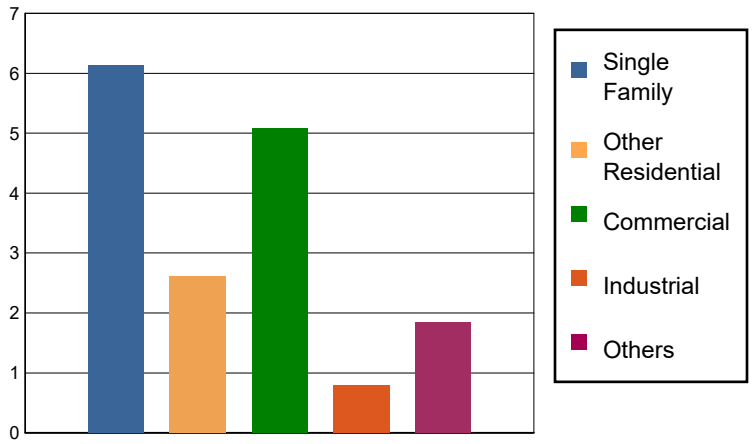


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0710	0.5186	0.0109	0.0757	0.6762
	Capital-Related	0.0000	0.0303	0.4905	0.0073	0.0118	0.5399
	Rental	0.1301	0.1409	0.2979	0.0046	0.0205	0.5940
	Relocation	0.4462	0.2490	0.4526	0.0392	0.1810	1.3680
	Subtotal	**0.5763**	**0.4912**	**1.7596**	**0.0620**	**0.2890**	**3.1781**
Capital Stock Losses							
	Structural	0.5910	0.3986	0.5306	0.0808	0.2669	1.8679
	Non_Structural	3.4446	1.3786	1.6678	0.3699	0.7285	7.5894
	Content	1.5139	0.3489	1.0929	0.2396	0.5352	3.7305
	Inventory	0.0000	0.0000	0.0325	0.0411	0.0212	0.0948
	Subtotal	**5.5495**	**2.1261**	**3.3238**	**0.7314**	**1.5518**	**13.2826**
	Total	**6.13**	**2.62**	**5.08**	**0.79**	**1.84**	**16.46**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1846.4206	0.0000	0.00
	Bridges	276.1425	0.0779	0.03
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**2122.5631**	**0.0779**	
Railways	Segments	305.8375	0.0000	0.00
	Bridges	376.2173	0.0010	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**682.0548**	**0.0010**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	1.4163	0.2044	14.43
	Subtotal	**1.4163**	**0.2044**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	13.2782	1.9462	14.66
	Runways	101.3928	0.0000	0.00
	Subtotal	**114.6710**	**1.9462**	
	Total	**2,920.71**	**2.23**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	186.1765	0.2352	0.13
	Subtotal	**186.1765**	**0.2352**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	506.3443	18.3385	3.62
	Distribution Lines	111.7059	0.1182	0.11
	Subtotal	**618.0502**	**18.4567**	
Natural Gas	Pipelines	121.6459	0.0000	0.00
	Facilities	1.5491	0.0856	5.53
	Distribution Lines	74.4706	0.0405	0.05
	Subtotal	**197.6656**	**0.1261**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	928.5930	68.8213	7.41
	Subtotal	**928.5930**	**68.8213**	
Communication	Facilities	0.1800	0.0130	7.22
	Subtotal	**0.1800**	**0.0130**	
	Total	**1,930.67**	**87.65**	

Appendix A: County Listing for the Region

Platte,WY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Wyoming					
	Platte	8,667	631	268	900
Total Region		**8,667**	**631**	**268**	**900**

6 Meeting Agendas and Invites

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

HMP Kickoff Webinar

Tuesday, February 8, 2022 / 9:30-11:00 am:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 126 284 268#

Agenda:

1. Hazard Mitigation Overview
2. Project Scope & Schedule
3. Roles & Responsibilities
4. Public Involvement Strategy
5. 2018 HMP Input
6. Recent Community Planning
7. Hazards to Profile
8. Recent Hazard Events
9. Hazard & Risk Viewers
10. Mitigation Strategy
11. Lifelines
12. Mitigation Grant Funding
13. Mitigation Resources
14. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- 2017 Mitigation Action Reporting
- Best Available Hazard Data
- Recent Community Plans
- HMPC Roster Additions
- Help to Share Public Engagement Content
- Hazard / Disaster / Mitigation Photos

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

Mike Garner

From: Terry Stevenson <tstevenson@plattecountywyoming.com>
Sent: Tuesday, January 25, 2022 10:50 AM
To: Aaron Voos (aaron.voos@usda.gov); Alan Baldy (alan.w.baldy.nfg@mail.mil); Planner; Beal Angle (james.angle@plattecountwyoming.com); James Beal-Angle; Ben Bigalke (Casper_WYMail@blm.gov); Brady Irvine (bradyirvine@rocketmail.com); Brandon Graves (brgraves770@gmail.com); Brandon Graves (b.graves@townofwheatlandwy.org); glendotownof@yahoo.com; c.wright@townofwheatlandwy.org; Carol Ash (promanage@aol.com); Clyde Harris; Cory Dziowgo - PCSD #1 (cdziow@platte1.k12.wy.us); Dave Noyce (glendovfd@yahoo.com); David Cummings (dcummings@bepc.com); David Smith (dsmith@togwy.us); David Warner (davidwarner1475 @yahoo.com); David Weber (david.weber@gci.org); Don Smith - Wheatland REA (dsmith@wheatlandrea.com); Doug Willadsen (dwilladsen@wheatlandpolice.org); Ian Jolovich; Jason Taliaferro (jasonp.taliaferro@gmail.com); Jay Collins (jkcollins@vcn.com); Jeanine West (jwest@laramiecounty.com); Jeff Thomas; Kayla Mantle; Kenny Small - Palmer Canyon Fire Department (asmalloutfit@gmail.com); Kim Graves (Kim.Graves@bannerhealth.com); Lee Arrington (l.arrington@wheatlandirrigation.org); Malcolm Ervin; hartville@vistabeam.com; Mike Beard (mbeard@gsviking.org); Mike Beard (mbeard@plt2.k12.wy.us); Nick Paustian (n.paustian@hotmail.com); Nicole Sticka; Pamela Hebbert (clerk@togwy.us); Rick Keck (r.keck@townofwheatlandwy.org); Sara Zappa (sara.zappa@wyo.gov); Shelly Kirchhefer (skirchhefer@GoshenSheriff.org); Steve Shockley; Susan Juschka - Glendo (sajus@wyoming.com); Tim Ash (chugone@gmail.com); Tim Ash (chugwaterfiredept@wyomail.com); Toby Hohnholt (t.hohnholt@townofwheatlandwy.org); Town Clerk (townofchugwater@chugwater.com); de Ryk Will (will@wyoagency.com)
Cc: Mike Garner
Subject: RE: Region 7 Hazard Mitigation Plan Update 2022

RE: Region 7 Hazard Mitigation Plan Update 2022– Hazard Mitigation Planning Committee Invitation and Kickoff Meeting
HMPC Kickoff Webinar
Date: 2/8/2022
Time: 9:30-11:00 am
Meeting Link Below

Hello,
You are invited to the first of three planning meetings to update the Wyoming Region 7 Hazard Multi-Jurisdictional Mitigation Plan. The current plan was developed in 2018 in accordance with the Disaster Mitigation Act of 2000, which requires all local governments to develop a plan to assess their risks to hazards and identify actions that can be taken in advance to reduce future losses. Hazard mitigation plans are to be updated every five years in order to maintain eligibility for Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) grants. The Region 7 Hazard Mitigation Plan includes Goshen, Laramie, and Platte Counties and their municipalities, in addition to any special districts that would like to participate.

The hazard mitigation planning process is heavily dependent on the participation of representatives from local government agencies and departments, the public, and other stakeholder groups. A Hazard Mitigation Planning Committee (HMPC) is being re-vitalized to support this project and will include representatives from the counties, incorporated cities and towns, and districts. Other interested stakeholders, including local and regional agencies involved in hazard mitigation activities or agencies that regulate development, are also invited. This includes private-non-profit entities, business partners, academic institutions, and other local, state, and federal agencies in the Region.

At the HMPC kickoff webinar, we will discuss the benefits of updating the hazard mitigation plan, the project schedule & scope, public engagement opportunities, and all of the hazards that affect the Region, such as wildfires, floods, winter storms, and more.

Appropriate persons to be a part of the HMPC include, but are not limited to: county and municipal planners, public works directors, floodplain managers, economic development directors, GIS staff, first responders, local government administration, elected officials, business partners, private-non-profit representatives, and special district representatives. Each plan adopting entity must have at least one representative at all meetings to meet FEMA participation requirements. We request your assistance in forwarding this invitation to others in your organization, as needed. There will be 3 total HMPC meetings held during the update process over the next 6 months, with submittal of the updated plan for State and FEMA review late in 2022.

As the County Emergency Management Coordinator, I will be taking the lead in coordinating the update of this plan. The Wyoming Office of Homeland Security has hired a consultant, Synergy Disaster Recovery, to manage this planning project. Synergy will facilitate the planning process, collect the necessary data, and perform other technical services, including updating the risk assessment and plan document. However, to successfully complete this project and ensure your organization is eligible for FEMA HMA funding, we need your participation and input.

A meeting invitation/calendar item for the webinar will be shared soon. I look forward to your input and participation during the process.

Region 7 Multi-jurisdictional Hazard Mitigation Plan Update
HMPC Kickoff Webinar
Date: 2/8/2022
Time: 9:30-11:00 am
Webinar link:

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting (https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTY3ZGRiYzMtNDlhMi00NzBiLWE0OTEtMTUzN2U1Mzg3MGYx%40thread.v2/0?context=%7b%22Tid%22%3a%2293508cfd-0e9e-4186-bbc9-15f48c5d31aa%22%2c%22Oid%22%3a%22e2a7596a-fe00-4ee4-9d18-d68d9e2ce0f4%22%7d)

Or call in (audio only)

+1 872-242-8065,,126284268# United States, Chicago

Phone Conference ID: 126 284 268#

Find a local number | Reset PIN

Terry A Stevenson
Platte County Emergency Management Coordinator
800 9th Street, PO Box 966
Wheatland, WY 82201
Desk: 307-322-1356
Cell: 307-331-8521
Email: TStevenson@plattecountywyoming.com

February 8, 2022 Kick Off WY Region 7

GID (Guest)9:37 AM

goshen irrigation district

Chuck Kenyon (Guest)9:37 AM

Jeff Harkens, Director of Public Works, City of Torrington

Ritch (Guest)9:38 AM

Ritch Reyes, Town of Lingle

Laramie River Station (Guest)9:38 AM

Levi Mickelsen Plant Manager at the Laramie River station Wheatland WY

Caitlin Langmead9:38 AM

1681 4126
www.menti.com

Brislawn, Jeff P (External)9:39 AM

Jeff Brislawn, Hazard Mitigation Lead, Wood Environment & Infrastructure Solutions, Inc

Shelly Kirchhefer (Guest)9:39 AM

Shelly Kirchhefer Goshen Emergency Management

Wesley Bay (External)9:39 AM

Wes Bay, Deputy City Engineer, City of Cheyenne

Jeanine West (External)9:48 AM

The Teams link is not working for some

Caitlin Langmead9:49 AM

Thank you, let me see what I can do.

Wesley Bay (External)9:49 AM

What was the code for the website again?

Caitlin Langmead9:49 AM

1681 4126

Caitlin Langmead9:51 AM

Jeanine can you share this link, it's the same but not with a hyperlink https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTY3ZGRiYzMtNDlhMi00NzBiLWE0OTEtMTUzN2U1Mzg3MGYx%40thread.v2/0?context=%7b%22Tid%22%3a%2293508cfd-0e9e-4186-bbc9-15f48c5d31aa%22%2c%22Oid%22%3a%22e2a7596a-fe00-4ee4-9d18-d68d9e2ce0f4%22%7d

Caitlin Langmead9:54 AM

They may need to copy and paste into web address bar and not click the link.

Jeanine West (External)9:55 AM

Thank you

Ritch (Guest)10:00 AM

town website and facebook

Shamika McDonald, Wy SHMO (Guest)10:25 AM

Please feel free to contact me on current funding available through FEMA or any grant questions . 307.777.4914 or shamika.mcdonald1@wyo.gov

Thank you all for being here!

Val Hankins (Guest)10:42 AM

Val Hankins, Goshen County Road & Bridge

Planner (External)10:43 AM

Amy Clark - Planner for the Town of Wheatland and Platte County

Matt Butler CLCEMA (Guest)10:43 AM

Matt Butler, LCEMA

GID (Guest)10:43 AM

Tyson Gladson, Linda Keeran, Ryan Allen GID

Ryan (Guest)10:43 AM

Thanks for all of the information! Ryan Wunibald PHRC Goshen County

Chris Hilker (Guest)10:43 AM

Chris Hilker - 153d Air Wing

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

Platte County Risk Assessment Webinar

Thursday, April 21, 2022 / 1:00-3:00 pm:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 690 295 640#

Agenda:

1. Project Overview & Updates
2. Public Involvement Strategy
3. Risk Assessment Summary
4. Mitigation Strategy
5. Mitigation Grant Funding
6. Mitigation Resources
7. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- Review draft HIRA
- Organizational Hazard Ranking Survey
- Help to Share Public Engagement Content (including survey)
- Hazard / Disaster / Mitigation Photos

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

Mike Garner

From: Terry Stevenson <tstevenson@plattecountywyoming.com>
Sent: Monday, July 25, 2022 9:05 AM
To: Mike Garner
Subject: April 21 Invitation List

Mike, here is the invitation list for the April 21 meeting

Terry A Stevenson

-----Original Appointment-----
From: Terry Stevenson **On Behalf Of** Mike Garner
Sent: Thursday, April 7, 2022 09:19
To: Mike Garner; Aaron Voos (aaron.voos@usda.gov); Alan Baldy (alan.w.baldy.nfg@mail.mil); Amy Clark (planner@plattecountywyoming.com); Beal Angle (James.Angle@plattecountywyoming.com); Beal Angle (James.Angle@plattecountywyoming.com); Ben Bigalke (Casper_WYMail@blm.gov); Brady Irvine (bradyirvine@rocketmail.com); Brandon Graves (brgraves770@gmail.com); Brandon Graves (b.graves@townofwheatlandwy.org); Brenda Hagen - Glendo (glendotownof@yahoo.com); Candy Wright - Wheatland (c.wright@townofwheatlandwy.org); Carol Ash (promanage@aol.com); Clyde D. Harris (charris@plattecountywyoming.com); Cory Dziowgo - PCSD #1 (cdziow@platte1.k12.wy.us); Dave Noyce (glendovfd@yahoo.com); David Cummings (dcummings@bepc.com); David Smith (dsmith@togwy.us); David Warner (davidwarner1475@yahoo.com); David Weber (david.weber@gci.org); Don Smith - Wheatland REA (dsmith@wheatlandrea.com); Doug Willadsen (dwilladsen@wheatlandpolice.org); Ian Jolovich (ijolovich@plattecountywyoming.com); Jason Taliaferro (jasonp.taliaferro@gmail.com); Jay Collins (jkcollins@vcn.com); Jeanine West (jwest@laramiecounty.com); Jeff Thomas; Kayla Mantle (kmantle@plattecountywyoming.com); Kenny Small - Palmer Canyon Fire Department (asmalloutfit@gmail.com); Kim Graves (Kim.Graves@bannerhealth.com); Lee Arrington (l.arrington@wheatlandirrigation.org); Malcolm Ervin (MErvin@plattecountywyoming.com); Mark Flohr (hartville@vistabeam.com); Mike Beard (mbeard@gsviking.org); Mike Beard (mbeard@plt2.k12.wy.us); Mike Garner (MGarner@synergy-dr.com); Nick Paustian (n.paustian@hotmail.com); Nicole Sticka (nicole.sticka@wyo.gov); Pamela Hebbert (clerk@togwy.us); Rick Keck (r.keck@townofwheatlandwy.org); Sara Zappa (sara.zappa@wyo.gov); Shelly Kirchhefer (skirchhefer@GoshenSheriff.org); Steve Shockley - Platte County (sshockley@plattecountywyoming.com); Susan Juschka - Glendo (sajus@wyoming.com); Tim Ash (chugone@gmail.com); Tim Ash (chugwaterfiredept@wyomail.com); Toby Hohnholt (t.hohnholt@townofwheatlandwy.org); Town Clerk (townofchugwater@chugwater.com); de Ryk Will (will@wyoagency.com)
Subject: FW: WY R7 HMP - Platte County Risk Assessment Webinar
When: Thursday, April 21, 2022 13:00-15:00 (UTC-07:00) Mountain Time (US & Canada).
Where: Microsoft Teams Meeting

This is an important meeting for you input to the Region 7 Hazard Mitigation Plan
Please note that this meeting is specifically intended to cover all of Platte County. Goshen and Laramie counties have their own separate meetings.

Terry A Stevenson
Platte County Emergency Management Coordinator
800 9th Street, PO Box 966
Wheatland, WY 82201
Desk: 307-322-1356

Cell: 307-331-8521
Email: TStevenson@plattecountywyoming.com

-----Original Appointment-----
From: Mike Garner <MGarner@synergy-dr.com>
Sent: Tuesday, March 15, 2022 13:35
To: Mike Garner; Terry Stevenson; Caitlin Langmead; Anthony Krotz
Cc: Shamika McDonald; Jeff Brislawn
Subject: WY R7 HMP - Platte County Risk Assessment Webinar
When: Thursday, April 21, 2022 13:00-15:00 (UTC-07:00) Mountain Time (US & Canada).
Where: Microsoft Teams Meeting

Please share with your hazard mitigation planning committee. Agenda to be posted in the coming weeks.

Microsoft Teams meeting

Join on your computer or mobile app
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Or call in (audio only)
+1 872-242-8065,,690295640# United States, Chicago
Phone Conference ID: 690 295 640#
Find a local number | Reset PIN

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WY R7 HMP - Platte County Risk Assessment Webinar	
Meeting Start Time	4/21/2022, 12:45:51 PM
Meeting End Time	4/21/2022, 2:48:11 PM
Full Name	Join Time
Mike Garner	4/21/2022, 12:45:51 PM
Caitlin Langmead	4/21/2022, 12:46:03 PM
Lee Arrington	4/21/2022, 12:46:25 PM
307-322-2741	4/21/2022, 12:48:14 PM
Terry Stevenson	4/21/2022, 12:52:58 PM
Candy Wright	4/21/2022, 12:59:46 PM
Don Smith	4/21/2022, 1:01:16 PM
Anthony Krotz	4/21/2022, 1:01:47 PM

Wyoming Region 7 Hazard Mitigation Plan
Goshen, Laramie, & Platte Counties

Platte County Mitigation Strategy Webinar

Wednesday, June 22, 2022 / 1:00-2:30 pm:
Join on your computer or mobile app: click here to join the meeting
Or call in (audio only): 1.872.242.8065 / ID: 402 726 00#

Agenda:

1. Project Overview & Updates
2. Local Government Participation
3. Plan Integration / Implementation
4. Past Mitigation Action Progress
5. Updated Mitigation Strategy
6. Mitigation Grant Funding
7. Mitigation Resources
8. Next Steps

Hazard Mitigation Planning Committee (HMPC) Post-Meeting Requests:

- New Mitigation Action Development
- Hazard Ranking Survey (outstanding)

QUESTIONS, COMMENTS, CONCERNS? –

CONTACT PROJECT MANAGER MICHAEL GARNER AT ANY POINT THROUGHOUT THE PLANNING PROCESS:
303.710.9498 | MGARNER@SYNERGY-DR.COM

SYNERGY DISASTER RECOVERY

Mike Garner

From: Terry Stevenson <tstevenson@plattecountywyoming.com>
Sent: Thursday, June 16, 2022 2:58 PM
To: Mike Garner
Subject: FW: Platte Mitigation Strategy HMPC Workshop

This was the invitation for June 22,2022 meeting

Terry A Stevenson

From: Terry Stevenson
Sent: Wednesday, May 18, 2022 09:47
To: EMergmgmt <EMergmgmt@plattecountywyoming.com>
Subject: Platte Mitigation Strategy HMPC Workshop

Cc: Aaron Voos (aaron.voos@usda.gov); Amy Clark (planner@plattecountywyoming.com); Anthony Krotz (akrotz@plattecountywyoming.com); Beal Angle (James.Angle@plattecountywyoming.com); Beal Angle (James.Angle@plattecountywyoming.com); Ben Bigalke (Casper_WYMail@blm.gov); Brady Irvine (bradyirvine@rocketmail.com); Brandon Graves (brgraves770@gmail.com); Brandon Graves (b.graves@townofwheatlandwy.org); Brenda Hagen - Glendo (glendotownof@yahoo.com); Candy Wright - Wheatland (c.wright@townofwheatlandwy.org); Carol Ash (promanage@aol.com); Chad Brush (chad.e.brush.mil@mail.mil); Clyde D. Harris (charris@plattecountywyoming.com); Cory Dziowgo - PCSD #1 (cdziow@platte1.k12.wy.us); Dave Noyce (glendovfd@yahoo.com); David Cummings (dcummings@bepc.com); David Smith (dsmith@togwy.us); David Warner (davidwarner1475@yahoo.com); David Weber (david.weber@gci.org); Don Smith - Wheatland REA (dsmith@wheatlandrea.com); Doug Willadsen (dwilladsen@wheatlandpolice.org); Ian Jolovich (ijolovich@plattecountywyoming.com); Jason Taliaferro (jasonp.taliaferro@gmail.com); Jay Collins (jkcollins@vcn.com); Jeanine West (jwest@laramiecounty.com); Jeff Thomas <jeffthomasfire1@gmail.com>; Kayla Mantle (kmantle@plattecountywyoming.com); Kenny Small - Palmer Canyon Fire Department (asmalloutfit@gmail.com); Kim Graves (Kim.Graves@bannerhealth.com); Lee Arrington (l.arrington@wheatlandirrigation.org); Levi Mickelsen (lmickelsen@bepc.com); Malcolm Ervin (MErvin@plattecountywyoming.com); Mark Flohr (hartville@vistabeam.com); Mike Beard (mbeard@gsviking.org); Mike Beard (mbeard@plt2.k12.wy.us); Mike Garner (MGarner@synergy-dr.com); Mike Huntington (michael.huntington2@bannerhealth.com); Nick Paustian (n.paustian@hotmail.com); Nicole Sticka (nicole.sticka@wyo.gov); Pamela Hebbert (clerk@togwy.us); Reena McCoy - BEPC (RMcCoy@bepc.com); Rick Keck (r.keck@townofwheatlandwy.org); Sara Zappa (sara.zappa@wyo.gov); Scott Bateman (s.bateman@wheatlandirrigation.org); Shelly Kirchhefer (skirchhefer@GoshenSheriff.org); Steve Shockley - Platte County (sshockley@plattecountywyoming.com); Susan Juschka - Glendo (sajus@wyoming.com); Tim Ash (chugone@gmail.com); Tim Ash (chugwaterfiredept@wyomail.com); Toby Hohnholt (t.hohnholt@townofwheatlandwy.org); Town Clerk (townofchugwater@chugwater.com); de Ryk Will (will@wyoagency.com)

Please put this on your calendar so that you can plan to attend this virtual meeting to provide community input to the Hazard Mitigation Plan for Platte County and the five towns within Platte County.
This will be a “virtual only” meeting which you can attend on your computer, smart phone, or regular phone.

Mitigation Strategy HMPC Workshop
soft Teams Meeting

022 13:00
022 14:30

Garner
es: Terry Stevenson; Anthony Krotz; Caitlin Langmead
s: Shamika McDonald; Jeff Brislawn

Agenda will be added in a few weeks. Thanks for sharing with your hazard mitigation planning committee.

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting

Or call in (audio only)

+1 872-242-8065,,40272600# United States, Chicago

Phone Conference ID: 402 726 00#

Find a local number | Reset PIN

https://i.ibb.co/nRLwGWJ/synergy-logo-small.png

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Meeting Summary	
Meeting Title	Platte Mitigation Strategy HMPC Workshop
Meeting Start Time	6/22/2022, 12:51:22 PM
Meeting End Time	6/22/2022, 2:11:52 PM
Full Name	Join Time
Mike Garner	6/22/2022, 12:51:22 PM
Caitlin Langmead	6/22/2022, 12:51:35 PM
Anthony Krotz	6/22/2022, 12:52:31 PM
David Warner	6/22/2022, 12:54:32 PM
Terry Stevenson	6/22/2022, 12:55:18 PM
307-630-5914	6/22/2022, 12:58:26 PM
Jason Wright	6/22/2022, 1:00:20 PM
Pam Hebbert	6/22/2022, 1:03:58 PM
Shamika McDonald, WY SHMO	6/22/2022, 2:09:44 PM

7 Adoptions

PLATTE COUNTY RESOLUTION #2023-03

A RESOLUTION TO ADOPT THE 2023 UPDATED WYOMING REGION 7 HAZARD MITIGATION PLAN

WHEREAS, the County of Platte, with the assistance from the Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update ("Plan"); and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the County of Platte is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Board of Platte County Commissioners have reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners of Platte County, Wyoming, that the County of Platte hereby adopts the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to consider the actions in the Plan.

Given our hand and seal this 7th day of March 2023.

County Clerk, Platte County SEAL State of Wyoming

ATTEST:

Malcolm Ervin, County Clerk &
Clerk of the Board

PLATTE COUNTY
BOARD OF COUNTY COMMISSIONERS

Steve Shockley, Chairman

Ian Jolovich, Commissioner

Kayla Mantle, Commissioner

RESOLUTION #05-2023

A RESOLUTION TO ADOPT THE 2023 UPDATED WYOMING REGION 7 HAZARD MITIGATION PLAN

WHEREAS, the Town of Wheatland, with the assistance from the Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update ("Plan"); and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Wheatland is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Council for the Town of Wheatland has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW, THEREFORE, BE IT RESOLVED, the Town of Wheatland hereby adopts the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to consider the actions in the Plan.

ADOPTED this 13th day of March 2023.

Brandon R Graves

Brandon Graves, Mayor

Attest:

Candy Wright

Candy Wright Clerk/Treasurer

TOWN OF CHUGWATER

RESOLUTION 2023-02

A RESOLUTION TO ADOPT THE WYOMING REGION 7 MITIGTION PLAN 2023 UPDATE

WHEREAS, the Town of Chugwater, with the assistance from the Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update; and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Chugwater is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Town Council of Chugwater has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW, THEREFORE, BE IT RESOLVED, by the Town Council of Chugwater that the Town of Chugwater adopts the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to consider the actions in the Plan.

ADOPTED this 6th day of March, 2023 at the meeting of the Town Council of Chugwater.

Carol A Ash

Carol Ash, Mayor

Attest:

Linda Webster

Linda Webster, Town Clerk

Exhibit 1: Adoption Resolution

Town of Glendo

Town Council of Glendo

Glendo, Wyoming

RESOLUTION

WHEREAS, the Town of Glendo, with the assistance from the Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update; and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Glendo is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Town Council of Glendo has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the Town Council of Glendo that the Town of Glendo adopts the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to consider the actions in the Plan.

ADOPTED this 8th day of March 2023 at the meeting of the Town council of Glendo.

Susan A Juschka
Mayor of Glendo

3-8-2023
Date

RESOLUTION NO. 2023-006

A RESOLUTION FOR THE ADOPTION OF THE WYOMING REGION 7 HAZARD MITIGATION PLAN 2023 UPDATE BY THE TOWN OF GUERNSEY.

WHEREAS, the Town of Guernsey, with the assistance from the Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update; and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, citizens of the Town of Guernsey have been afforded an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Town Council of Guernsey has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW THEREFORE, BE IT RESOLVED by the Town Council that the Town of Guernsey adopts the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan and resolves to consider the actions in the Plan.

PASSED, APPROVED AND ADOPTED this 7TH day of March, 2023.

Edward Delgado, Mayor

ATTEST:

Pam Hebbert

Pam Hebbert, Clerk/Treasurer

RESOLUTION 23-01

WHEREAS, the Town of Hartville, with the assistance from the Wyoming Office of Homeland Security, has gathered information and prepared the Wyoming Region 7 Hazard Mitigation Plan 2023 Update; and,

WHEREAS, the Wyoming Region 7 Hazard Mitigation Plan 2023 Update has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the Town of Hartville is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Town Council of Hartville has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

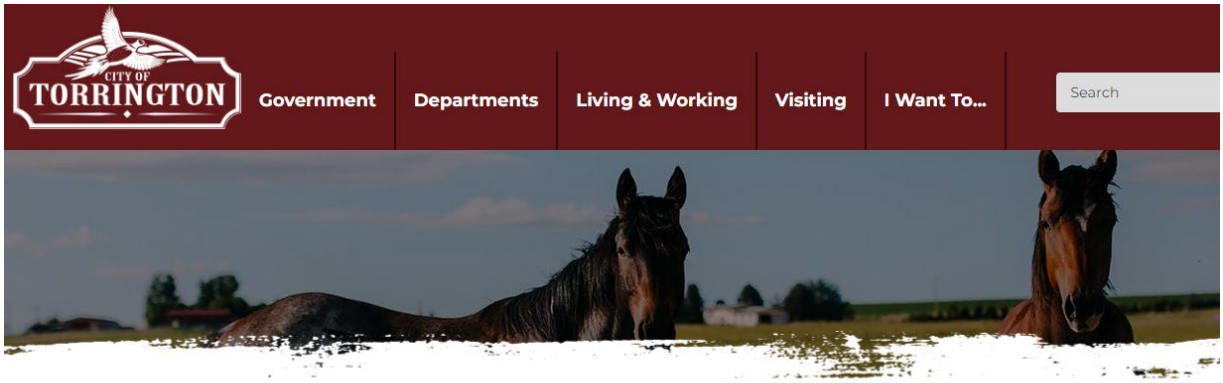
NOW THEREFORE, BE IT RESOLVED by the Town Council of Hartville that the Town of Hartville adopts the Wyoming Region 7 Hazard Mitigation Plan 2023 Update as this jurisdiction's Multi-Hazard Mitigation Plan, and resolves to consider the actions in the Plan.

ADOPTED this 9 day of March, 2023 at the meeting of the Town council of Hartville.

Mark A. John
Mayor of Hartville

3/9/2023
Date

Appendix D: Outreach Documentation



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Posted on: April 27, 2022

Hazard Mitigation Plan Survey

WY Region 7 Hazard Mitigation Plan 2020 Update

Wyoming Region 7 (Goshen, Laramie, and Platte Counties), in collaboration with local municipalities, districts, and other community organizations, is updating the 2017 Hazard Mitigation Plan. This plan develop...

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City of Torrington Wyoming Emergency Management

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Intro

Torrington Emergency Management works with Goshen County Emergency Management, Wyoming Office of Hom

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(307) 534-4730

torringtonwy.gov

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City of Torrington Wyoming Emergency Management
April 26 at 9:34 AM ·

Wyoming Region 7 Goshen, Laramie and Platte Counties, in collaboration with local communities like Torrington, is updating the 2017 Multi-Jurisdictional Hazard Mitigation Plan. The term "Hazard Mitigation" describes actions that can help reduce or eliminate long-term risks caused by hazards, such as floods and wildfires.
Residents, organizations, and businesses are encouraged to contribute to the planning process.
What hazards do you think the County should focus on?
Benefit... See more

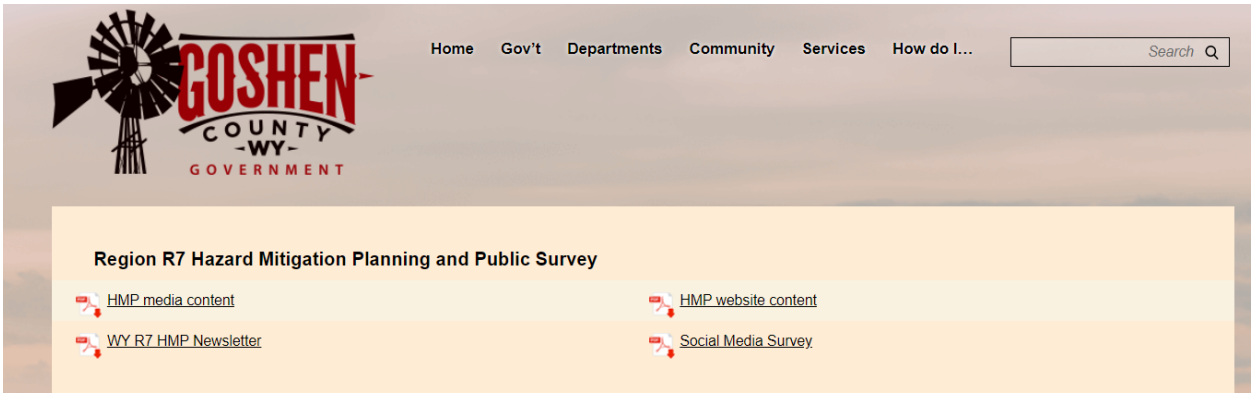
Region R7 Hazard Mitigation Planning and Public Survey

Goshen County Community Charitable Relief Program

2020 Unofficial General Election Results

Welcome to the Goshen County Wyoming Web-Site!

Goshen County is located in the southeastern corner of the state and its eastern boundary borders the Nebraska state line. The county seat is located in Torrington, Wyoming.
Goshen County was organized in 1913 and includes the incorporated city of Torrington, and towns of Lingle, Fort Laramie, Yoder and LaGrange. Unincorporated population centers in the county include Jay Em, Prairie Center, Hawk Springs,


GOSHEN
COUNTY
WY
GOVERNMENT
Home
Gov't
Departments
Community
Services
How do I...
Search
Region R7 Hazard Mitigation Planning and Public Survey
HMP media content
HMP website content
WY R7 HMP Newsletter
Social Media Survey

Appendix E: Hazard Mitigation Planning Committee

The following is a comprehensive list of those invited to participate in the planning process. Those who participated are marked (*).

Name	Title/Agency	Jurisdiction
Aaron Voos	Public Affairs Director	US Forest Service
Alan Baldy	Fire Chief	Camp Guernsey
Albert Lira	EMS	Torrington
Amy Clark *	Planner	Platte County, Wheatland
Andy Worshek	Chief of Staff	Cheyenne
Anthony Krotz *	Deputy EMA Director	Platte County
Beal Angle	Road & Bridge Supervisor	Platte County
Ben Bigalke	Field Manager	BLM - High Plains District
Beth Harris *	Emergency Management Agency	Laramie County
Bill Law *	Fire Warden	Goshen County
Bob Fenton *	Tallgrass Energy	Goshen County
Brady Irvine	District Manager - Resource District	Platte County
Brandon Graves	Mayor	Wheatland
Brenda Hagen	Clerk	Glendo
Brook Conner *	Senior Engineer	FEMA Region VIII
Calvin Goddard *	WYDOT	District #2
Candy Wright *	Clerk / Treasurer	Wheatland
Carol Ash	Mayor	Chugwater
Charles Bloom *	Planning Director	Cheyenne
Chris Hilker *	Tech Sgt - 153D Air Wing	Wyoming Air National Guard, Cheyenne
Chuck Kenyon *	EMA Director / Interim EM	Torrington / Goshen County
Cindy Osborne	Health Coalition Coordinator	Region 7
Clyde Harris	Sheriff	Platte County
Cody Cox	Commissioner	Goshen County
Cory Dziowgo	Superintendent	PCSD #1
Craig Gueswel	Jay Em FPD	Goshen County
Dana Youtz	Electric Utility Superintendent	Torrington
Dane Bolzer	Road and Bride Superintendent	Goshen County
Darin Yates *	EMS Director / Coroner	Goshen County / Torrington
Dave Cummings *	Environmental Coordinator	Basin Electric Power Coop.
Dave Noyce	Fire Chief	Glendo

Name	Title/Agency	Jurisdiction
Dave Patterson	Water Treatment Plant Supervisor	Basin Electric Power Coop.
David Smith	Police Chief	Guernsey
David Warner *	Fire Chief	Guernsey Rural FD
David Weber	Antelope Gap Rural Fire District	Wheatland
Don Smith	Manager - Rural Electric Association	Wheatland
Doug DesEnfants *	Prairie Center FD	Goshen County
Doug Willasden *	Police Chief	Wheatland
Dr. Lesley Travers	President Eastern Wyoming College	Goshen County
Dr. Ted Church	County Health Officer	Goshen County
Enden Nelson *	Damage Prevention - Plains Pipeline	Fort Laramie
Endra Andrews *	Police Chief	Lingle
Erik Fountain	Compliance Director	Cheyenne
George Siglin	Mayor	Lingle
Holly Martinez	Director of Constituent (Mayor's Office)	Cheyenne
Ian Jolovich	Commissioner	Platte County
James Santistevan	Emergency Management Director	Niobrara County
Jared Allen	NWS Warning Coord. Meteorologist	Cheyenne
Jason Land *	Board of Public Utilities	Cheyenne
Jason Norris *	Plains Pipeline	Fort Laramie
Jason Taliaferro	Fire Chief	Hartville
Jason Wright *	Operations Manager - Rural Electric Association	Wheatland
Jay Collins	Fire Chief - Glendo Rural Fire	Glendo
Jeanine West *	Co Emergency Management Agency	Laramie County
Jeff Harkins *	Director of Public Works	Torrington
Jeff Thomas	Fire/EMS	Guernsey
Jeremiah Johnson	Town Council	Albin
Jesse Bowen	IT Director	Goshen County
Jim Clark	Mayor	Burns
John Ellis	Commissioner, Chairman	Goshen County
John Poelma *	Public Works Assistant Director	Laramie County
Jordan Evans *	GIS Cooperative	Cheyenne/Laramie County
Joyce Evans	Mayor	Fort Laramie
Justin Arnold *	Public Works – Planning Prog. Mgr.	Laramie County
Justin Burkhart *	EM & Fire Chief / Commissioner	Yoder / Goshen County
Justin Fornstrom	Mayor	Pine Bluffs

Name	Title/Agency	Jurisdiction
Kasey Bangerter	Volunteer Fire Dept.	Lingle
Kate Allred	Emergency Management Director	Albany County
Kayla Mantle	Commissioner	Platte County
Kelly Beard	Public Health	Goshen County
Kelly Krakow	Mayor	Albin
Ken Small	Fire Warden	Palmer Canyon, Wheatland
Kim Graves	Emergency Management	Platte County Memorial Hospital
Kim Patterson *	Treasurer / HR Advisor	Pine Bluffs
Kory Fleenor	Sheriff	Goshen County
Lance Green	Supervisor - WYDOT	Torrington
Lance Petsch *	Fire Chief	Torrington
Larry Haeffelin	Public Works	Lingle
Lee Arrington *	Manager	Wheatland Irrigation Dist.
Levi Mickelsen *	Plant Manager	Laramie River Station
Linda Cockett *	Ex. Director - Senior Friendship Center	Goshen County
Linda Heath *	County Commissioner	Laramie County
Linda S. Keeran *	Secretary / Treasurer	Goshen / Torrington Irrigation District
Loren Lovitt	Public Works Director	Pine Bluffs
Lori Hodges	Emergency Management Director	Larimer County, CO
Lori Pollack *	Risk Management	Laramie County
Lori Ruwart	Co-Owner	Laramie Peak Motors
Lou Hubbs	Fire Chief	Hawk Springs
Malcolm Ervin	County Clerk	Wheatland/Platte County
Marcy Cates	Administrative Rep	Goshen County SD #1
Mark Flohr	Mayor	Hartville
Mark Marshall	Mayor	LaGrange
Matt Butler *	EMA / County Fire Warden	Laramie County
Matt Johnson	Police Chief	Torrington
Mike Beard	Superintendent	PCSD #2
Mike Doan *	Emergency Manager	Fort Laramie
Mike Huntington *	Emergency Manager	Banner Health Systems
Miles Duffy *	Company Operations Manager	Wyrulec
Molly Bennett *	Public Works Director	Laramie County
Nan Gould	Emergency Management Director	Sioux County, NE

Name	Title/Agency	Jurisdiction
Nick Paustian	Mayor	Guernsey
Nicole Sticka *	Public Health	Platte County
Norman Feagler	Mayor	Yoder
Pamela Hebbert *	Clerk	Guernsey
Patrick Collins	Mayor	Cheyenne
Pete Howes	Fire Chief	Fort Laramie
Randy Adams *	Mayor	Torrington
Reena McCoy *	Safety and Training Supervisor	Basin Electric Power Coop.
Rick Keck	Dept Head Water / Sewer	Wheatland
Rick Teeters	Veteran Fire District – Board Member	Goshen County
Ritch Reyes *	Clerk / Treasurer	Lingle
Rob Posten	Manager	Goshen Irrigation District
Rod Weyrich	Public Works Director	Yoder
Ron Zavorka *	-	Horse Creek Conservation District
Ronald Leal	Emergency Management Director	Kimball County, NE
Roy Rudisill	Emergency Management Director	Weld County, CO
Russel Dalgarn	Emergency Management Director	Converse County
Ryan Allen *	Ditchrider	Goshen Irrigation District
Ryan Kramer	Superintendent	Goshen County SD #1
Ryan Schilreff	Wyrulec Company	Goshen County
Ryan Wunibald *	Public Health Response Coordinator	Goshen County
Sam Berta *	Construction Engineer	Cheyenne
Sandra Newland *	Grants	Laramie County
Sara Zappa *	Public Health Response Coordinator	Platte County
Scott Bateman *	Field Supervisor	Wheatland Irrigation Dist.
Shelly Kirchhefer *	Emergency Manager	Goshen County
Steve Shockley	Commissioner	Platte County
Steven Chulski	EM Preparedness - Captain	WY Medium Correction Faculty (WMCI) DOC
Susan Juschka	Mayor	Glendo
Tammy Cearns	Dispatch / City Codes	Torrington
Ted Church *	County Health Officer	Goshen County
Terry Stevenson *	Co. Emergency Management Agency	Platte County
Thomas Bozeman	EMA Director	Goshen County
Tim Ash *	Fire Chief	Chugwater

Name	Title/Agency	Jurisdiction
Tim Newman	Emergency Management Director	Banner County and Scotts Bluff County, NE
Toby Hohnholt	Transportation	Wheatland
Tom Cobb *	City Engineer	Cheyenne
Toni Shiery	Town Clerk	Burns
Tracy Pragnell	Fire Chief	LaGrange
Tyson Gladson *	Crew	Goshen Irrigation District
Val Hankins *	Road & Bridge Asst.	Goshen County
Vicki Nemecek	Director of Public Works	Cheyenne
Wes Bay *	Deputy City Engineer	Cheyenne
Will de Ryk *	Fire Chief	Palmer Canyon, Wheatland

Appendix F: Mitigation Strategy Action Ideas Guide

Mitigation Strategy Action Ideas

The following ideas for mitigation actions were informed by a community survey of the residents of Wyoming Region 7, in addition to actions identified throughout the planning process. These surveys identified the priorities of community members and their input on ways to mitigate hazards in their neighborhoods, municipalities, and on their private properties.

- ***Multiple Hazards***
  - Establish mitigation match fund for future grant opportunities
  - Utilize resources and education opportunities to improve grant application capabilities
  - Build additional roads and bridges to provide redundancies for evacuations
  - Improve communication systems for first responders
  - Assess potential shelters with the American Red Cross to ensure all requirements are met
  - Provide adequate accommodations during hazard events including food and water, medical care, and accommodations for domestic animals
  - Develop plans for large animal evacuation and provide adequate accommodations
  - Improve and increase the number of sheltering and safe haven facilities
  - Develop plans and relationships to ensure adequate medical care and medication availability
  - Store food and water in multiple locations and use large capacity water storage tanks
  - Secure generators and other back-up power sources, for essential services and critical facilities
  - Provide education on back-up power sources, including types and safety considerations
  - Install solar panels to isolate from the grid for emergency power in the event of interruption
  - Public education and outreach on preparedness - “Whole Community Preparedness”
  - Develop bilingual public education on preparedness (radio, TV, print, etc.)
  - Develop and implement an ongoing community education program on emergency alert systems
  - Utilize subscription-based text messaging alert notifications
  - Implement siren systems and educate public on what this means for the community
  - Implement proper addressing and signage for response
  - Develop enhanced planning for those with access and functional needs, including for evacuations
  - Promote collaboration between neighbors, the municipalities, and jurisdictions to assist in preparing area specific response and evacuation plans
  - Utilize available resources to support community driven mitigation projects and assist with communal mitigation grant funding efforts
  - Assistance for the homeowners / renters with clearing trees, debris, following a natural disaster, and tree trimming assistance before winter
  - Develop community plans with an emphasis on wildlife and water source protection
  - Create assessment for risk of industrial property development, including mining regulation, oil / gas explorations
  - Develop and implement systematic process to evaluate and upgrade existing infrastructure
  - Repair and replaced degrading road and street infrastructure
  - Educate builders, developers, architects, and engineers in techniques of disaster-resistant homebuilding
  - Maintain Lifeline GIS data going forward, including public road maps for evacuation needs

Mitigation Strategy Action Ideas

  - Promote structural mitigation to assure redundancy of critical facilities, including roof structure improvement, to meet or exceed building code standards, electrical panel upgrades to accept generators, etc.
  - Create and deliver hazard education tailored to the necessary audience – public, political, responders, property owners, etc.
- **Cyber Hazards**
  - Host workshops and provide educational material on cybersecurity for all residents
  - Conduct in-depth trainings for local government IT staff, as well as other critical stakeholders
  - Obtain grant funding for trainings, software, and equipment
  - Strengthen relationships with large organizations, such as oil and gas producers, to create a local plan of action should there be a cyber security breach
- **Dam / Levee Incident**
  - Develop and implement floodplain management, operation, and maintenance plans
  - Develop a region-wide portfolio of dams to better understand risk management in Region 7
  - Utilize subject matter experts to complete preliminary engineering studies on safety, performance, and potential improvements of the dam
  - Develop dam / levee public education and evacuation plan for targeted areas of the community
  - Develop an outreach program aimed at identifying and assisting private dam owners with repairing or decommissioning at risk dams
  - Develop and implement early warning / monitoring systems on all dams – inflow and breach
  - Ensure an Emergency Action Plan (EAP) is developed for the Hawk Springs Dam in Goshen County. Currently classified as having a high hazard potential with no EAP on record.
- **Drought**
  - Increase the number and capacity of storage facilities for potable water
  - Develop a public education campaign on drought mitigation actions and long-term effects
  - Identify alternative water supplies for time of drought and create mutual aid agreements with alternative suppliers
  - Develop an outreach program to assist the public in learning the financial and environmental benefits of small modifications to plumbing systems - i.e., water saving kits
- **Earthquake**
  - Create public education materials on earthquakes and an outreach strategy for residents
  - Conduct a study and analyze earthquakes related to appropriate levels of seismic safety in building codes and practices
  - Use study findings to identify shelters, schools, and critical facilities needing retrofitting
  - Work with WYDOT to accomplish bridge retrofits and upgrades to reduce vulnerability to events
- **Flood**
  - Mitigation actions for erosion control measures, including trees
  - Provide maintenance and improvements to existing drainage channels and other drainage conveyances
  - Rebuild the storm water drainage system in the City of Torrington
  - Install flow gauges on creeks entering municipalities
  - Implement flood containment structures, require designs / engineering to reduce flood risk
  - Improve infrastructure on county roads to minimize washout

Mitigation Strategy Action Ideas

  - Continued road maintenance for improved evacuation routes
  - Review updated FEMA floodplain maps and ensure all areas are mapped and NFIP compliant
  - Educate non-participants on benefits and drawbacks of participation in NFIP
  - Participate in the flood plan
  - Develop and implement floodplain management, operation, and maintenance plans
  - Implement structural and non-structural flood mitigation measures for flood-prone properties,
- **Hazardous Materials Release**
  - Develop a local hazardous materials release plan
  - Provide training and additional personnel for the hazardous materials awareness and operations
  - Develop list of pipeline operators, contact information, and type of product transported
  - Truck and rail bypasses for hazardous materials to isolate hazard from community
  - Install fixed air monitoring stations to detect hazardous materials release
- **Landslide / Rockfall / Debris Flow**
  - Coordinate with other stakeholders, creating mutual aid agreements and contracts, to implement a common plan with partners responding to landslide events
  - Identify and mitigate areas of potential rockfalls in populated areas and traffic corridors
  - Identify and monitor areas at high risk for landslides, inform developers and the public
- **Public Health Hazards**
  - Improve ability to efficiently test large amounts of the population and contact trace those with confirmed cases of a disease
  - Provide education and outreach to the public to improve compliance with public health orders
  - Monitor air pollution and educate the public on safe levels of exposure
  - Develop and strengthen relationships with water / wastewater operators
  - Plan with public health department and water / wastewater operators for responding to a water contamination incident affecting the public
- **Thunderstorm (Hail, Lightning)**
  - Encourage communities to achieve the Stormready certification
  - Develop a program which encourages residents to obtain a NOAA weather radio
  - Implement the Weather-Ready Ambassador Initiative in the county
  - Continued training of National Weather Service Weather Spotters
  - Install Lightning Warning & Alert Systems in public recreation areas
  - Install lightning rods on public structures
- **Tornado / Wind**
  - Stockpile plywood and materials to mitigate damage during an event
  - Develop a program encouraging residents to trim or remove trees that could affect power lines
  - Bury power lines underground to ensure protection from the wind
  - Develop a program which encourages residents to obtain a NOAA weather radio
  - Secure emergency generators (or alternative power sources) for all critical and vital facilities
  - Support programs such as "Tree Watch" that proactively manage problem areas by use of selective removal of hazardous trees, tree replacement, etc.
  - Establish and enforce building codes that require all roofs to withstand high wind loads
  - Install natural wind breaks to mitigate high winds
  - Develop a SafeRoom plan for county / community facilities
  - Educate public on individual SafeRoom rebate program

Mitigation Strategy Action Ideas

- **Wildfire**
  - Fuel mitigation, thinning, removal of beetle kill, modification of wildland fuels, etc.
  - Removal / trimming of trees
  - Implement use of a wood chipper for wildfire fuels reduction around properties
  - Develop a program to assist property owners who are unable to complete mitigation actions sufficiently on their own
  - Increase public information on wildfire risk mitigation and education on warnings / alerts
  - Assist community members in creating neighborhood mitigation action plans and applying for grant funding as a community
  - Create incentive program to provide funding for landowners to maintain defensible space
  - Work with the public and private landowners to create a buffer that protects properties
  - Facilitate controlled grazing on public lands to prevent overgrowth
  - Update building codes, requiring the use of fire-retardant building materials in high hazard areas
  - Continue to develop partnerships with other organizations to implement wildfire mitigation plans and other hazard reduction programs
  - Increase capacity and number of water storage tanks for wildfire response
- **Winter Storm**
  - Removal / trimming of trees
  - Install windbreak / snow fences
  - Education of residents on how to prepare for winter storms (radio, TV, print, etc.)
  - Continue education about hazards associated with supplemental heat sources (radio, print, etc.)
  - Host sessions for livestock producers around the county on preparing for winter storms
  - Comprehensive planning to determine when to cease operations and close roads before situations are dangerous; public education on what the plans are
  - Increased snow plowing capacity
  - Develop a program which encourages residents to obtain a NOAA weather radio

Appendix G: FEMA Approval

U.S. Department of Homeland Security
Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267

FEMA

R8-MT

April 14, 2023

Shamika McDonald
State Hazard Mitigation Officer
Wyoming Office of Homeland Security
5500 Bishop Boulevard - East Door
Cheyenne, Wyoming 82002

Dear Ms. McDonald,

We are pleased to announce the approval of the Region 7 Hazard Mitigation Plan as meeting the requirements of the Stafford Act and Title 44 of the Code of Federal Regulations §201.6 for a local hazard mitigation plan. The plan approval extends to the Counties of Goshen and Platte, the City of Torrington, the Towns of Fort Laramie, LaGrange, Lingle, Yoder, Albin, Burns, Pine Bluffs, Wheatland, Chugwater, Glendo, Guernsey, and Hartville, and the Districts of Goshen Irrigation, Horse Creek Conservation, Pathfinder Irrigation, and Eastern Laramie County Solid Waste Disposal.

The jurisdictions are hereby eligible for FEMA Hazard Mitigation Assistance grant programs. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular programs under which the application is submitted. Approved mitigation plans may be eligible for points under the National Flood Insurance Program Community Rating System.

This plan is approved through April 13, 2028. A local jurisdiction must revise its plan and resubmit it for approval within five years to continue to be eligible for mitigation project grant funding. We have provided recommendations for the next plan update on the enclosed Plan Review Tool.

We wish to thank all jurisdictions that participated in the planning process and commend your continued commitment to reducing future disaster losses.

Sincerely,

Nicole M. Aimone
Acting Mitigation Division Director

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Laramie County	**Title of Plan:** Wyoming Region 7 Hazard Mitigation Plan (HMP)	**Date of Plan:** 2/2/2023
Local Point of Contact: Jeanine West		**Address:** 3962 Archer Pkwy Cheyenne, WY 82007
Title: Emergency Manager		
Agency: Cheyenne/Laramie County Emergency Management		
Phone Number: 307.633.4666		**E-Mail:** Jeanine.West@laramiecountywy.gov

Jurisdiction: Platte County	**Title of Plan:** Wyoming Region 7 Hazard Mitigation Plan (HMP)	**Date of Plan:** 2/2/2023
Local Point of Contact: Terry Stevenson		**Address:** 800 9th St Wheatland, WY 82201
Title: Emergency Manager		
Agency: Platte County Emergency Management		
Phone Number: 307.322.1356		**E-Mail:** tstevenson@plattecountywyoming.com

Jurisdiction: Goshen County	**Title of Plan:** Wyoming Region 7 Hazard Mitigation Plan (HMP)	**Date of Plan:** 2/2/2023

Local Point of Contact: Chuck Kenyon	**Address:** 436 E 22nd Torrington, WY 82240
Title: Interim Emergency Manager	
Agency: Goshen County Emergency Management	
Phone Number: 307.534.4730	**E-Mail:** CityEMC@torringtonwy.gov

State Reviewer: Shamika McDonald	**Title:** State Hazard Mitigation Officer	**Date:** 2/2/2023

FEMA Reviewer: Danielle Curtis, IR Rob Pressly, QC	**Title:** CERC Planner FEMA Community Planner	**Date:** 2/22/2023 3/8/2023; 4/11/2023
Date Received in FEMA Region VIII	**2/3/2023**	
Plan Not Approved	**3/8/2023**	
Plan Approvable Pending Adoption	**4/11/2023**	
Plan Approved	**4/14/2023**	

SECTION 1:
MULTI-JURISDICTION SUMMARY SHEET

MULTI-JURISDICTION SUMMARY SHEET									
#	Jurisdiction Name	Jurisdiction Type	Jurisdiction Contact	Email	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Rqtms.	E. Adoption Resolution
1	**Goshen County**	County	Chuck Kenyon	CityEMC@torringtonwy.gov	Y	Y	Y	Y	Y
2	Torrington	City	Chuck Kenyon	CityEMC@torringtonwy.gov	Y	Y	Y	Y	Y
3	Fort Laramie	Town	Mike Doan	mdoan@townofftlaramie.org	Y	Y	Y	Y	Y
4	LaGrange	Town	Mark Marshall	lagrange@lagrangewyo.com	Y	Y	Y	Y	Y
5	Lingle	Town	Richard Reyes	lingletown@hotmail.com	Y	Y	Y	Y	Y
6	Yoder	Town	Justin Burkhart	jburkart@goshencounty.org	Y	Y	Y	Y	Y
7	Goshen Irrigation District	District	Linda Keeran	goshenirr@embarqmail.com	Y	Y	Y	Y	Y
8	Horse Creek Conservation District	District	Ron Zavorka	rdzavorkafarm@gmail.com	Y	Y	Y	Y	Y
9	Pathfinder Irrigation District	District	Rick Miller	rick@pathfinderirrigation.com	Y	Y	Y	Y	Y
10	**Laramie County**	County	Jeanine West	jeanine.west@laramiecountywy.gov	Y	Y	Y	Y	Y
11	Cheyenne	City	Patrick Collins	pcollins@cheyennecity.org	Y	Y	Y	Y	Y
12	Albin	Town	Kelly Krakow	kkrakow01@yahoo.com	Y	Y	Y	Y	Y

MULTI-JURISDICTION SUMMARY SHEET									
#	Jurisdiction Name	Jurisdiction Type	Jurisdiction Contact	Email	Requirements Met (Y/N)				
					A. Planning Process	B. HIRA	C. Mitigation Strategy	D. Update Rqtms.	E. Adoption Resolution
13	Burns	Town	Jim Clark	james.f.okie.clark@gmail.com	Y	Y	Y	Y	Y
14	Pine Bluffs	Town	Justin Fornstrom	jfornstrom@pinebluffswy.gov	Y	Y	Y	Y	Y
15	Eastern Laramie County Sanitation District	District	Mike Ragsdale	landfilloffice@rtconnect.net	Y	Y	Y	Y	Y
16	**Platte County**	County	Terry Stevenson	tstevenson@plattecountywyoming.com	Y	Y	Y	Y	Y
17	Wheatland	Town	Brandon Graves	b.graves@townofwheatlandwy.org	Y	Y	Y	Y	Y
18	Chugwater	Town	Tim Ash	chugone@gmail.com	Y	Y	Y	Y	Y
19	Glendo	Town	Susan Juschka	glendotownof@yahoo.com	Y	Y	Y	Y	Y
20	Guernsey	Town	Nick Paustian	dana@togwy.us	Y	Y	Y	Y	Y
21	Hartville	Town	Mark Flohr	hartville@vistabeam.com	Y	Y	Y	Y	Y

SECTION 2:
REGULATION CHECKLIST

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Chapter 2, pp. 7-17 Appendix A, B, C, (County Annexes) — Section 6 Appendix E	X	
A2. Does the Plan document an opportunity for neighboring communities, local 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? (Requirement §201.6(b)(2))	Chapter 2, pp. 7-17 Appendix A, B, C, (County Annexes) — Section 6 Appendix E	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Chapter 2, pp. 11-12	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Chapter 3, Appendix A, B, C, (County Annexes) — Section 3, 5	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Appendix A, B, C, (County Annexes) — Section 4.3.4	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Appendix A, B, C, (County Annexes) — Section 4.3.1	X	
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Chapter 3, pp. 25-51 Appendix A, B, C, (County Annexes) — Section 3	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Chapter 3, pp. 25-51 Appendix A, B, C, (County Annexes) — Section 3	X	

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Chapter 3, pp. 25-51 Appendix A, B, C, (County Annexes) — Section 3	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Appendix A, B, C, (County Annexes) — Section 3	X	
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Appendix A, B, C, (County Annexes) — Section 1.3	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Appendix A, B, C, (County Annexes) — Section 1.2.2, Section 3.8.4	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Chapter 1, p. 4	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Appendix A, B, C, (County Annexes) — Section 1.2.3	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Chapter 1, pp. 4-5 Appendix A, B, C, (County Annexes) — Section 1.2.3	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Appendix A, B, C, (County Annexes) — Section 4.3.3	X	
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Appendix A, B, C, (County Annexes) — Section 2, 3	X	

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Appendix A, B, C, (County Annexes) — Section 1 – 1.2.1	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Chapter 2 Appendix A, B, C, (County Annexes) — Section 1	X	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Appendix A, B, C, (County Annexes) — Section 7	N/A	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Appendix A, B, C, (County Annexes) — Section 7	X	
ELEMENT E: REQUIRED REVISION			
OPTIONAL: HIGH HAZARD POTENTIAL DAM RISKS			
HHPD1. Did Element A4 (planning process) describe the incorporation of existing plans, studies, reports, and technical information for high hazard potential dams?			
HHPD2. Did Element B3 (risk assessment) address HHPDs?			
HHPD3. Did Element C3 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?			
HHPD4. Did Element C4-C5 (mitigation actions) address HHPDs prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?			
REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			

REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT F: REQUIRED REVISIONS			

SECTION 3:
PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Strengths

State:

- I am pleased to see more participating communities and special districts listed.

FEMA:

- Using a webpage dedicated to the plan update is a great strategy for information sharing. It also encourages the public to get involved in plan development. Keeping this webpage active for continued public involvement and education is a good approach. Also, using a survey was a great way to get the public involved during plan development.

- Locations where stakeholder input was included or used to inform the plan were clearly identified.

Opportunities for Improvement

State:

- The state would like to see more in-person meetings in the planning process instead of mostly virtual meetings.

- The state would also like to see more communication via phone if unable to reach participants (or potential participants) via email.

FEMA:

- Along with the stakeholders listed in Appendix E, consider including people from academic institutions, business owners, and non-profit organizations in your next update. Involving these stakeholders can give new areas of expertise and insight to the plan.

- It is difficult to tell exactly who was invited to the planning process. Page 9 notes the general groups that were invited to take part. However, it does not state who from those groups was reached out to. For the next plan, please include who was invited and took part. Some

of this information can be found in the Appendices, but it should be made clearer in the main plan document.

- Data sources are referred to throughout the plan, but there is no explicit documentation of what existing plans, studies, reports or technical information were reviewed. For the next plan update, please describe these existing sources and how relevant information was included in the plan in order to meet Element A4(a)(b). Sources may include the state hazard mitigation plan, local comprehensive plans, flood insurance studies, etc. This information can easily be provided in a list or table of the sources reviewed and how information was included.

Element B: Hazard Identification and Risk Assessment

Strengths

State:

- I am pleased to see that Cyber Security and Drought are listed in section 3.1.

FEMA:

- The HIRA gives a thorough analysis of the risks and vulnerabilities faced by each jurisdiction.

- Focusing on lifelines as a framework to assess exposure and vulnerability is a great strategy. Exposed lifelines are described for different hazards in each jurisdiction and recognized as a vital risk communication service (p. 22). Assessing these fundamental services will result in greater community preparedness and the ability to mitigate potential disruptions.

- Using HAZUS modeling to estimate losses from earthquakes is a great example of using the best available data to describe significant hazards. Including this methodology to estimate losses to vulnerable and critical infrastructure will inform mitigation actions and guide when to prioritize projects.

Opportunities for Improvement

State:

- In future updates, I would like to see details on the demographics impacted by the identified hazards (elderly, Hispanic, etc.).

FEMA:

- For the next plan update, please make sure that all general terms used to describe hazard probabilities are defined. General descriptions may be defined using percentages like, "100% chance of occurrence in any given year." For example, the term 'reasonable' is used to describe the chance that the planning area will be impacted by drought conditions in the future (see County Annexes- Section 3.6.3). Please define what is meant by this.

- The plan must describe the types of repetitive loss properties located in identified flood hazard areas. These structure types could include residential, commercial, etc. Goshen County, Laramie County, and the city of Cheyenne currently have repetitive loss properties, but the plan does not describe the structure types. To meet this requirement for the next plan update, please state what type of repetitive loss structures are in these jurisdictions.

- When profiling flood risk, it may help to include maps of the effective special flood hazard area from the flood insurance rate map. This is in addition to maps of the preliminary flood area. There are also non-regulatory Risk MAP products (e.g., depth grids) that can be included in these sections of the plan. Including these products can help communicate vulnerability to flooding.

- While it is not required, consider developing problem statements that link the HIRA with the Mitigation Strategy. These can create more direct connections between key vulnerabilities and specific mitigation actions. For example, when a mitigation action will address a major issue identified for a hazard, consider adding a footnote or cross-reference to the text noting the relevant Action(s) and/or Action Number(s).

Element C: Mitigation Strategy

Strengths

FEMA:

- Linking the goals to each action in the mitigation strategy is a good way to show plan alignment. This shows that the plan content has a cohesive flow from the risk assessment to the setting of goals to mitigation action development. The mitigation strategy also includes diverse actions for each jurisdiction.

- The mitigation capabilities assessment in Section 1.3 of the county annexes thoroughly lists the capabilities of participating jurisdictions in the four main areas. These areas are planning/regulatory, administrative/technical, financial, and education/outreach. Knowing the existing capabilities in each jurisdiction and how to leverage them is key to successfully carry out mitigation actions. For the next update, build on this discussion by stating the gaps in existing resources and capabilities that should be addressed as part of the mitigation strategy. Per the new local policy guidance that will take effect in April 2023, you must describe the ability of each participant to expand on and improve the capabilities described in the plan.

Opportunities for Improvement

State:

- I would like to see more mitigation actions give details on the benefit/reduction of disaster impact.

FEMA:

- For the next update, please assess the potential impact of hazards on socially vulnerable and underserved communities. These groups could include youth and the elderly or those with access and functional needs. During disasters, populations with higher levels of social vulnerability are more likely to be adversely impacted. It is important to know which groups are at risk to guide the creation of equitable mitigation strategies. More information on social vulnerability can be found in FEMA's National Risk Index.

- Aim to create focused approaches/strategies (beyond 'referencing') to include the plan in other planning mechanisms. Currently, the plan describes integration for each jurisdiction

by stating "some of the larger opportunities for impactful integration involve comprehensive plans, transportation plans, building codes, community wildfire protection (and implementation) plans, and annual capital expenditure planning." The current approach of giving blanket direction may not be effective. The next update should include a deeper analysis of the *how*. It should describe what information from the plan will be included in other planning mechanisms. It should also give a clear process for how this will be achieved for each participating jurisdiction.

- While generators are technically fundable under FEMA mitigation grants, they will be hard to fund under competitive grant programs like BRIC. For high-priority hazards, we would like to see innovative and impactful strategies that communities could implement.

- Including more details on funding sources would help make the projects more viable. Please specify FEMA grants and local funding sources in the potential funding sources column of the mitigation action plan. Information on FEMA HMA grants can be found here.

- For the next plan update, please be sure to specify who will be implementing the mitigation action for all actions. Many provide the office or department (e.g., public works department), but others provide more general information like the county. Additionally, the next update will need to include more specifics on potential funding sources. Providing generic terms like federal or FEMA will not meet the requirements under the new local planning guidance.

Element D: Plan Review, Evaluation, and Implementation (Plan Updates Only)

Strengths

FEMA:

- The description of climate change and future development trends in each hazard profile was a great way to show changing conditions specific to each hazard. It also helped show changes in priorities since the last plan. Continue to expand on these topics as more data and information becomes available.

- It is good to see chances for continued public engagement through direct community outreach. For example, attendance at the county fair. It is wise to go directly to the people. This helps to make sure they know of local hazard mitigation efforts. At the same time, it urges the public to take part in this work.

- Including mitigation successes in each jurisdictional annex is a valuable addition to the plan. It recognizes the efforts made by each community to address the risks they face. Also, it is encouraging that the continued public involvement section emphasizes the importance of sharing these success stories with the public.

Opportunities for Improvement

FEMA:

- Consider adding an annual review or a monitoring checklist along with the process described in Chapter 4. This may be a useful resource to make sure there are effective plan updates in case of staff changes or other considerations.

- It would help to explain the lack of progress on previous actions labeled as "no progress-continue action." This narrative should highlight specific holdups, such as insufficient funding or lack of support from elected officials. By explaining the cause of delay, potential solutions can be explored to move the project forward. While the Laramie County mitigation strategy gave an explanation for previous actions, the Goshen and Platte counties strategies did not.

- Each jurisdiction annex gives information on building permits issued. However, the plan does not give a clear picture of the location of these new developments and if they are situated near areas prone to hazards. In future updates, include narratives and/or maps that show recent and potential new developments. Also, explain how changes in development may affect the risks and vulnerabilities in each jurisdiction taking part in the plan.

B. Resources for Implementing Your Approved Plan

FEMA FUNDING SOURCES

Hazard Mitigation Grant Program (HMGP). The HMGP is a post-disaster mitigation program. It is made available to states by FEMA after each Federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures. The HMGP can be used to fund cost-effective projects that will protect public or private property in an area covered by a federal disaster declaration or that will reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard prone areas, flood-proofing or elevation to reduce future damage, minor structural improvements and development of state or local standards. Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to your state and placed in rank order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available. More information: https://www.fema.gov/hazard-mitigation-grant-program

Building Resilient Infrastructure and Communities (BRIC) Grant Program. The BRIC program supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Rehabilitation of High Hazard Potential Dams (HHPD) Grant Program. This program provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. For more information, please visit: https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants#hhpd

Flood Mitigation Assistance (FMA) Grant Program. FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is 75 percent. At least 25 percent of the total eligible costs must be provided by a non-federal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. FMA funds are distributed from FEMA to the state. More information: https://www.fema.gov/flood-mitigation-assistance-grant-program

Fire Management Assistance Grant (FMAG) Program. The FMAG program provides grants to states, tribal governments and local governments for the mitigation, management and control of any fire burning on publicly (non-federal) or privately owned forest or grassland that threatens such destruction as would constitute a major disaster. The grants are made in the form of cost sharing with the federal share being 75 percent of total eligible costs. Grant approvals are made within 1 to 72 hours from time of request. More information: http://www.fema.gov/fire-management-assistance-grant-program

Hazard Mitigation Grant Program (HMGP) Post Fire Grant Program. FEMA's Hazard Mitigation Grant Program (HMGP) has Post Fire assistance available to help communities implement hazard mitigation measures after wildfire disasters. States, federally-recognized tribes and territories affected by fires resulting in an Fire Management Assistance Grant (FMAG) declaration on or after October 5, 2018, are eligible to apply. More information: https://www.fema.gov/grants/mitigation/post-fire

Fire Prevention and Safety (FP&S) Grants. FP&S Grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death. Eligibility includes fire departments, national, regional, state, and local organizations, Native American tribal organizations, and/or community organizations recognized for their experience and expertise in fire prevention and safety programs and activities. Private non-profit and public organizations are also eligible. Interested applicants are advised to check the website periodically for announcements of grant availability: https://www.fema.gov/welcome-assistance-firefighters-grant-program

OTHER MITIGATION FUNDING SOURCES

Grant funding is available from a variety of federal and state agencies for training, equipment, and hazard mitigation activities. Several of these programs are described below.

Program 15.228: Wildland Urban Interface Community and Rural Fire Assistance. This program is designed to implement the National Fire Plan and assist communities at risk from catastrophic wildland fires. The program provides grants, technical assistance, and training for community programs that develop local capability, including: Assessment and planning, mitigation activities,

and community and homeowner education and action; hazardous fuels reduction activities, including the training, monitoring or maintenance associated with such hazardous fuels reduction activities, on federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas; and, enhancement of knowledge and fire protection capability of rural fire districts through assistance in education and training, protective clothing and equipment purchase, and mitigation methods on a cost share basis.

Secure Rural Schools and Community Self-Determination Act - Title III- County Funds. The Self-Determination Act has recently been reauthorized and now includes specific language regarding the Firewise Communities program. Counties seeking funding under Title III must use the funds to perform work under the Firewise Communities program. Counties applying for Title III funds to implement Firewise activities can assist in all aspects of a community's recognition process, including conducting or assisting with community assessments, helping the community create an action plan, assisting with an annual Firewise Day, assisting with local wildfire mitigation projects, and communicating with the state liaison and the national program to ensure a smooth application process. Counties that previously used Title III funds for other wildfire preparation activities such as the Fire Safe Councils or similar would be able to carry out many of the same activities as they had before. However, with the new language, counties would be required to show that funds used for these activities were carried out under the Firewise Communities program. For more information, click here.

Community Planning Assistance for Wildfire. Established in 2015 by Headwaters Economics and Wildfire Planning International, Community Planning Assistance for Wildfire (CPAW) works with communities to reduce wildfire risks through improved land use planning. CPAW is a grant-funded program providing communities with professional assistance from foresters, planners, economists and wildfire risk modelers to integrate wildfire mitigation into the development planning process. All services and recommendations are site-specific and come at no cost to the community. More information: http://planningforwildfire.org/what-we-do/

Urban and Community Forestry (UCF) Program. A cooperative program of the U.S. Forest Service that focuses on the stewardship of urban natural resources. With 80 percent of the nation's population in urban areas, there are strong environmental, social, and economic cases to be made for the conservation of green spaces to guide growth and revitalize city centers and older suburbs. UCF responds to the needs of urban areas by maintaining, restoring, and improving urban forest ecosystems on more than 70 million acres. Through these efforts the program encourages and promotes the creation of healthier, more livable urban environments across the nation. These grant programs are focused on issues and landscapes of national importance and prioritized through state and regional assessments. Information: http://www.fs.fed.us/managing-land/urban-forests/ucf

Western Wildland Urban Interface Grants. The National Fire Plan (NFP) is a long-term strategy for reducing the effects of catastrophic wildfires throughout the nation. The Division of Forestry's NFP Program is implemented within the Division's Fire and Aviation Program through the existing USDA Forest Service, State & Private Forestry, State Fire Assistance Program.

Congress has provided increased funding assistance to states through the U.S. Forest Service State and Private Forestry programs since 2001. The focus of much of this additional funding was mitigating risk in WUI areas. In the West, the State Fire Assistance funding is available and awarded through a competitive process with emphasis on hazard fuel reduction, information and education, and community and homeowner action. This portion of the National Fire Plan was developed to assist interface communities manage the unique hazards they find around them. Long-term solutions to interface challenges require informing and educating people who live in these areas about what they and their local organizations can do to mitigate these hazards.

The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The Western States Wildland Urban Interface Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, reduction of hazardous fuels, and restoration of fire-adapted ecosystems and promotion of community assistance. More information: https://www.westernforesters.org/wui-grants

U.S. Fish & Wildlife Service, Rural Fire Assistance Grants. Each year, the U.S. Fish & Wildlife Service (FWS) provides Rural Fire Assistance (RFA) grants to neighboring community fire departments to enhance local wildfire protection, purchase equipment, and train volunteer firefighters. Service fire staff also assist directly with community projects. These efforts reduce the risk to human life and better permit FWS firefighters to interact and work with community fire organizations when fighting wildfires. The Department of the Interior (DOI) receives an appropriated budget each year for an RFA grant program. The maximum award per grant is $20,000. The DOI assistance program targets rural and volunteer fire departments that routinely help fight fire on or near DOI lands. More information: http://www.fws.gov/fire/living_with_fire/rural_fire_assistance.shtml

U.S. Bureau of Land Management, Community Assistance Program. BLM provides funds to communities through assistance agreements to complete mitigation projects, education and planning within the WUI. More information: https://www.blm.gov/services/financial-assistance-and-grants

NOAA Office of Education Grants. The Office of Education supports formal, informal and non-formal education projects and programs through competitively awarded grants and cooperative agreements to a variety of educational institutions and organizations in the United States. More information: http://www.noaa.gov/office-education/grants

NRCS Environmental Quality Incentives Program (EQIP). The Environmental Quality Incentives Program, administered through the NRCS, is a cost-share program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland. Owners of land in agricultural or forest production or persons who are engaged in livestock, agricultural or forest production on eligible land and that have a natural resource concern on that land may apply to participate in EQIP. Eligible land includes cropland,

rangeland, pastureland, non-industrial private forestland and other farm or ranch lands. EQUIP is another funding mechanism for landowner fuel reduction projects. More information: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

U.S. Department of Agriculture, Community Facilities Loans and Grants. Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required. More information: http://www.usda.gov/wps/portal/usda/usdahome?navid=GRANTS_LOANS

General Services Administration, Sale of Federal Surplus Personal Property. This program sells property no longer needed by the federal government. The program provides individuals, businesses and organizations the opportunity to enter competitive bids for purchase of a wide variety of personal property and equipment. Normally, there are no restrictions on the property purchased. More information: http://www.gsa.gov/portal/category/21045

Hazardous Materials Emergency Preparedness Grants. Grant funds are passed through to local emergency management offices and HazMat teams having functional and active LEPC groups. More information: http://www.phmsa.dot.gov/hazmat/grants

U.S. Department of Homeland Security. Enhances the ability of states, local and tribal jurisdictions, and other regional authorities in the preparation, prevention, and response to terrorist attacks and other disasters, by distributing grant funds. Localities can use grants for planning, equipment, training and exercise needs. These grants include, but are not limited to areas of Critical Infrastructure Protection Equipment and Training for First Responders, and Homeland Security Grants.

Community Development Block Grants (CDBG). The U.S. Department of Commerce administers the CDBG program which are intended to provide low and moderate-income households with viable communities, including decent housing, as suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during the times of "urgent need" (e.g. post disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. CDBG funds can be used to match FEMA grants. More Information: https://www.hud.gov/program_offices/comm_planning/cdbg

Building Blocks for Sustainable Communities. The EPA Office of Sustainable Communities sometimes offers grants to support activities that improve the quality of development and protect human health and the environment. When these grants are offered, they will always be announced on www.grants.gov. More information: https://www.epa.gov/smartgrowth/building-blocks-sustainable-communities#2016

PUBLICLY AVAILABLE TOOLS

FEMA Community Engagement Prioritization Tool (CEPT).

https://www.fema.gov/floodplain-management/manage-risk/community-engagement-prioritization-tool

FEMA National Risk Index for Natural Hazards (NRI).

https://hazards.geoplatform.gov/portal/apps/MapSeries/index.html?appid=ddf915a24fb24dc8863eed96bc3345f8

FEMA Resilience Analysis and Planning Tool (RAPT).

https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool

FEMA Flood Assessment Structure Tool (FAST).

https://www.fema.gov/sites/default/files/2020-09/hazus_fast-factsheet.pdf

FEMA HAZUS

https://www.fema.gov/flood-maps/products-tools/hazus

Decision Support System for Water Infrastructure Security (DSS-WISE):

https://dsswiseweb.ncche.olemiss.edu/

CDC/ASTDR Social Vulnerability Index (SVI).

https://www.atsdr.cdc.gov/placeandhealth/svi/index.html

U.S. Census Bureau Community Resilience Estimates

Community Resilience Estimates (census.gov)

OTHER RESOURCES

FEMA: Grant Application Training. Each year, FEMA partners with the State on training courses designed to help communities be more successful in their applications for grants. Contact your State Hazard Mitigation Officer for course offering schedules. Example Courses:

- Unified Hazard Mitigation Grant Assistance Application Development Course
- Benefit Cost Analysis (BCA) Course

FEMA: Community Assistance Visit. It may be appropriate to set up a Community Assistance Visit with FEMA to provide technical assistance to communities in the review and/or updating of their floodplain ordinances to meet the new model ordinance. Consider contacting your State NFIP Coordinator for more information.

FEMA: Building Science. The Building Science branch develops and produces multi-hazard mitigation publications, guidance materials, tools, technical bulletins, and recovery advisories that incorporate the most up-to-date building codes, floodproofing requirements, seismic design standards, and wind design requirements for new construction and the repair of existing buildings. To learn more, visit: https://www.fema.gov/building-science

NOAA/NIDIS: U.S. Drought Portal. NOAA's National Integrated Drought Information System's Drought Portal provides resources for communities to understand their drought conditions, vulnerability, and impacts. The Portal includes data and maps down by city, county, state, zip code, and at watershed global scales. Communities can use this information to inform their hazard mitigation plans with update-to-date data regarding drought conditions, vulnerability, and impacts for sectors such as agriculture, water utilities, energy, and recreation.

EPA: Smart Growth in Small Towns and Rural Communities. EPA has consolidated resources just for small towns and rural communities to help them achieve their goals for growth and development while maintaining their distinctive rural character. To learn more, visit: https://www.epa.gov/smartgrowth/smart-growth-small-towns-and-rural-communities

EPA: *Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities.* The EPA released guidance on how to mitigate natural disasters specifically for water and wastewater utilities. For more information, visit: https://www.epa.gov/waterutilityresponse/hazard-mitigation-natural-disasters

National Integrated Drought Information System. The National Drought Resilience Partnership may provide some additional resources and ideas to mitigate drought hazards and increase awareness of droughts. Visit: https://www.drought.gov/drought/what-nidis/national-drought-resilience-partnership.

STAR Community Rating System. Consider measuring your mitigation success by participating in the STAR Community Rating System. Local leaders can use the STAR Community Rating System to assess how sustainable they are, set goals for moving ahead and measure progress along the way. To get started, go to http://www.starcommunities.org/get-started

Flood Economics. The Economist Intelligence Unit analyzed case studies and state-level mitigation data in order to gain a better understanding of the economic imperatives for investment in flood mitigation. To learn more, visit: http://floodeconomics.com/

Headwaters Economics. Headwaters Economics is an independent, nonprofit research group that works to improve community development and land management decisions in the West. To learn more, visit: https://headwaterseconomics.org/