Natrona County
Hazard Mitigation Plan
November 2017

NATRONA COUNTY Wyoming

amec foster wheeler

Natrona County
Hazard Mitigation Plan
2017 Update

November 2017

Developed by Natrona County

with professional planning assistance from

Amec Foster Wheeler Environment & Infrastructure, Inc.
Hazard Mitigation and Emergency Management

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1 INTRODUCTION

1.1 Purpose

Natrona County including the City of Casper and towns of Bar Nunn, Edgerton, Evansville, Midwest, and Mills prepared this regional hazard mitigation plan to guide hazard mitigation planning and to better protect the people and property of the planning area from the effects of hazard events. This plan demonstrates the region's commitment to reducing risks from hazards, and serves as a tool to help decision makers direct mitigation activities and resources. This plan also maintains the planning area's eligibility for certain federal disaster assistance under the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grant programs.

1.2 Background and Scope

This plan builds upon years of mitigation planning and project implementation by Natrona County and its communities. This Hazard Mitigation Plan underwent a comprehensive update in 2017 and replaces the 2010 Natrona County Hazard Mitigation Plan.

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally-mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents the planning region's hazard mitigation planning process, identifies relevant hazards and risks, and identifies the strategies that each participating County and jurisdiction will use to decrease vulnerability and increase resiliency and sustainability.

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007 (hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act (DMA). While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the

requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the planning area is subject to many kinds of hazards, access to these programs is vital.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. The planning area has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

1.3 Plan Organization

Natrona County Hazard Mitigation Plan is organized in alignment with the DMA planning requirements and the FEMA plan review crosswalk as follows:

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption, Implementation, and Maintenance
- Appendices

2 COMMUNITY PROFILE

2.1 Geography and Climate

Natrona County is located in central Wyoming and has a total area of 5,376 square miles, of which 5,340 square miles is land and 35 square miles is water. Natrona County is a large area to not only respond to but also to plan for. Natrona County is bordered by Johnson County to the north, Converse County to the east, Carbon County to the south, and Fremont County to the west. Nationally protected areas in Natrona County include Medicine Bow National Forest and Pathfinder National Wildlife Refuge.

Natrona has a semi-arid climate with long, cold, but dry winters and hot but generally dry summers. Highs range from 32 degrees in January to 88 degrees in July and August. Snow can fall heavily during the winter months, being the greatest in April. Precipitation is greatest in spring and early summer.

Major roadways include Interstate 25, Highway 20, Highway 26, Highway 87 and Wyoming Highway 220. A base map of the planning region is illustrated below. Jurisdictional base maps follow the countywide base map.

Figure 2.1: Natrona County Base Map

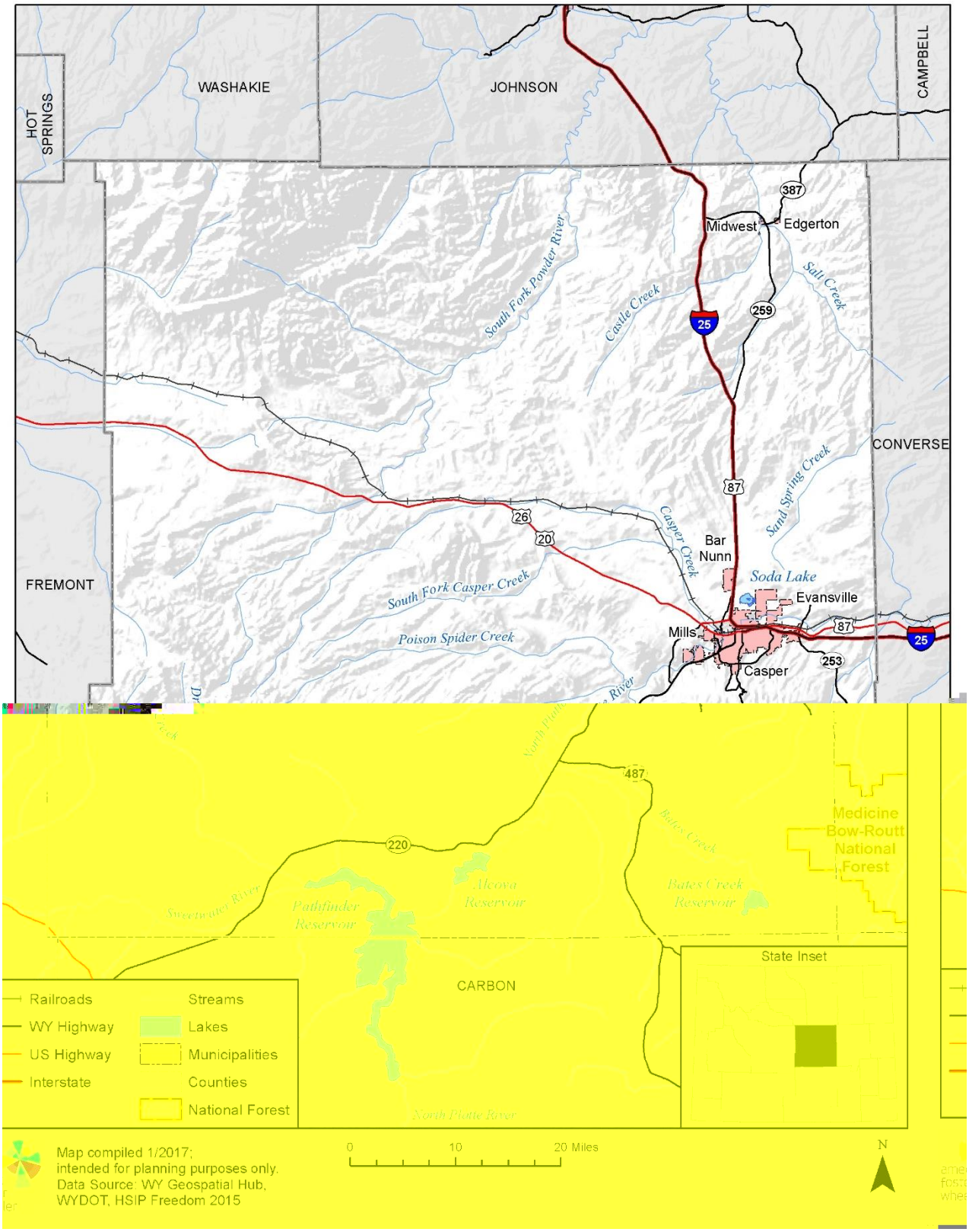


Figure 2.2: City of Casper

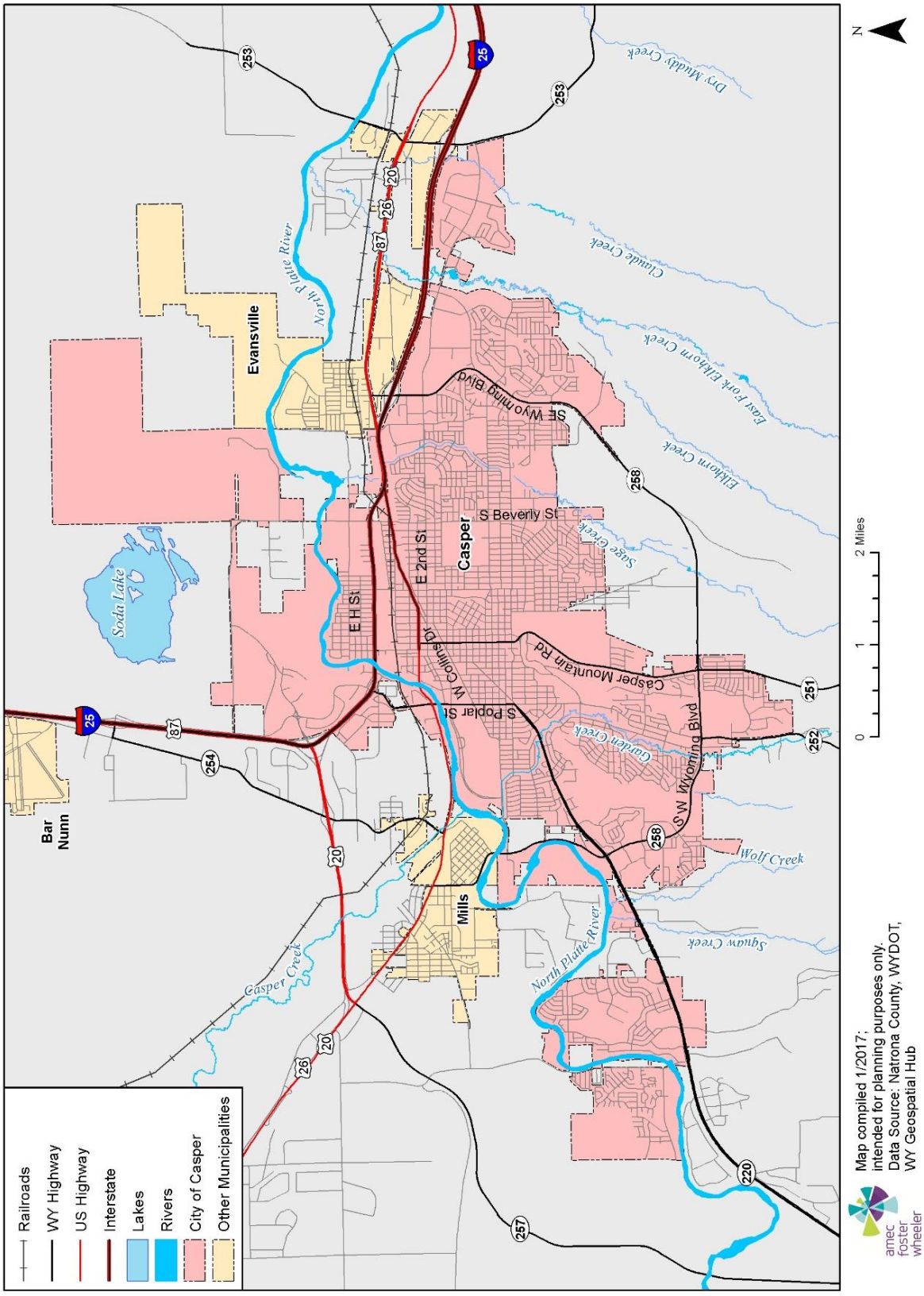


Figure 2.3: Town of Bar Nunn

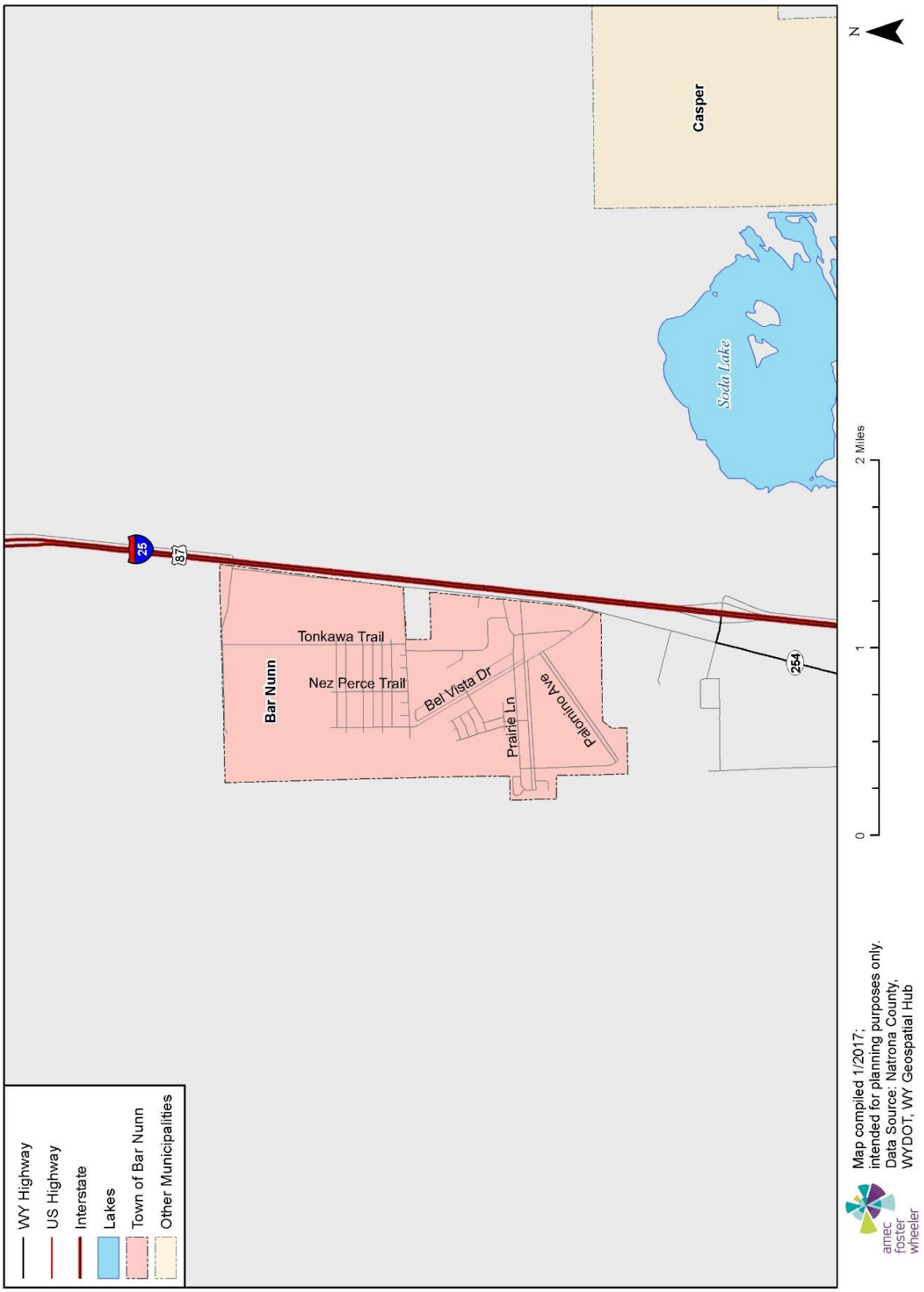


Figure 2.4: Towns of Edgerton and Midwest

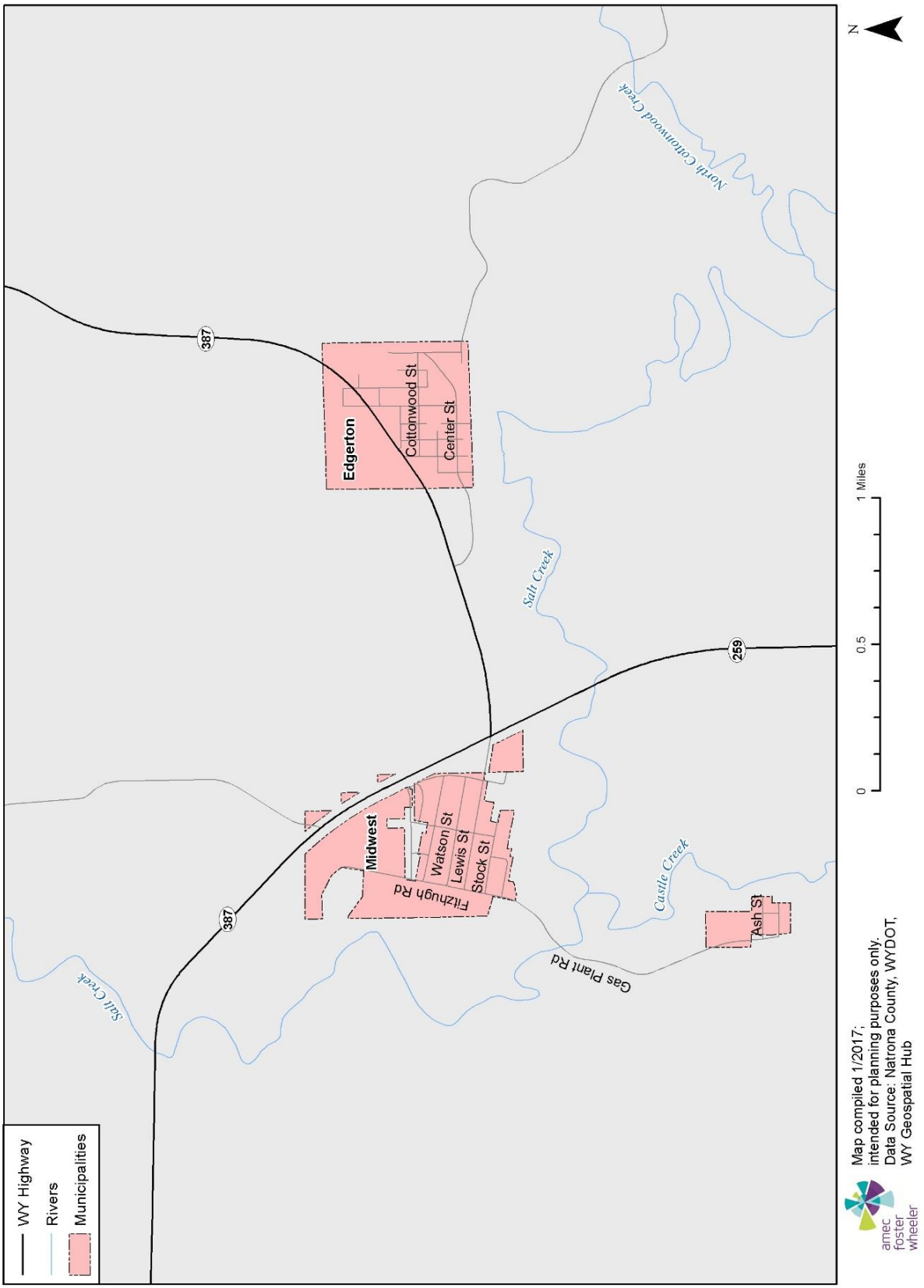


Figure 2.5: Town of Evansville

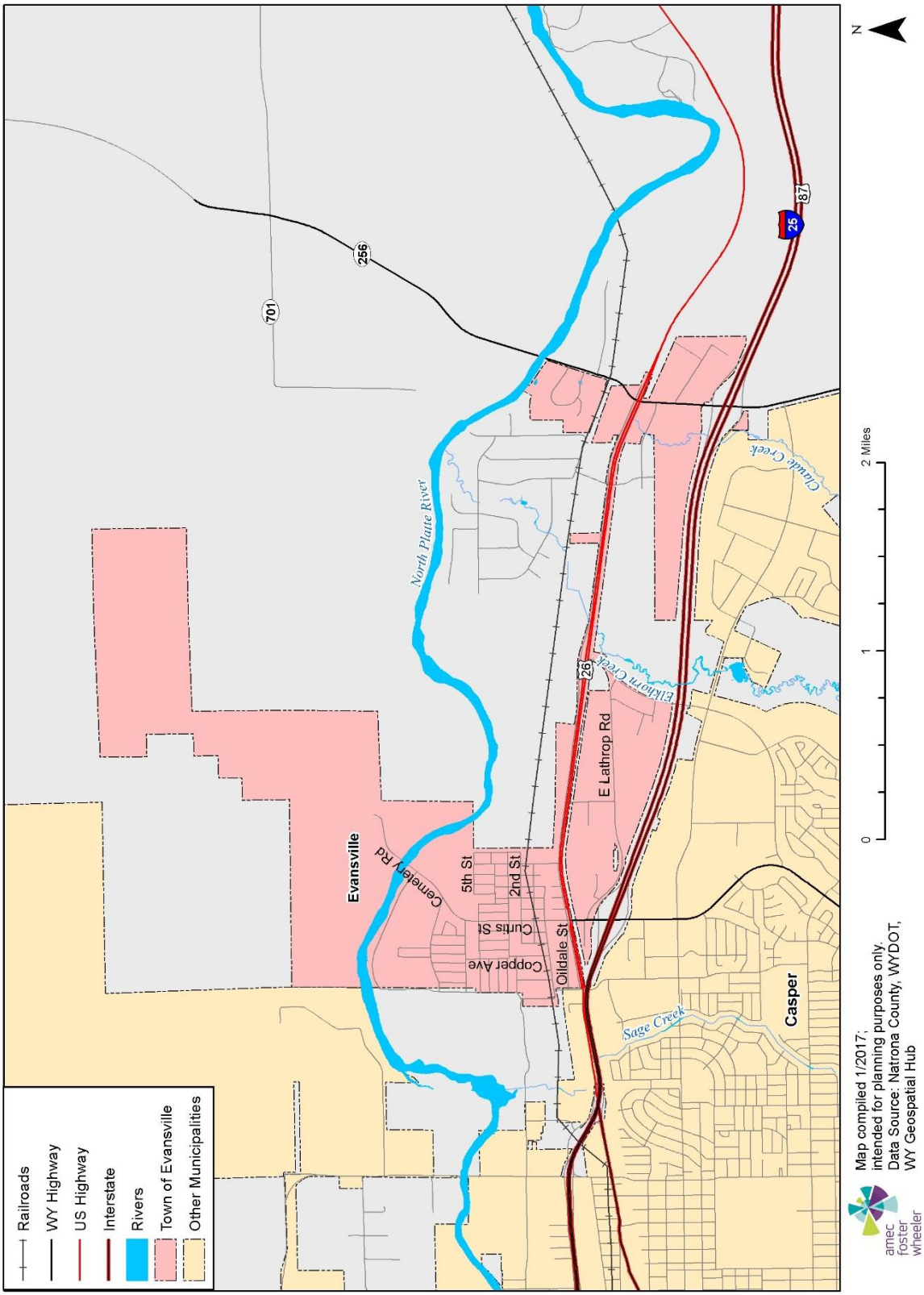
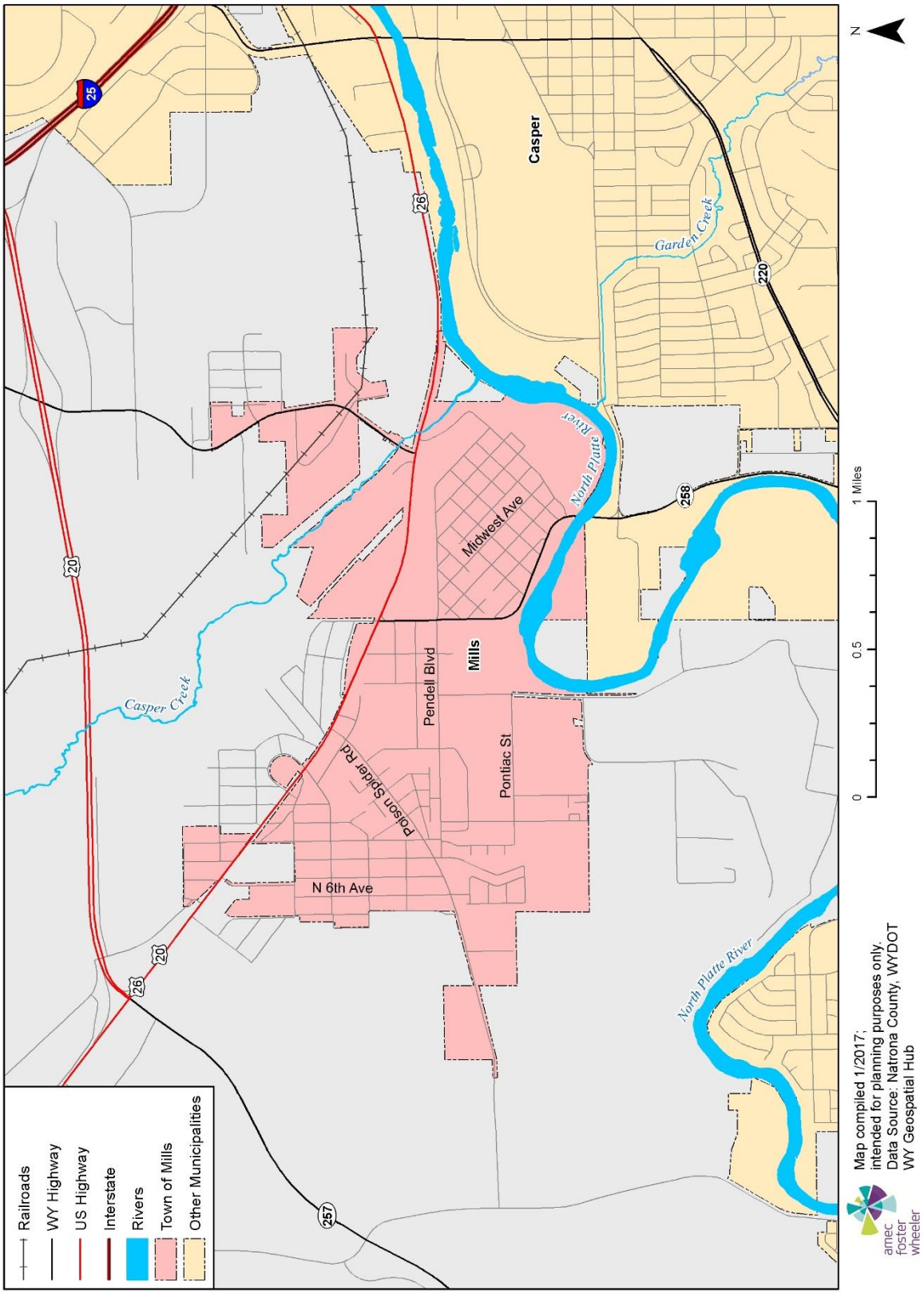


Figure 2.6: Town of Mills



2.2 Population

As of the 2010 census, the population was 75,450 and estimated to be 81,039 based on July 1, 2016 Census Bureau population estimates. Natrona County is the second-most populous county in Wyoming with its county seat in Casper. Jurisdictions in Natrona County include the City of Casper, the Town of Bar Nunn, the Town of Edgerton, the Town of Evansville, the Town of Midwest, and the Town of Mills. The population is by far the highest within the city limits of Casper. The steady population growth is an indication of the changing conditions within the County. Yet, as growth continues to occur within Natrona County, more and more people are choosing to live within the smaller communities, as well as in areas that are more highly susceptible to natural hazards such as fire, high winds, severe winter storms, and flooding. Table 2.1 describes the population and estimated population change for the planning region as a whole and each individual jurisdiction. Estimates beyond 2010 are based on the American Community Survey data from the US Census Bureau. As a whole, the Region is increasing slightly in population, but percent increase varies by jurisdiction.

Table 2.1: Planning Area Population

	2010 Census	2011 Estimate	2012 Estimate	2013 Estimate	2014 Estimate	2015 Estimate	% Change 2010 to 2015
Natrona County	75,450	76,410	78,602	81,092	81,432	82,191	8.93
City of Casper	54,139	54,837	55,729	56,853	57,815	58,817	8.64
Town of Bar Nunn	1,932	2,011	2,223	2,331	2,447	2,573	33.17
Town of Edgerton	206	278	306	397	401	327	58.73
Town of Evansville	2,476	2,510	2,651	2,709	2,776	2,836	14.53
Town of Midwest	474	427	436	454	426	362	-23.62
Town of Mills	3,394	3,438	3,449	3,472	3,545	3,597	5.98

2.3 Mitigation Capabilities

The Wyoming State Multi-Hazard Mitigation Plan summarizes existing mitigation capabilities of each county and some of their incorporated cities. The information was derived from county websites and through completed worksheets from the County Coordinators. The table below presents a summary of Natrona County's mitigation capabilities that are highlighted in the 2016 Wyoming State Mitigation Plan and in some cases updated with 2017 information. Opportunities to expand on these capabilities were discuss during the 2017 update process as part of the updated mitigation strategy in Chapter 5 and implementation and incorporation through related planning efforts in Chapter 6.

Table 2.2: Summary of Mitigation Capabilities

Building Codes	Comprehensive Planning	Floodplain Management	GIS & Planning	Land Use Regulations	Other
County enforces building codes.	County Development Plan 2016 includes polices regarding growth in floodplains, steep slopes, and hazardous soils	Countywide DFIRM effective 5/18/15 Casper participates in the CRS and is a Class 9 community and has a floodplain management website	GIS department with 2 staff members. Planning Dept. administers zoning and subdivision regulations Casper has Planning and Zoning Dept.	County subdivision, zoning and nuisance regulations 2016 Natrona County Development Plan	The County is designated as StormReady community by National Weather Service Casper has been a Tree City USA for 17 years Casper has a Local Energy Assurance Plan

Source: Wyoming Multi-Hazard Mitigation Plan 2016

2.3.1 Mitigation Capabilities by Hazard

The following are summaries of mitigation strategies or capabilities that have been implemented in Natrona County by hazard, building on mitigation efforts highlighted in the 2010 Hazard Mitigation Plan (HMP).

All Hazards

Natrona County's first priority is life safety. Education and awareness of hazards is a key to this goal and therefore has been a leading activity and will continue to be a leading activity of mitigation. An all hazards approach has been taken in planning for events, inclusive of natural and human-caused hazards. Partnerships with private individuals, companies and other governmental entities have been used in the past and will continue to be used for future mitigation activities.

Natrona Regional Geospatial Cooperative

The Natrona Regional Geospatial Cooperative is comprised of Natrona County, the City of Casper, the Town of Evansville, Town of Mills, and the Town of Bar Nunn. The Natrona Regional Geospatial Cooperative was created in 2012 to maintain shared data and resources between all members and to create standard operating procedures. This information can be viewed at https://geosmart.casperwy.gov. GIS mapping in the County includes an inventory of addresses of rural residence for the Public Safety Communications Center's E911 system. The Metropolitan Planning Organization in conjunction with the Natrona Regional Geospatial Cooperative created a parcel map for Natrona County which includes a Growth Management Area. A database was created and continues to be updated as new parcels are created and land is developed. The parcel and address databases, among other information, was used to inform the 2017 update of this HMP to reflect current development hazard exposure and vulnerability in Chapter 4.

Casper Local Energy Assurance Plan

The Casper Local Energy Assurance Plan outlines critical facilities that must remain operational during response and recovery operations, and includes planning for backup power and fuel for these facilities. Implementation of the plan can assist with mitigation from a variety of severe weather hazards including winter storms, wind, tornadoes, hail and lightning.

Severe Weather

Continued education of the potential for severe weather, the possible results of a severe weather event, and how to be prepared for and recover from an event has been a priority with the Natrona County Emergency Management Agency. Educational forums such as Winter Weather Awareness Weeks, Spring Severe Weather Awareness Weeks, public displays, public presentations, Community Emergency Response Team (CERT) Program, and Public Service Announcements via radio, television and newspapers have also been implemented. Tying down modular homes for wind events as well as for constructed homes, and the placement of hurricane clips are examples of recommendations made to the public.

Severe weather warning systems are presently available through the NOAA weather radio or video crawlers on a local television channel, or local radio stations as well as the outdoor warning siren systems. In addition, the public service communication center together with the Natrona County Emergency Management agency has launched a program to identify citizens with disabilities throughout the County.. Mass notification system exist within the School District population as well as the Casper College community. The Natrona County EMA is focused on funding for additional mass notification systems such as Reverse 911 system and the expansion of the current outdoor warning system via grants or optional sales tax revenues (see related mitigation strategy in Chapter 5).

Due to these communication and warning capabilities Natrona County is recognized as a "StormReady" community by the National Weather Service. Other sites in the county recognized as "StormReady" include the Casper/Natrona County International Airport and Casper College.

Severe Winter Storms

Mitigation capabilities related to winter storms include public service announcements on public communication systems (television and radio) promoting winter preparedness and activation of warning systems and announcements on public communication systems in the event of an impending winter storm. Since winter storms are an annual event, public education on procedures for family preparedness and home preparedness will continue. These efforts are increased during the fall of each year before severe winter storms occur.

Flooding

Natrona County and flood-prone municipalities of Casper, Evansville and Mills have been active in floodplain management through continued compliance with the National Flood Insurance Program (NFIP). This is an integral part of reducing damage to existing and future development and emphasized in the mitigation strategy in Chapter 5 (see section on Continued Compliance with the NFIP). This includes continuing to comply with the NFIP's standards for updating and

adopting floodplain maps and maintaining and updating the floodplain zoning ordinance. The Flood Insurance Rate Maps in the County were updated and adopted in 2015. More details regarding NFIP participation is shown in the following table. Flood insurance statistics are discussed in Chapter 4 in the flood hazard vulnerability discussion in relation to flood losses.

Table 2.3: NFIP Participation and Map Status

Jurisdiction	Current Effective Flood Map Date	NFIP Status Participation Status
Bar Nunn	*NSFHA	participation optional
Casper	5/18/15	Since 9/15/7
Edgerton	*NSFHA	participation optional
Evansville	5/18/15	Since 7/17/78
Midwest	*NSFHA	participation optional
Mills	5/18/15	Since 12/1/86
Natrona County	5/18/15	Since 8/15/78

* No-special flood hazard areas: An area in a low to moderate risk flood zone (Zones B, C, X) that is not in any immediate danger from flooding caused by overflowing rivers or hard rains

The City of Casper is a participant in the Community Rating System which underscores the City's commitment to managing its floodplains above and beyond the FEMA minimum standards and keeping flood insurance affordable. The City is a Class 9 as of October 2016, which results in a 5% discount on flood insurance for residents of the City.

Various projects have been implemented to lessen the impacts of flood hazards such as the construction of containment dams and detention ponds in drainages, installing storm drain systems to a higher capacity or installing where none existed, and assisting in establishing and maintaining areas along the North Platte River (The Platte River Parkway) to keep it as natural or parkland with minimal or no structures.

Figure 2.7: Photo of Elevated Home adjacent to North Platte River in Unincorporated Natrona County (Photo: Jeff Brislawn**)**

Wildfire

Wildfire mitigation has been a long-term priority with the County and land management agencies. The Casper Mountain Wildfire Mitigation Committee was started in 2001. This committee is comprised of members from private insurance carriers, Bureau of Land Management, Wyoming State Forestry, Natrona County Emergency Management, Natrona County Fire Protection District, and Casper Mountain Fire Protection District. The main focus of the original committee was to establish wildfire mitigation efforts on Casper Mountain proper.

GPS mapping of all structures and doing property surveys with homeowners has been one of the Committee's accomplishments. The committee is also the pipeline for which homeowners can get financial assistance with wildfire mitigation efforts taken on the property. The committee changed its name to Wyoming Firewise. This committee has also expanded its efforts to homeowners in the Big Horn Mountain Range, Rattle Snake Mountains, and the Alcova Lake area.

This committee continues to meet and has established future funding through federal grants. The main force of the committee is public education through personal visits and property surveys, informational booths at public gatherings, as well as producing Public Service Announcements that are shown on local television. The reviewing of resolutions and ordinances effecting future land use, and reviewing mitigation activities for future areas of development (i.e. dry hydrant systems, water sources, wide access routes) will continue to occur.

This County volunteered to be a pilot county for HAZUS projects dealing with wildfire mitigation. Since Wyoming Firewise/Natrona County has been in existence for several years, this pilot project was offered to them. The County Community Wildfire Protection Plan provides an extremely comprehensive look at each of the communities in Natrona County that are currently within fire

prone areas. Mitigation activities for wildfire include constructing firebreaks on the west end of Casper Mountain. Further firebreaks are planned to be established in the central part of Casper Mountain.

Drought

In 2001, Natrona County formed a drought task force comprising members from the Fire Departments, Farm Service, rural ranchers, University of Wyoming Agricultural Extension Office, Regional Water Board, Kendrick Irrigation Board, and Emergency Management. This committee's main purpose is to educate those affected by the drought on actions to be taken. The board has also agreed to keep meeting during non-drought conditions to educate on mitigation and planning strategies for residents that could be affected by drought. Water use and ownership are critical factors during these conditions. Possible water restrictions can be placed on users as well. "Calls" on water ownership are made by those jurisdictions that have ownership to available water. Efforts are currently being done to educate all citizens on water conservation as well as strategies for future mitigation efforts against future droughts. These efforts are being led by the Natrona County Drought Task Force.

Earthquake

Public education on earthquake mitigation projects that citizens and businesses can participate in has occurred and will be on going. Some of this information includes CERT Training, lamination film for windows, strapping of gas hot water heaters, securing book cases and other wall hangings, securing computer monitors on desks, 72 hour kits, etc.

Hazardous Materials

Since 1987, Natrona County has been successful in getting facilities to identify what materials they have on hand as well as how much. The Local Emergency Planning Committee (LEPC) was formed and continues to meet. They have, however, expanded to an all hazards planning committee. The LEPC is in contact with Natrona County Planning to keep apprised of any new businesses that may come into the area that may be using, storing, or manufacturing hazardous materials.

Ordinances and resolutions will continue to be reviewed as well as federal regulations, in regards to hazardous materials, followed. The City of Casper has passed ordinances in relation to where vehicles hauling hazardous materials may be parked; adopted the Uniform Fire Code as to use, storage and disposal of hazardous materials; and has established an intra-city truck route. Natrona County has passed resolutions on adoption of the Uniform Fire Code in relation to use, storage, and disposal of hazardous materials.

In order to have a clearer picture of the hazardous materials that are being transported through each of the jurisdictions, a commodity flow study was completed in the spring of 2017. This key takeaways from this study have been integrated into the Hazardous Materials hazard profile in Chapter 4.

The Natrona County Local Emergency Planning Committee (LEPC) will continue to be the lead for mitigation strategies against hazardous materials incidents. Assisting that committee will be the local elected officials and emergency management offices.

Terrorism

Natrona County has identified several areas of potential target value to both domestic and foreign terrorists. A committee was formed comprised of representatives of all entities and all response agencies within the County. A priority listing was established of needs for a potential incident. The number one need was determined to be interoperable communications. This was placed as a priority as funding was obtained. As of 2017 this project is now in a continuum mode. The 800 MHZ system has added an additional tower site in the Alcova/Pathfinder dam areas in a partnership with Union Cellular. By placing 800 MHZ radio equipment on the Union Tower, communications are greatly improved in a once inoperable area. In addition the 800 system has been interlinked into the WYOLINK system enabling responders to communicate state-wide.

2.3.2 Safe Growth and Development

The 2016 Natrona County Development Plan is an official guidance document adopted by the Board of County Commissioners as a policy guide for making decisions about the physical development of the County. It indicates how public officials and citizens desire the local area (referred to as the "planning area") to develop in the future. It is an official statement of a governing body which outlines its major policies concerning future physical development. Preventing damage from natural hazards to future growth is one of the goals of the plan. The goals, policies, and actions related to environmental/natural hazards are excerpted below.

Environmental/Natural Hazards Goals: To minimize development in identified hazardous areas and ensure development within hazardous areas is engineered properly to mitigate the impact of existing hazards.

Flood Policies

- Policy 1 – To reduce flood danger, all subdivision plats shall define areas which lie within any 100 year flood plain, as established by the Corps of Engineers and FEMA for streams and rivers.
- Policy 2 – Building permits shall be issued in accordance with adopted FEMA Flood Hazard boundary maps and FEMA guidelines.
- Policy 3 – All subdivision proposals shall include a drainage plan with the plat of a subdivision which details storm drainage facilities.

Soils

- Policy 1 - Soil limitations shall be a major locational factor in the approval of subdivisions, building permits and other development permits, with proper corrective measures required to mitigate identified soil limitations.
  - Action 1 – Use the Natrona County Conservation District or a Wyoming Licensed Geotechnical Engineer's soils studies to require site specific data for final approval.

Slopes

- Policy 1 – Steep slopes, over ten percent, present significant engineering problems for urban development. The slope of a site shall be a major determining factor in approval of subdivision plats, building permits, and other development proposals, with corrective measures required if development is to be allowed.
  - Action 1 – Utilize the NRCS/NCCD soils studies in the preliminary development review and evaluation of soil suitability in steep slope areas.

3 PLANNING PROCESS

Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.]

3.1 Background on Mitigation Planning in Natrona County

This Multi-Hazard Mitigation Plan is an update to the 2010 Plan for Natrona County. The County, with the Office of Emergency Management (OEM) as the lead agency, recognized the need and importance of this plan and was responsible for initiating its development. The County contracted with Amec Foster Wheeler in 2016 to facilitate and develop the plan. Amec Foster Wheeler's role was to:

The Emergency Management Coordinator led Hazard Mitigation Planning Committees (HMPCs) working in concert with the hazard mitigation planning consultant. As the planning consultant, Amec Foster Wheeler's role was to:

- Provide guidance on a planning organization for the entire planning area representative of the participants;
- Meet all of the DMA requirements as established by federal regulations, following FEMA's most recent planning guidance;
- Facilitate the entire planning process;
- Identify the data requirements that the participating counties and municipalities could provide, and conduct the research and documentation necessary to augment that data;
- Develop and help facilitate the public input process;
- Produce the draft and final plan documents; and
- Ensure acceptance of the final Plan by WOHS and FEMA Region VIII

The remainder of this chapter provides a narrative description of the steps taken to prepare the hazard mitigation plan (HMP).

3.2 Local Government Participation

The Disaster Mitigation Act (DMA) planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the Hazard Mitigation Planning Committee (HMPC),
- Detail areas within the planning area where the risk differs from that facing the entire area,
- Identify specific projects to be eligible for funding, and
- Have the governing board formally adopt the plan.

For the Natrona County Multi-Hazard Mitigation Plan's HMPC, "participation" meant:

- Attending and participating in HMPC meetings;
- Establishing/reconvening a local steering committee;
- Providing available data requested by the HMPC coordinator/Amec Foster Wheeler;
- Providing/updating the hazard profile and vulnerability details specific to jurisdictions;
- Developing/updating the local mitigation strategy (action items and progress);
- Advertising and assisting with the public input process;
- Reviewing and commenting on plan drafts; and
- Coordinating the formal adoption of the plan by the governing boards.

In the interest of completing a robust process that would ultimately result in FEMA approval the County and participating municipalities met all of these participation requirements. In most cases one or more representatives for each agency attended the HMPC meetings described in Table 3.2 and also brought together department staff to help collect data, identify mitigation actions and implementation strategies, and review and provide data on plan drafts. Appendix B provides additional information and documentation of the planning process.

3.3 The 10-Step Planning Process

Amec Foster Wheeler established the planning process for the Natrona County Hazard Mitigation Plan using the DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1) Organize Resources
2) Assess Risks
3) Develop the Mitigation Plan
4) Implement the Plan and Monitor Progress

Into this four-phase process, Amec Foster Wheeler integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance (FMA) programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Community Rating System (CRS), Flood Mitigation Assistance Program, Severe Repetitive Loss program, and new flood control projects authorized by the U.S. Army Corps of Engineers. FEMA's March 2013 *Local Mitigation Planning Handbook* recommends a nine step process within the four phase process. Table 3.1 summarizes the four-phase DMA process, the detailed CRS planning steps and work plan used to develop the plan, the nine handbook planning tasks from FEMA's 2013 *Local Mitigation Planning Handbook*, and where the results are captured in the Plan. The sections that follow describe each planning step in more detail.

Table 3.1 Mitigation Planning Process

FEMA 4 Phase Guidance	Community Rating System (CRS) Planning Steps (Activity 510) and Amec Foster Wheeler Work Plan Tasks	FEMA Local Mitigation Planning Handbook Tasks (44 CFR Part 201)	Location in Plan
Phase I: Organize Resources	Task 1. Organize Resources	1: Determine the Planning Area and Resources	Chapters 1, 2 and 3
		2: Build the Planning Team 44 CFR 201.6(c)(1)	Chapter 3, Section 3.3.1
	Task 2. Involve the public	3: Create an Outreach Strategy y 44 CFR 201.6(b)(1)	Chapter 3, Section 3.3.1
	Task 3. Coordinate with Other Agencies	4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)	Chapter 3, Section 3.3.1 and Chapter 4, Section 4.4
Phase II: Assess Risks	Task 4. Assess the hazard	5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)	Chapter 4, Sections 4.1-4.3
	Task 5. Assess the problem		Chapter 4, Sections 4.1-4.3
Phase III: Develop the Mitigation Strategy	Task 6. Set goals	6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)	Chapter 5, Section 5.2
	Task 7. Review possible activities		Chapter 5, Section 5.3
	Task 8. Draft an action plan		Chapter 5, Section 5.4
Phase IV: Adopt and Implement the Plan	Task 9. Adopt the plan	8: Review and Adopt the Plan	Chapter 6, Appendix C
	Task 10. Implement, evaluate, revise	7: Keep the Plan Current	Chapter 6
		9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)	Chapter 6

3.3.1 Phase 1: Organize Resources

Planning Task 1: Organize the Planning Effort

With the County's commitment to update the Plan, Amec Foster Wheeler worked with County Emergency Management to establish the framework and organization for the process. Organizational efforts were initiated with each jurisdiction to inform and educate the plan participants of the purpose and need for the update and continued participation. During the update of this plan, the planning process was directed through a Hazard Mitigation Planning Committee comprised of Natrona County and participating jurisdictions. The planning consultant held an

initial conference call to discuss the organizational aspects of the planning process with the county Emergency Management Coordinator. Using FEMA planning guidance, representatives for the county's HMPC base membership was established, with additional invitations extended as appropriate to other federal, state, tribal, and local stakeholders and the public throughout the planning process.

Amec Foster Wheeler and the County's Emergency Management Coordinator identified key county, municipal, and other local government and initial stakeholder representatives. An email was sent to invite them to participate as members of the HMPC and to attend a series of planning workshops. Representatives from the following county and municipal departments participated on the county or jurisdictional-level HMPC during the development of the 2017 plan update.

Table 3.2 HMPC Members by Jurisdiction

Jurisdictions	Departments
Natrona County	Emergency Management
	Fire Department
	Sheriff's Office
	GIS
	Road and Bridge Department
	Casper-Natrona County Health Department
City of Casper	Fire Department Police
	Public Works Department
	Planning Department
	Police Department
	Engineering Department
Town of Bar Nunn	Administration
Town of Edgerton	Police Department
Town of Evansville	Fire Department
	Police Department
	Public Works Department
	Engineering Department
	Planning Department
Town of Midwest	Police Department
Town of Mills	Fire Department
	Police Department
	Public Works Department
	Engineering Department
	Planning Department

Stakeholders	
	WYDOT
	WYOHS
	Bureau of Land Management
	Black Hills Energy Corporation
	Red Cross

The planning process officially began with a kick-off meeting/webinar held on January 12, 2017 in combination with a meeting of the Natrona County Local Emergency Planning Commission (LEPC). The meeting covered the scope of work, project schedule and an introduction to the DMA planning requirements. The meeting was also an opportunity to revisit the list of hazards analyzed in the plan. A summary of this meeting is included in Appendix A

During the planning process, the HMPC communicated through face-to-face meetings, email, and telephone conversations. Draft documents were also shared by email. The complete draft was posted on the County website so that the HMPC members and the public could easily access and review them.

The HMPC held three primary planning meetings during the planning period (January 2017-July 2017). The purposes of these meetings are described in Table 3.2. Agendas for each of the meetings are included in Appendix A.

Planning Task 2: Involve the Public

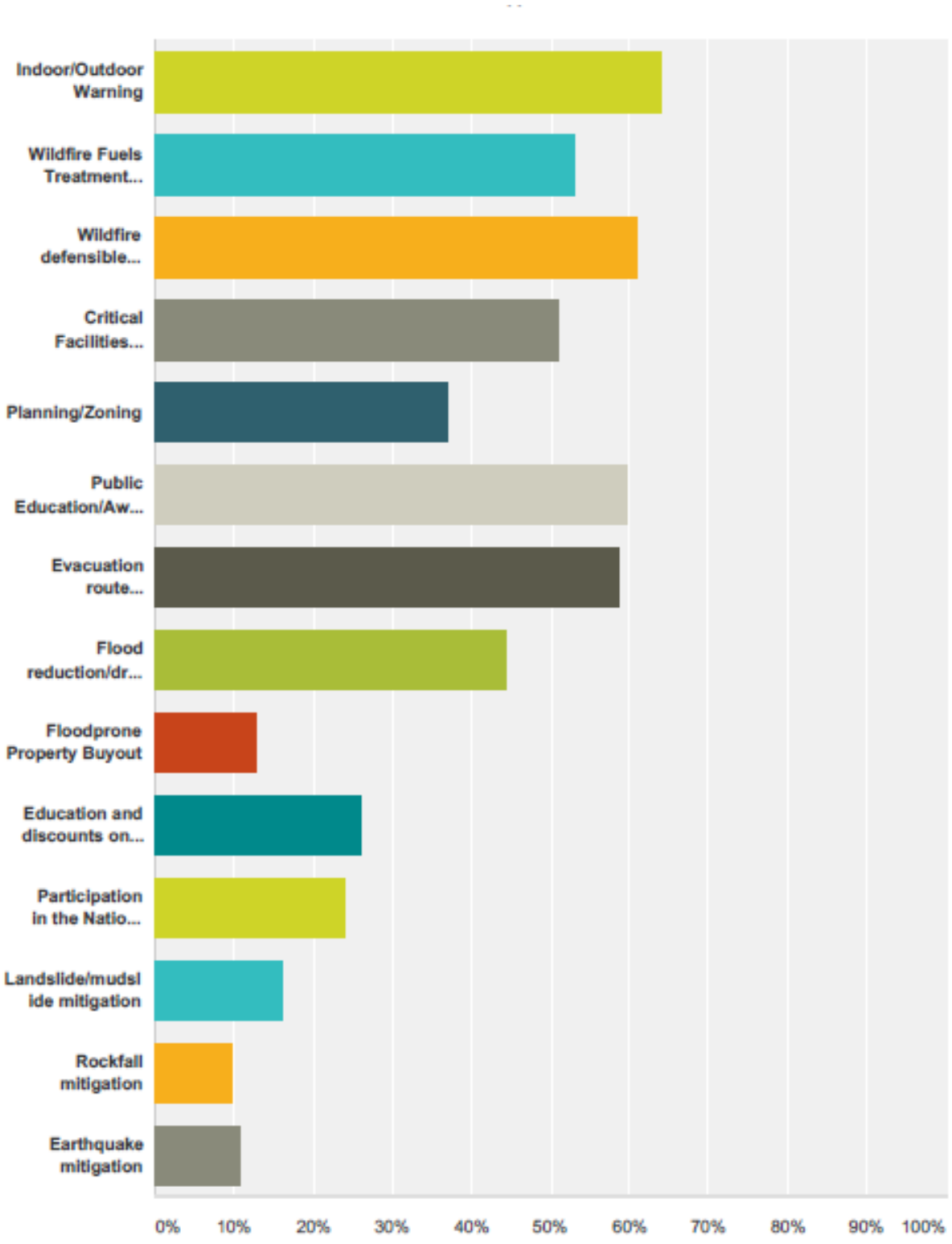
The 2017 planning process was an open one, with the public informed and involved early in the process. Mitigation planning was primarily accomplished at HMPC meetings, which in some cases such as the kickoff meeting included members of the public and local business and industry. Additional public involvement was accomplished through a public survey.

2017 Public Survey

During the 2017 planning process and drafting stage, a public survey was developed as a tool to gather public input. The survey was for the public to provide feedback to the county planning teams on topics related to hazard concerns and reducing hazard impacts. The survey provided an opportunity for public input during the planning process, prior to finalization of the plan update. The survey gathered public feedback on concerns about wildfires, floods, winter storms and other hazards and solicited input on strategies to reduce their impacts. The survey was released as both an online tool and a hardcopy form in January 2017 and closed on March 15, 2017. The County provided links to the public survey by distributing it using social media, email, and posting the link on websites. Ninety-six responses were received and shared with the county planning committees to inform the process.

The survey included a question on ranking hazard significance. The results generally track with the significance levels noted in Chapter 4 of this plan, with drought, winter storm, wildfire, and wind as being the most significant. The following graph is a display of the results from Question 4. Question 4 read: *The following types of mitigation actions may be considered in this plan. Please indicate all the types of mitigation actions that you think should have the highest priority in the Multi-Hazard Mitigation Plan. These results will be considered during the planning process.* The results indicate that public education/awareness, indoor/outdoor warning, and flood reduction/drainage improvement were popular with the public. Additional results of the survey are included in Appendix A Planning Process Documentation.

Figure 3.1 Mitigation Action Survey - Results from Question 4



Prior to finalizing, a draft of the plan was made available to the public for review and comment. The plan was placed on each county's web page and a press release and social media were used to announce the public comment period. A feedback form was provided to collect specific comments. There were no comments received from the public on the plan, however, three people viewed the survey form. There were some final edits provided by the HMPC during the public review that resulted in minor edits to the plan before submittal to FEMA.

Planning Task 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation activities or their role in land stewardship in the county, representatives from state, federal, and local businesses were invited to participate on the HMPC in 2017 and are noted in Table 3.2.

Many of these stakeholders participated in the process by attending HMPC meetings or providing data and information that was used to update hazard profiles in the plan. Stakeholders were also given an opportunity to review and comment on the draft plan.

Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community planning efforts is an important aspect to mitigation planning. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. The County uses a variety of comprehensive planning mechanisms, such as development master plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives. Examples of this are described in the following table. The actions in the mitigation action strategy in Chapter 5 note related planning mechanism, where applicable, with each detailed action description.

Table 3.3 Incorporated or Referenced Plans

Plan	How Incorporated or Referenced
Natrona County Development Plan 2016	Incorporated into Community Profile, Capabilities Assessment
Community Wildfire Protection Plan	Incorporated into Risk and Vulnerability Assessment and Mitigation Strategy
Casper Local Energy Assurance Plan	Informed Risk and Vulnerability Assessment, Capabilities Assessment
Platte River Revival River Restoration Master Plan	Incorporated into Mitigation Strategy

Plan	How Incorporated or Referenced
City of Casper 2013 Stormwater Management Master Plan	Referenced and Incorporated into Mitigation Strategy in applicable actions
Wyoming Hazard Mitigation Plan (2016)	Informed data sources and information gathering and goals update

Other documents were reviewed and cited, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment.

2010 Mitigation Plan Inclusion in Other Planning Mechanisms

The 2010 HMP was integrated or cross referenced into some other planning mechanisms in the County. The risk assessment portion of the 2010 plan was integrated into the other planning mechanisms listed in Table 3.4. The table lists the jurisdiction and what planning mechanism the 2010 HMP was integrated into. In some cases communities have deferred this for future planning mechanisms, as discussed in the Chapter 6 Plan Adoption, Implementation and Maintenance.

Table 3.4 2010 Hazard Mitigation Plan Inclusion in Other Planning Mechanisms

Jurisdiction	Planning Mechanism
Natrona County	Local Emergency Operations Plan (LEOP) – used to inform Hazard Vulnerability Assessment
City of Casper	LEOP adopted. Deferred for incorporation by reference in other future planning mechanisms
Town of Bar Nunn	LEOP adopted. Deferred for incorporation by reference in other future planning mechanisms
Town of Edgerton	LEOP adopted. Deferred for incorporation by reference in other future planning mechanisms
Town of Evansville	LEOP adopted. Deferred for incorporation by reference in other future planning mechanisms
Town of Midwest	LEOP adopted. Deferred for incorporation by reference in other future planning mechanisms
Town of Mills	LEOP adopted. Deferred for incorporation by reference in other future planning mechanisms
State of Wyoming	The 2016 Wyoming Hazard Mitigation Plan provides a high-level analysis of hazards profiled in local mitigation plans. Natrona County's 2010 plan is included in this analysis.

3.3.2 Phase 2: Assess Risks

Planning Tasks 4 and 5: Identify the Hazards and Assess the Risks

Amec Foster Wheeler led the HMPC in research effort to identify and document all the hazards that have, or could, impact the planning area. The existing hazard mitigation plan and Wyoming Hazard Mitigation Plan provided a basis for most of the hazard profiles. Where data permitted,

Geographic Information Systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. Sophisticated analyses for flood, landslide and wildfire hazards were performed by Amec Foster Wheeler that included an analysis of flood risk based on the recent Digital Flood Insurance Rate Maps (DFIRMs).

Also included in the 2016 plan is a capability review and document the planning area's current capabilities to mitigate risk and vulnerability from natural hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. The results of this review are captured in Chapter 2. A more detailed description of the risk assessment process and the results are included in **Chapter 4 Risk Assessment**.

3.3.3 Phase 3: Develop the Mitigation Plan

Planning Tasks 6 and 7: Set Goals and Review Possible Activities

Amec Foster Wheeler facilitated discussion sessions with the HMPC that described the purpose and the process of developing planning goals, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This process was used to update and enhance the mitigation action plan, which is the essence of the planning process and one of the most important outcomes of this effort. The action plan and the process used to identify and prioritize mitigation actions are described in greater detail in **Chapter 5 Mitigation Strategy**.

Planning Task 8: Draft an Action Plan

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, Amec Foster Wheeler produced a complete first draft of the updated Plan. This complete draft was shared for HMPC review and comment. Other agencies were invited to comment on this draft as well. HMPC and agency comments were integrated into the second draft, which was advertised and distributed to collect public input and comments. Amec Foster Wheeler integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Wyoming Office of Homeland Security and FEMA Region VIII to review and approve, contingent upon final re-adoption by the governing boards of each participating jurisdiction.

3.3.4 Phase 4: Implement the Plan and Monitor Progress

Planning Task 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was adopted by the governing boards of each participating jurisdiction. Since the adoption process follows the FEMA plan

review and approval, copies of the adoption resolution will be included electronically in **Appendix D Records of Adoption**.

Planning Task 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing/updating appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead agency and possible funding sources, to help initiate implementation. Progress on the implementation of specific actions identified in the plan is captured in a discussion and the mitigation action plan summary table in **Chapter 5 Mitigation Strategy.** An overall implementation strategy is described in **Chapter 6 Plan Adoption, Implementation and Maintenance**.

Finally, there are numerous organizations within Natrona County planning area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the ongoing success of this plan and mitigation in Natrona County, and is addressed further in Chapter 6. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 6.

Figure 4.18 Bar Nunn 1% Annual Chance Flood Hazards

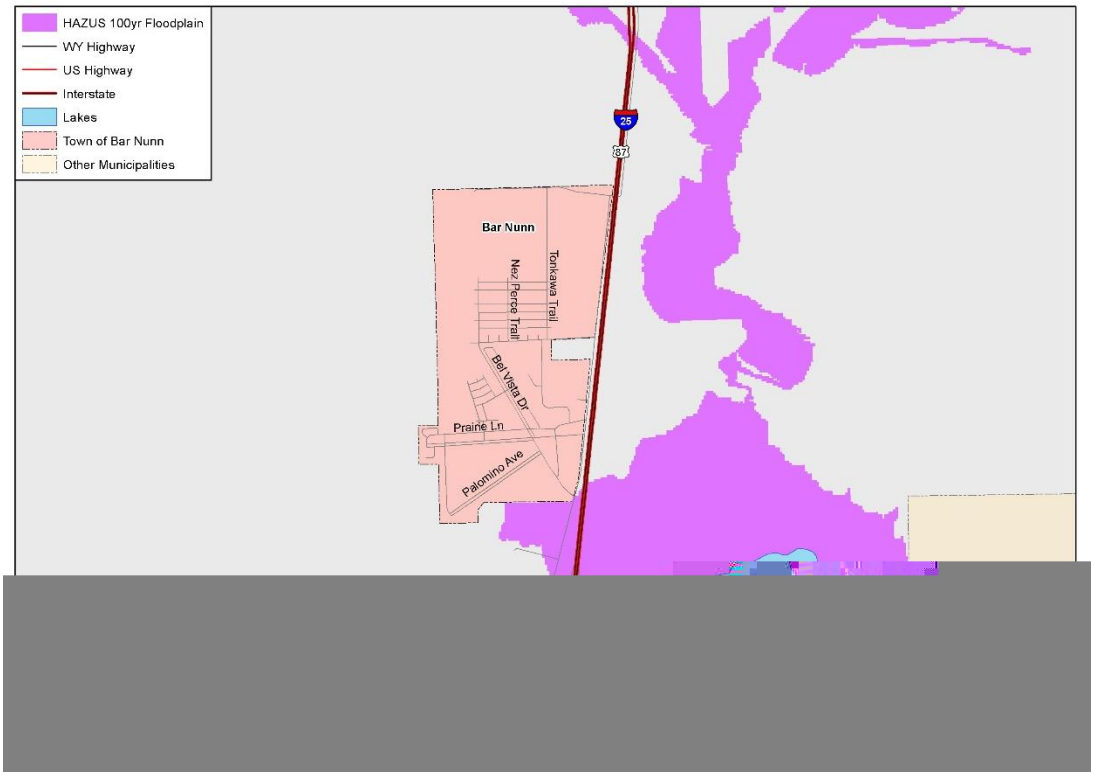


Figure 4.19 Midwest and Edgerton 1% Annual Chance Flood Hazards

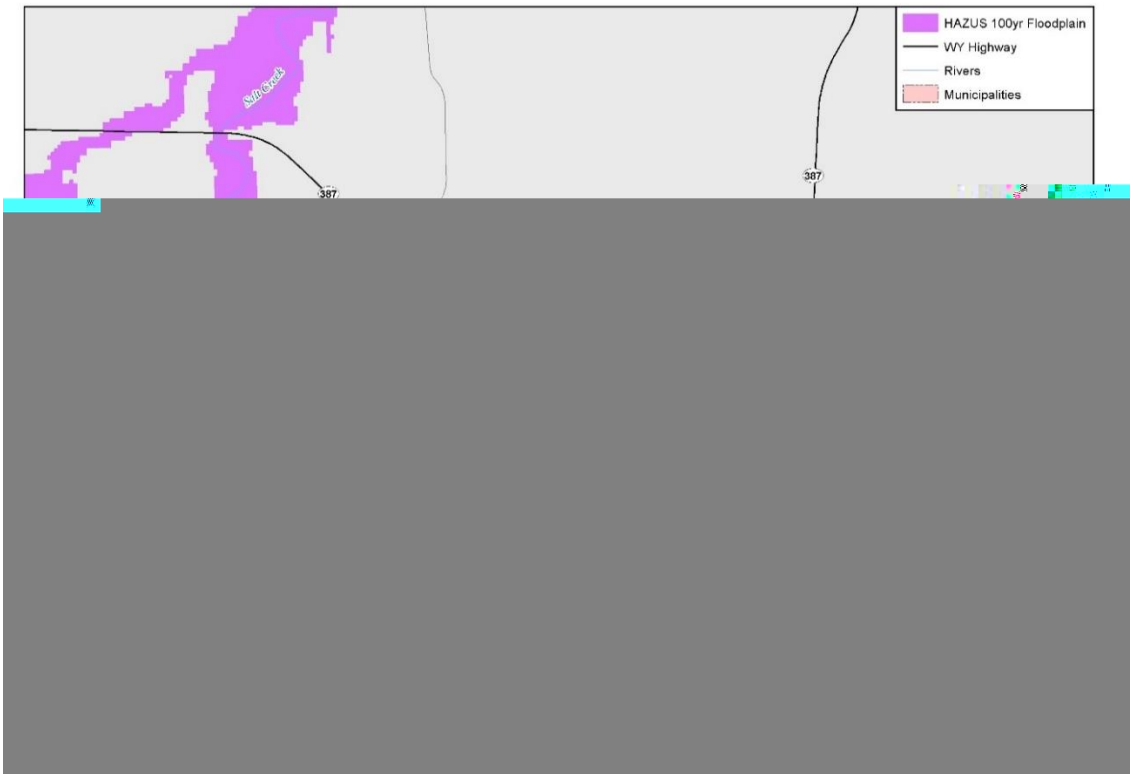


Figure 4.20 Casper 1% Annual Chance Flood Hazards

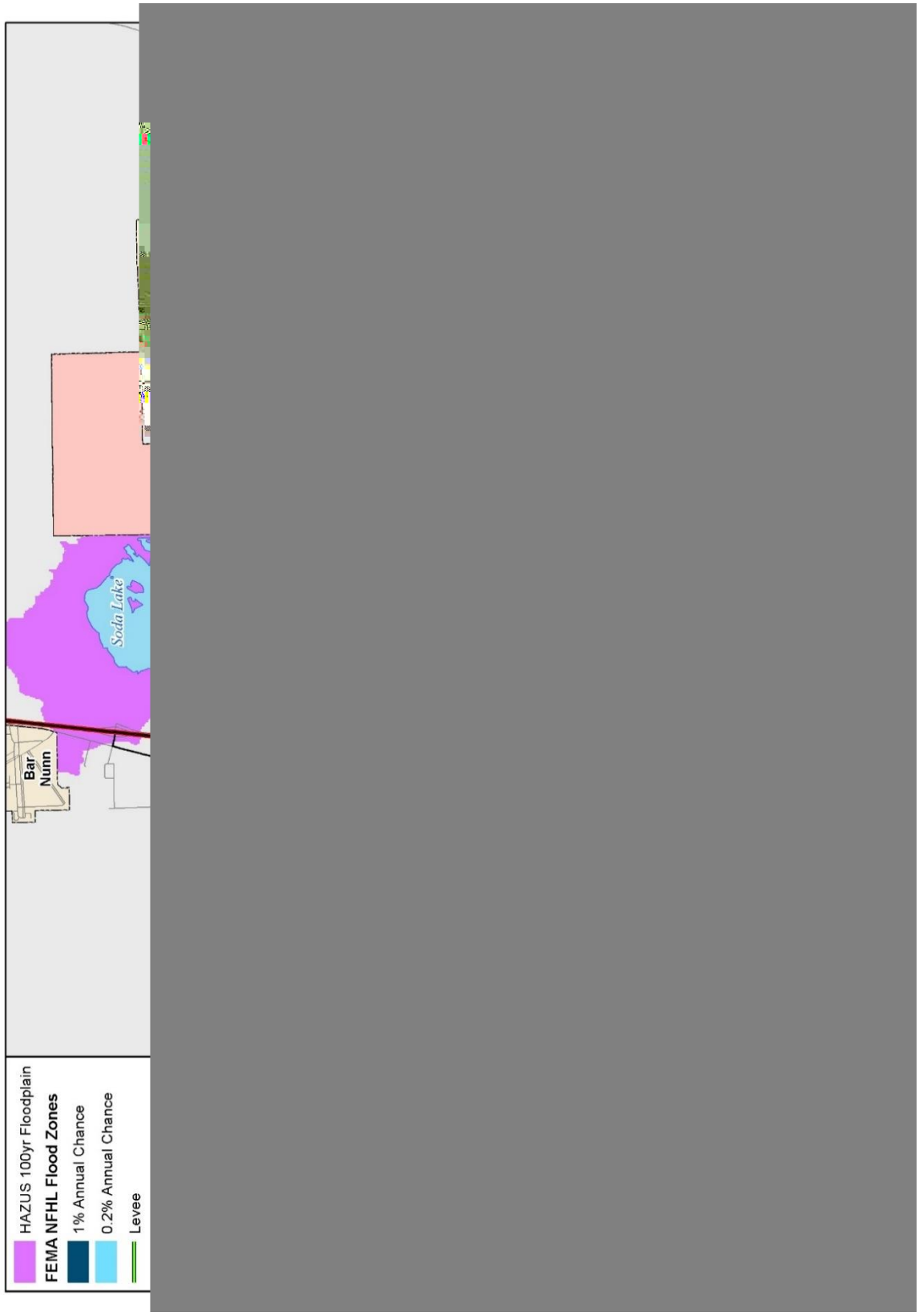


Figure 4.21 Evansville 1% Annual Chance Flood Hazards

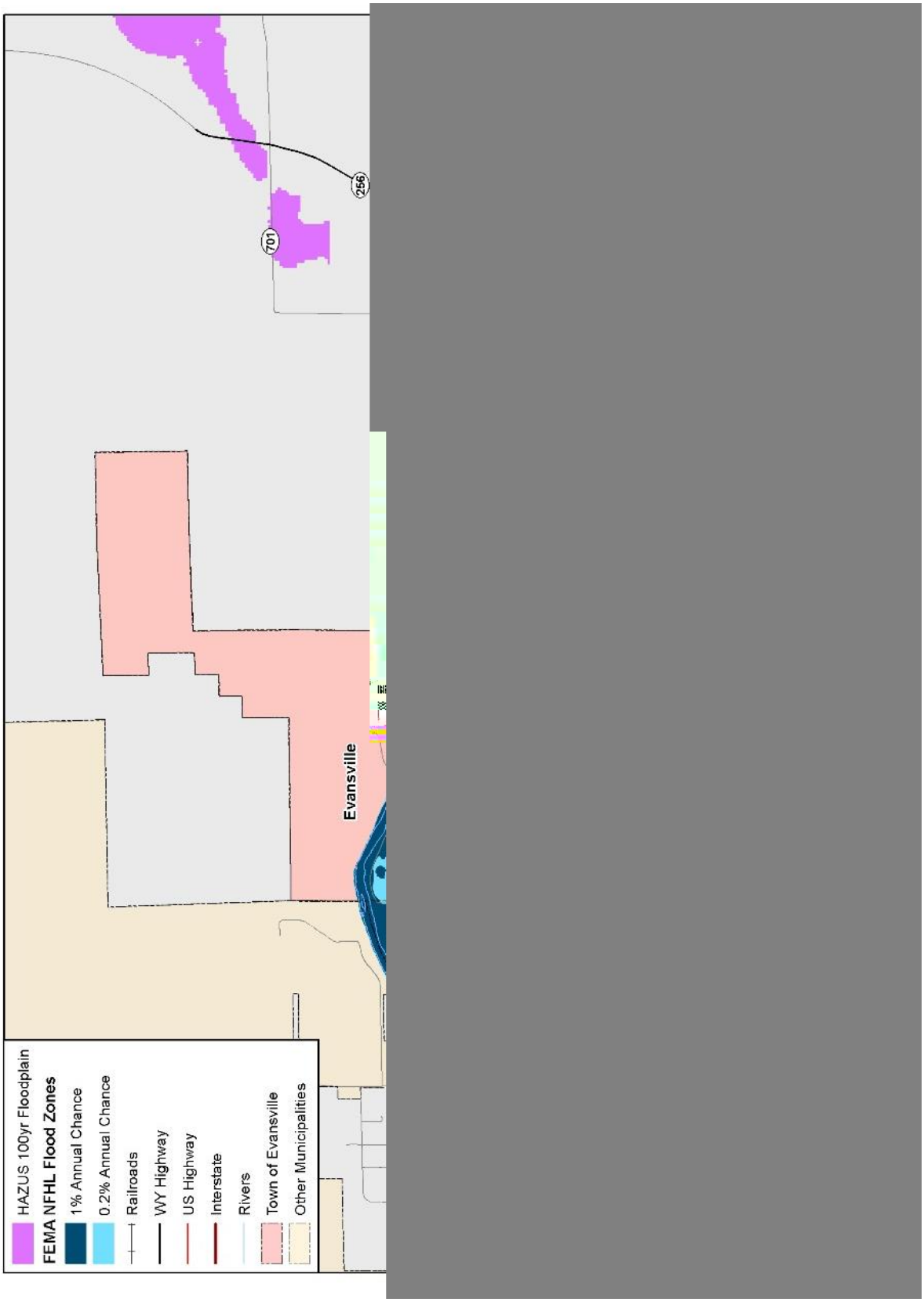
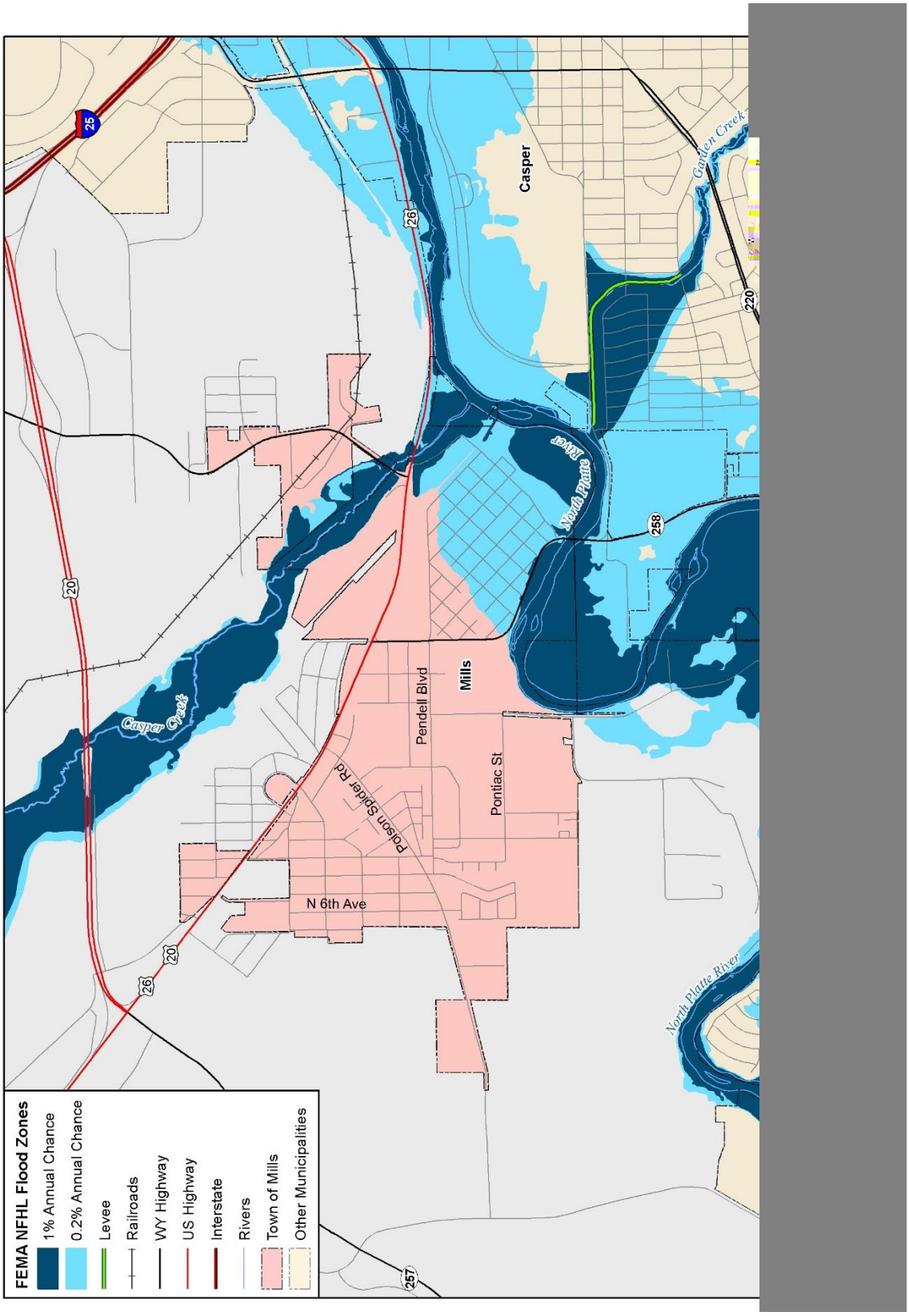


Figure 4.22 Mills 1% Annual Chance Flood Hazards



Past Occurrences

A brief history of significant floods is presented below, while a more extensive summary is included in the county annexes. A damaging flood occurs in the area every year on average, based upon the NCDC data presented below.

Table 4.32 Flood Occurrences in Natrona County

Date	Type of Event	Property Damage
1/29/1996	Flood	$2,000
3/13/1996	Flood	$0
6/19/1998	Flood	$0
1/29/1996	Flood	$2,000
5/29/2001	Flash Flood	$0
5/29/2001	Flash Flood	$0
5/29/2001	Flash Flood	$0
6/16/2003	Flash Flood	$0
7/13/2004	Flash Flood	$0
7/25/2005	Flash Flood	$500,000
8/3/2005	Flash Flood	$85,000
7/19/2007	Flash Flood	$50,000
7/19/2007	Flash Flood	$5,000
7/25/2007	Flash Flood	$300,000
8/2/2007	Flash Flood	$500,000
8/3/2007	Flash Flood	$50,000
8/3/2007	Flash Flood	$15,000
6/13/2009	Flash Flood	$2,000
7/3/2009	Flash Flood	$5,000,000
7/29/2013	Flash Flood	$200,000
8/9/2013	Flash Flood	$17,000
8/9/2013	Flash Flood	$0
8/5/2014	Flash Flood	$200,000
5/24/2015	Flash Flood	$100,000
5/24/2015	Flash Flood	$0
6/5/2015	Flash Flood	$0
10/2/2015	Flash Flood	$40,000
	Total	$7.066,000

Source: NCDC

In May 2001, flash flooding along Teapot and Castle Creeks occurred. No property or crop damage was reported.

In June of 2003, flash flooding occurred and caused rocks, boulder, mud and water to be displaced over Highway 220. No property or crop damage was reported.

In July of 2004, minor flooding reported along Poison Spider Creek with water flowing atop Poison Spider Road. No property or crop damage was reported.

In July of 2005, a line of strong thunderstorms moved west to east across Natrona County between 4:30 p.m. and 6:30 p.m. These storms originated over the Bighorn Mountains of Wyoming and rapidly intensified near the Natrona County International Airport, 6 miles west of Casper, where a 54 kt wind gust was reported. The airport received nearly an inch of rain between 5:35 p.m. and 6:05 p.m. The storms hit the Casper area between 5:50 p.m. and 6:20 p.m. with similar strong outflow winds followed by reports of up to 1.44 inches of rainfall over this 30 minute period. The brief torrent of rain produced flooding on the north side of downtown Casper, shutting down portions of Interstate 25. Portions of Poplar and McKinley streets near the interstate were also blocked with water and mud, which in some cases flowed into business buildings. The strong outflow winds that preceded the storm snapped the top of a cottonwood tree off of its 18 inch diameter trunk and ripped a sheet metal roof off a RV storage shed. Property damage totaled $500,000. There was no crop damage reported.

In August of 2005, in the early evening hours, a strong thunderstorm and its associated heavy rainfall neared the Casper area dropping a significant amount of rainfall. Within the city of Casper, rainfall totals ranged from 1 to 1.5 inches in less than an hour which led to an area of flash flooding. The rushing water moved cars several feet, approached the doorsteps and flooded the basements of several homes in the Allendale area, and caused an underground drainage pipe to give way causing a 20-foot wide sinkhole. Property damage totaled $85,000. There was no crop damage reported.

In July of 2007, Strong and severe thunderstorms spread south along the eastern slopes of the Bighorn Mountains during the afternoon and early evening. These storms produced long periods of hail and very heavy rain. Additional thunderstorms brought heavy rain to areas west and southwest of Casper, including the area near the Jackson Canyon fire burn scar. Property damage reached $105K. Crop damage reached $6K. Later in the month, copious moisture was brought north into Wyoming in strong monsoonal flow. Low-level upslope flow from the north aided the development of showers and thunderstorms. Atmospheric moisture values were around 200 percent of normal. Rainfall estimated by radar to be three inches or more fell in a swath from Emigrant Gap to Bar Nunn. The heavy rain caused flash flooding along Poison Spider Road and other nearby roads as culverts could not handle the large volume of water. Portions of a ranch along Poison Spider Road were under several feet of water. A mobile home park south of Bar Nunn was flooded as water flowed from surrounding higher terrain. The lower floor of the rural Poison Spider Elementary School sustained flood damage as the water poured in through several doorways. Property damage totaled $585K. There was no crop damage reported.

In August of 2007, Thunderstorms producing heavy rain formed northwest of Casper during the late evening. The storms tracked southeast along and south of U.S. Highway 20/26 over areas that had been hard hit by heavy rain over the previous two weeks. Natrona County Emergency Management officials reported flooding at the intersection of Poison Spider and 12 Mile roads at 8:57 p.m. Flooding along Poison Spider Road continued to increase through 10:00 p.m. with additional reports of ditches overflowing in and around Mills. Heavy rainfall of nearly one inch fell in less than 30 minutes at the Natrona County International Airport causing flooding. The Poison Spider Elementary School was flooded for the second time in eight days causing upwards of $100,000 in damage. Total property damage was $500K. The next day, one to two inches of rain fell on already saturated ground west of Casper along Poison Spider Road. Also, rainfall of 0.50 to 1.50 inches fell in less than one hour in and near the city of Casper. The rain produced flash flooding along Poison Spider and Paradise Valley roads and in some locales around Paradise Valley. Urban flooding was also observed along Interstate 25 in Casper. This event resulted in $65K in property damage. There was no crop damage reported.

In June of 2009, severe thunderstorms developed in a moist, upslope flow air mass east of the Continental Divide. The severity of the storms was aided by a disturbance that moved northeast across the area and a favorable jet stream position. Rainfall of one to two inches fell in and around Casper. One location at Wyoming Medical Center recorded 1.75 inches of rain. The water accumulated at the intersection of Poplar and CY avenues and flooded the area. There was $2K reported in property damage. There was no crop damage reported.

In July of 2009, a vicious thunderstorm struck the city of Casper between about 5:15 and 6:00MST at the start of the July 4th holiday weekend. Extreme rainfall rates falling on the urbanized landscape produced flash flooding throughout Casper, with the most extensive inundation centered on the intersection of Poplar and Collins streets. Nearly one inch of rain fell in 21 minutes at the Natrona County International Airport northwest of the city. A precipitation gauge along the North Platte River in Casper reported 1.79 inches of rain in 30 minutes. Final tallies around town showed rainfall from around one inch up to a high of about 2.25 inches occurred within about a 35 minute time frame. Several streets, including Poplar and McKinley were reported to be rivers carrying rocks and other debris toward downtown Casper. Reports indicated one to three feet of water was present on some city streets. The flash flooding floated several cars and sent storm drains shooting wildly into the air. One storm drain cover injured an individual as the surging water displaced it. Emergency management estimated anywhere from 800 to 1000 structures, mainly homes, were impacted by the flooding. In addition to hundreds of impacted homes, many well-known locations also sustained damage, including the Nicolaysen Art Museum, Wyoming Medical Center, Central Wyoming Fairgrounds, Three Crowns Golf Course, and several city school buildings. Major damage also occurred at Casper College where five buildings, including the gymnasium and theater, were significantly impacted. Retaining wall bricks and landscape gravel were washed from a hillside at the college and cascaded to neighboring residences and streets below. The Hall of Justice on North David Street also sustained significant damage when water poured through a door into an underground garage. The building's elevator shafts and the ceilings in several sheriff's offices were also damaged. Property damage resulted in $5M. There was no reported crop damage.

In July of 2013, Heavy rain began falling around 7:00MST over east Casper and the east end of Casper Mountain. Thunderstorms had approached the area from the southwest and a low-level northeast flow made for a slower progression over east Casper. The result was rainfall of one-half to one-inch in about 25 minutes. Street flooding was observed along East 2nd Street from Wyoming Boulevard toward Hat Six Road. The water was up to two feet deep near the intersection of Blackmore Road and East 2nd Street. Hail around one-half inch in diameter accumulated to a depth of several inches. The most significant flooding occurred at the Hat Six Ranch at the east end of Casper Mountain. The steep canyons and hillsides above the ranch were torched the previous September by the Sheep Herder Hill Wildfire. Excessive rainfall quickly brought a mix of rock, mud, and debris down one canyon and another draw damaging two homes, at least three vehicles, and two all-terrain vehicles. Water and debris eventually found the Clear Fork Muddy Creek channel and spread out to be anywhere from 50 to 100 yards wide. One additional ranch received damage as the creek swept northeast and eventually topped the Hat Six Road. Property damage reached $200K. There was no reported crop damage.

In August of 2014, slow-moving thunderstorms produced very heavy rain near the Red Wall and Gray Wall in northern Natrona County. Radar estimated up to 3.5 inches of rain fell within one hour in the Hackett Creek drainage, while widespread 1.5 inch amounts were estimated across a larger area near the walls. The Alkali, Indian, and Willow creek drainages were significantly impacted. Damage to county roads was extensive as culverts could not handle the volume of water and debris which washed down hillsides and across the roads. There were numerous instances of water, mud, and debris across Willow Creek and Baker Cabin roads. Small reservoirs quickly filled with water and overflow channels were utilized. Large hail also occurred with the thunderstorms which further complicated the situation. Hail stones larger than a quarter were still visible in deep drifts the morning after the deluge. Hay meadows, backcountry roads, and a ranch fence line were all damaged by the flood waters and hail. Near the Willow Creek Ranch and downstream near the rural Willow Creek School, the flood waters on Willow Creek were estimated at over 100 yards wide and at least 4 to 5 feet deep. The high water re-routed the creek and left a large amount of sediment and debris behind. Farther upstream near the two walls, the flood waters tore loose the soil and grass of Hackett Creek scouring out the creek bed. Numerous fences were destroyed and at least one residence reported flooding near the school. The school itself was damaged when a small drainage overflowed a county road sending water and debris cascading into the building. Property damage reached $200K. There was no reported crop damage.

In May of 2015, A slow-moving upper level low south of Wyoming sent waves of moisture northward over central and eastern Wyoming during the Memorial Day holiday weekend. Measured and estimated rainfall totals ranged from two to around five inches. This resulted in flooding and flash flooding in several areas. Johnson County saw significant flooding along the tributaries and main stem of the Powder River and around Buffalo. The greatest impact was felt in Hot Springs County where heavy rains in the Wind River Canyon resulted in several mud and rock slides that closed State Highway 789 between Thermopolis and Shoshoni. Several storm spotters reported flash flooding on Salt Creek in Natrona County. Some county and Bureau of Land

Management roads were washed out. At least one fracking trailer was destroyed south of town. Property damage in the area of Salt Creek totaled $100K.

In October of 2015, West-northwest moving showers and thunderstorms tracked up the south slope of the Bighorn Mountains during the late afternoon of October 2. Heavy rain estimated at 0.75 inch to around 1.00 inch fell in a 20 to 30 minute period in the Buffalo Creek drainage. The water quickly ran off the steep slopes into creeks and streams feeding Buffalo Creek. Eyewitness reports indicated the creek went from a dry creek to well outside its banks in just minutes. The raging waters damaged a county road in several spots, overtopped and damaged a ranch road, and ruined fence line at a rural ranch. Property damage reached $40K. There was no reported crop damage.

During the HMP Risk and Goals meeting, recent occurrences were noted. Periodic flooding has occurred in the past five years including 2012, 2015, and 2016. 2016 flooding along the North Platte was minimal due to mitigation and greenway efforts along the Platte River Parkway. Flash flooding resulted in evacuations in the 33 Mile area June 5, 2015 (the day after flooding in Lusk in 2015).

Frequency/Likelihood of Occurrence

With 27 recorded floods in the last twenty years, a flood of at least minimal magnitude occurs roughly every year in the County. Most of these floods were less than the 100-year flood; the chance of a 100-year flood occurring within any 30-year period is 26%. The chance of a 100-year flood occurring in any 100-year period is approximately 63%. Using the formula in Section 4.2, this yields a 10-100 % probability. This corresponds to a **Likely** occurrence rating, meaning that a flood has a 10-100 percent chance of occurrence in the next year somewhere in the County.

Potential Magnitude

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 the County span a comprehensive range and are summarized as follows:

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

Floods present a risk to life and property, including buildings, their contents, and their use. Floods can affect crops and livestock. Floods can also affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies. The

impact of a flood event can vary based on geographic location to waterways, soil content and ground cover, and construction. 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.

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 have caused the worst historic flood impact in terms of property damage, loss of life, etc. The flood of record in Natrona County occurred in July 2009 just west of Casper. Intense rainfall accompanied a strong thunderstorm which gained strength just west of Casper before blasting though town. Longtime residents reported this to be the worst flash flooding they had seen in the city. Several streets, including Poplar and McKinley were reported to be rivers carrying rocks and other debris toward downtown Casper. Reports indicated one to three feet of water was present on some city streets. The flash flooding floated several cars and sent storm drains shooting wildly into the air. One storm drain cover injured an individual as the surging water displaced it. Emergency management estimated anywhere from 800 to 1000 structures, mainly homes, were impacted by the flooding. In addition to hundreds of impacted homes, many well-known locations also sustained damage, including the Nicolaysen Art Museum, Wyoming Medical Center, Central Wyoming Fairgrounds, Three Crowns Golf Course, and several city school buildings. Major damage also occurred at Casper College where five buildings, including the gymnasium and theater, were significantly impacted. Retaining wall bricks and landscape gravel were washed from a hillside at the college and cascaded to neighboring residences and streets below. The Hall of Justice on North David Street also sustained significant damage when water poured through a door into an underground garage. The building's elevator shafts and the ceilings in several sheriff's offices were also damaged. Property damage totaled $5M.

One method of examining the magnitude and severity of flooding in the planning area is to examine the damage losses and payments from the National Flood Insurance Program. This information is not comprehensive, because it only reflects the communities which participate in the NFIP, but it is a useful overview of flood damages in the planning area. The information below represents the composite of unincorporated and community-specific policies, claims and payments. There were no repetitive losses or substantial damage claims reported.

Table 4.33 NFIP Claims and Payments in Natrona County 1978-2016

Jurisdiction	Policies	Coverage	# of Claims	Paid Losses	# of Policies in A Zones	# of Policies in Non A Zones
Barr Nunn	n/a	n/a	n/a	n/a	n/a	n/a
Casper	223	$45,597,900	20	$125,586	134	89
Edgerton	n/a	n/a	n/a	n/a	n/a	n/a
Evansville	2	$630,000	0	0	0	2
Midwest	n/a	n/a	n/a	n/a	n/a	n/a
Mills	4	$735,000	0	0	0	4
County	46	$14,083,500	1	$2,726	21	25

Source: FEMA Policy and Claim Statistics http://www.fema.gov/policy-claim-statistics-flood-insurance

The potential magnitude for a flood event in the planning area is generally **limited**. An event of limited magnitude would result in some injuries, a complete shutdown of critical facilities for over a week, and damages to more than 10% of the planning area. This is consistent with the flood event history in the County. The flood history indicates that damaging floods have occurred consistently in the County. Fortunately, there has been no loss of life or any significant injury caused by floods in the county.

Vulnerability Assessment

Population

Vulnerable populations in the County include residents living in known flooding areas or near areas vulnerable to flash floods. Certain populations are particularly vulnerable. This may include the elderly and very young; those living in long-term care facilities; mobile homes; hospitals; low-income housing areas; temporary shelters; people who do not speak English well; tourists and visitors; and those with developmental, physical, or sensory disabilities. These populations may be more vulnerable to flooding due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

As part of this plan's preparation, an estimate of the population exposed to flooding was created using a GIS overlay of existing DFIRMs on potentially flooded parcels. The flood-impacted population for each jurisdiction in the county was then calculated by taking the number of parcel units in the 1% annual chance and .02% annual chance floodplains and multiplying that number by the average household size based on the Census Bureau's estimate for the county. The average household factor was 2.44 in Natrona County.

Property and Economic Losses

GIS analysis was used to estimate Natrona County's potential property and economic losses. The parcel layer was used as the basis for the inventory of developed parcels. An address point layer was used to represent buildings, which was overlaid on the floodplain layer. For the purposes of

this analysis, the flood zone that intersected the address point was assigned as the flood zone for the entire parcel. In some cases, there are parcels in multiple flood zones, such as Zone A and X 500. Another assumption with this model is that every parcel with an improvement value greater than zero was assumed to be developed in some way. Only improved parcels, and the value of those improvements, were analyzed and aggregated by jurisdiction, property type and flood zone. The summarized results for the planning area are shown below

Table 4.34 shows the count and improved value of parcels in the planning area, broken out by each jurisdiction, that fall in a floodplain, by 1% annual chance flood and 0.2% annual chance flood. The table also shows loss estimate values which are calculated based upon the improved value and estimated contents value. The estimated contents value is 50% of the improved value; the total value is the sum of the improved and estimated contents values; the loss estimate is 25% of the total value based on FEMA's depth-damage loss curves. For example, a two-foot flood generally results in about 25% damage to the structure (which translates to 25% of the structure's replacement value).

Table 4.34 Natrona County FEMA 1% Annual Chance Flood Risk Summary by Jurisdiction

Jurisdiction	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Casper	488	669	$55,332,980	$30,192,351	$85,525,331	$21,381,333	1,379
Evansville	5	5	$1,973,011	$1,865,907	$3,838,918	$959,730	2
Mills	10	16	$839,867	$801,531	$1,641,398	$410,349	12
Unincorporated	345	441	$50,084,868	$37,242,907	$87,327,775	$21,831,944	781
Total	848	1,131	$108,230,726	$70,102,695	$178,333,421	$44,583,355	2,174

Table 4.35 Natrona County FEMA .02% Annual Chance Flood Risk Summary by Jurisdiction

Jurisdiction	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Casper	1,801	2,072	$240,271,148	$159,052,979	$399,324,127	$99,831,032	3,887
Evansville	258	277	$23,774,147	$12,065,397	$35,839,544	$8,959,886	583
Mills	294	379	$15,171,838	$12,192,736	$27,364,574	$6,841,144	651
Unincorporated	265	399	$47,901,073	$32,389,893	$80,290,966	$20,072,742	559
Total	2,618	3,127	$327,118,206	$215,701,005	$542,819,211	$135,704,803	5,680

Based on this analysis, the planning area has significant assets at risk to the 100-year and greater floods. There are 848 improved parcels within the 100-year floodplain (1% annual chance) for a total improved value of $108M. There are 2,618 improved parcels within the 500-year floodplain (0.2% annual chance) for a total value of $327M. Overall, Natrona County potentially faces almost

$169 million in losses from flooding. Approximately $44 million of that is based on damage estimates from the 1% annual chance flood, with the remaining $135 million in damages resulting

Table 4.36 Critical Facilities within 1% Chance FEMA Flood Zone

Jurisdiction	Critical Facility Type	Facility Count
Casper	Community Support	1
	EPA FRS Location	3
	Substation	1
	Total	5
Evansville	EPA FRS Location	1
	Total	1
Unincorporated	EPA FRS Location	2
	Substation	3
	Tier II	3
	Total	8
	Grand Total	14

Table 4.37 Critical Facilities within 0.2% Chance FEMA Flood Zone

Jurisdiction	Critical Facility Type	Facility Count
Casper	Community Support	8
	Day Cares	5
	EPA FRS Location	56
	EPA Regulated Facility	1
	Fire Department	1
	Law Enforcement	3
	EOC (on 2nd floor)	1
	National Shelter System Facility	2
	School	1
	Special Medical Facility	3
	Substation	2
	Tier II	8
	Total	91
Mills*	Day Cares	3
	EPA FRS Location	1
	Senior/community center (former Fire Station #9)	1
	National Shelter System Facility	1
	School	1
	Tier II	1
	Total	8
Unincorporated	Air Facility	1
	EPA FRS Location	10
	National Shelter System Facility	1
	Substation	1
	Total	13
	Grand Total	112

*The Mills town Hall, Public Works department and Water Treatment Plant are all near the river according to the HMPC

Natural, Historic, and Cultural Resources

Natural resources are generally resistant to flooding except where natural landscapes and soil compositions have been altered for human development or after periods of previous disasters such as drought and fire. Wetlands, for example, exist because of natural flooding incidents. Areas that are no longer wetlands may suffer from oversaturation of water, as will areas that are particularly

impacted by drought. Areas recently suffering from wildfire damage may erode because of flooding, which can permanently alter an ecological system.

Tourism and outdoor recreation is an important part of the County's economy. If part of the planning area were damaged by flooding, tourism and outdoor recreation could potentially suffer.

Future Development

For NFIP participating communities, floodplain management practices implemented through local floodplain management ordinances should mitigate the flood risk to new development in floodplains. As the unincorporated County is not mapped there is potential for flood prone development to occur. The HMP noted that after the construction of Pathfinder Reservoir, development has encroached closer to the North Platte River.

Summary

Overall, flooding presents a **medium risk** for Natrona County. A 0.2% annual chance flood would have significant consequences. Somewhere in the county floods almost every year. Flooding has damaged homes, infrastructure (roads and bridges), and caused agricultural losses in the planning area in the past. Flood risk varies by jurisdiction.

Table 4.38 Flood Hazard Risk Summary

	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Limited	Limited	Likely	Medium
Casper	Significant	Critical	Likely	High
Edgerton	Limited	Limited	Likely	Medium
Evansville	Significant	Limited	Likely	Medium
Midwest	Limited	Limited	Likely	Medium
Mills	Significant	Critical	Likely	High
Natrona County	Significant	Limited	Likely	Medium

4.3.6 Hazardous Materials

Hazard Description

Generally, a hazardous material is a substance or combination of substances which, because of quantity, concentration, or physical, chemical, or infectious characteristics, may either (1) cause or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, disposed of, or otherwise managed. Hazardous material incidents can occur while a hazardous substance is stored at a fixed facility, or while the substance is being transported.

The U.S. Department of Transportation, U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) all have responsibilities in regards to hazardous materials and waste.

The U.S. Department of Transportation has identified the following classes of hazardous materials:

- Explosives
- Compressed gases: flammable, non-flammable compressed, poisonous
- Flammable liquids: flammable (flashpoint below 141 degrees Fahrenheit) combustible (flashpoint from 141 - 200 degrees)
- Flammable solids: spontaneously combustible, dangerous when wet
- Oxidizers and organic peroxides
- Toxic materials: poisonous material, infectious agents
- Radioactive material
- Corrosive material: destruction of human skin, corrodes steel

Natrona County is home to several gas plants, refineries and mines, and hazardous materials transportation routes, pipelines and rail lines run across the County, creating a likely potential for hazardous materials releases.

Geographical Areas Affected

Hazmat incidents can occur at a fixed facility or during transportation. Hazardous materials facilities are identified and mapped by the counties they reside in, along with the types of materials stored there. Some facilities contain extremely hazardous substances; these facilities are required to generate Risk Management Plans (RMPs), and resubmit these plans every five years.

Hazardous materials routes are also present in the County. Interstate 25 goes directly north through the county and the Casper metropolitan area. Major rail lines run through the county as well, and can convey hazardous materials. The HMPC explained that railroad goes through the Casper metropolitan area and Evansville, which can include cars carrying ore from uranium mines. Generally, any infrastructure or populations located within a half mile of a hazardous materials route or fixed facility can be considered at elevated risk for impacts from a hazmat incident.

A 2017 commodity flow study conducted by the University of Wyoming Department of Civil and Architectural Engineering examined HAZMAT traffic from four different study locations in Natrona County. Using data from the 2015 Wyoming Vehicle Miles Report a monthly average daily traffic (MADT) was calculated for each of the study locations. HAZMAT truck percentages are based on the percentage of HAZMAT trucks counted during field data collection. Using the estimated number of HAZMAT trucks per day, the study went on to calculate the potential range of hazardous materials transported by different truck body configurations (straight truck, truck-trailer, and multi-trailer).

Total min amount = MADT ×% of trucks × %of HAZMAT trucks × body config. × min capacity
Total max amount = MADT ×% of trucks × %of HAZMAT trucks × body config. × max capacity

Table 4.39 displays the minimum and maximum amount of hazardous materials transported along these major routes.

Table 4.39 HAZMAT Traffic Assessment in Natrona County

Study Location	Monthly Average Daily Traffic	% of Truck	% of HAZMAT Trucks	Monthly Average Number of HAZMAT trucks per day	Total Amount (US gallons/day) Min/Max
US 220 MP 108	3,082	17.9%	10.5%	58	424,401/806,511
US 20/26 MP 12	2,211	11.6%	10.7%	27	217,245/407,116
I-25 East of Casper MP 182.06	8,188	17.9%	12.7%	186	1,131,353/2,061,772
I-25 North of Casper MP 192	5,505	17.9%	15.3%	151	966,289/1,768,941

The estimated minimum/maximum amounts of the transported HAZMATs were 424,401/806,511 US gallons/day for US 220 south of Casper, 217,245/407,116 US gallons/day for US 20/26 west of Casper, 1,131,353/2,061,772 US gallons/day for I-25 south of Casper and 966,289/1,768,941 US gallons/day for I-25 north of Casper. It should be noted that these numbers were estimated without taking seasonal variation into account due to lack of seasonal factors for HAZMAT transportation in Wyoming.

Data analysis showed that the most common HAZMAT class being transported is class 3, which is flammable liquids. Accordingly, it would indicate that the most likely HAZMAT incident could happen would involve a class 3 HAZMAT of flammable liquids. Flammable liquids (Class 3) HAZMAT has the highest percentage among the transported HAZMAT classes. It represents 55.8% of transported HAZMAT on 1st location, 85.4% on 2nd location, 78.5% on 3rd location and 85.3% on 4th location, averaged for both directions.

Past Occurrences

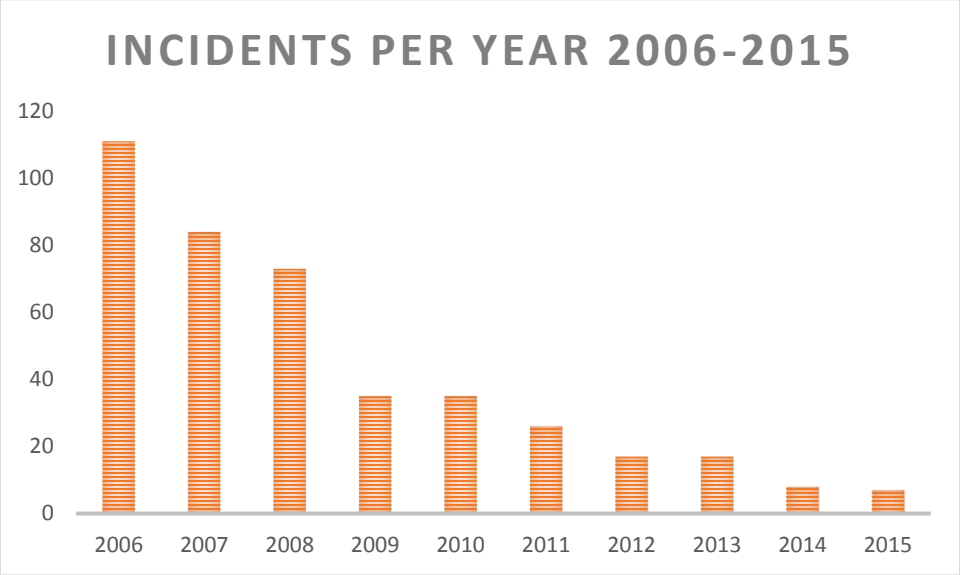
There are a variety of mechanisms to get an idea of the number and types of historical hazardous materials spills in Natrona County. One such repository is the catalog of hazardous materials spill and accident reports at the National Response Center (NRC) as part of the Right to Know Network (RTK NET). The figure below shows a ten-year record for reported incidents in the Natrona County.

413 hazardous materials incidents were recorded between 2006 and 2015 in Natrona County. Zero fatalities, hospitalizations, injuries and evacuations were recorded, and no property damage was reported in any of these incidents.

The HMPC reported a high number of incidents in Midwest. It was speculated that this could be venting of CO2 which would need to be reported. Gas lines has been hit during digs that did not call ahead.

Natrona County has seen a sharp decline in the number of recorded incidents. Between 2006 and 2015, the number has steadily dropped from a high of 111 reported incidents in 2006 to seven incidents recorded in 2015. The following figure shows this trend.

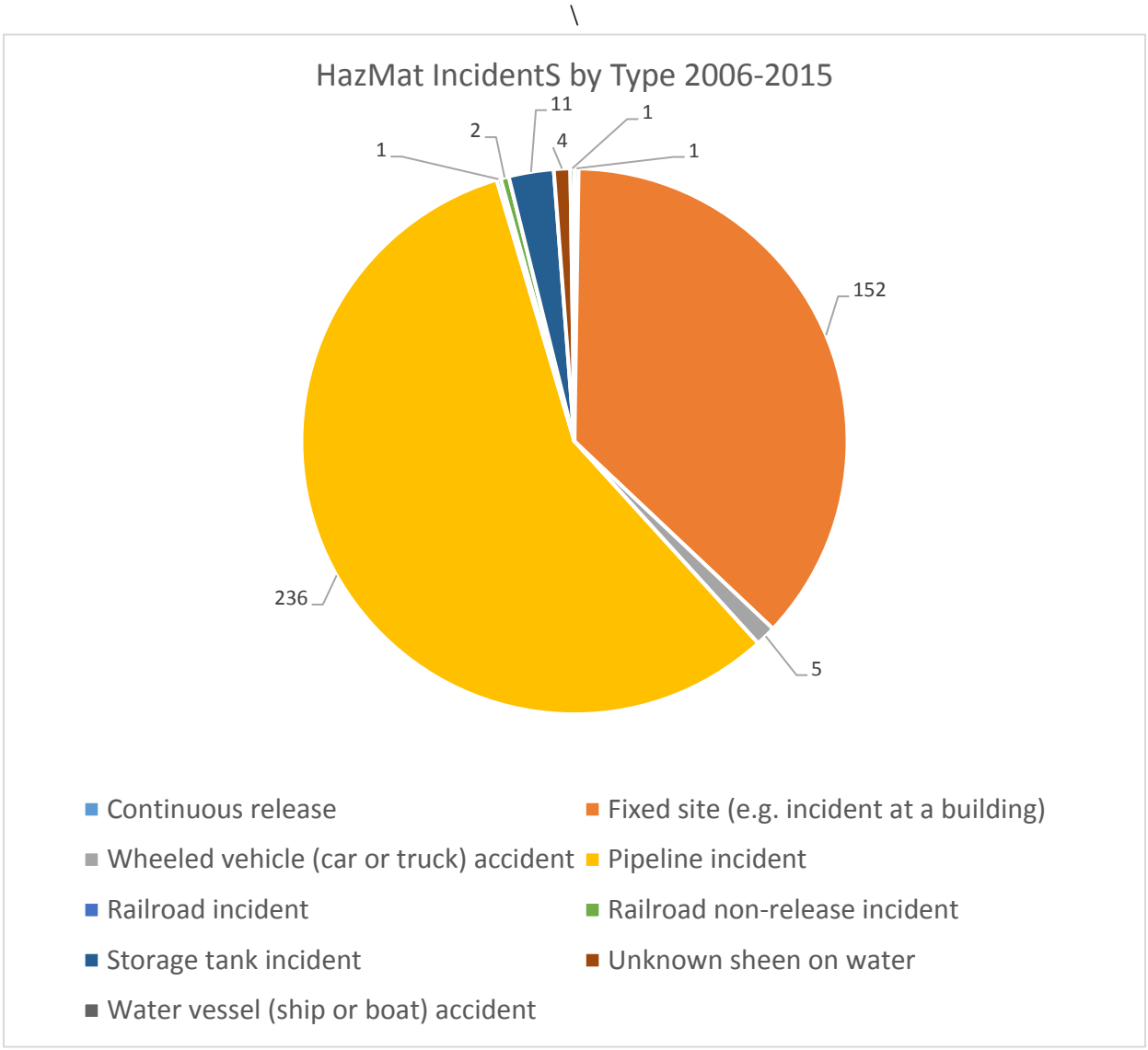
Figure 4.24 Hazardous Materials Spills/Accidents Reported to the NRC 2006-2015



Source: National Response Center

According the NRC site, the incident types with the highest rates of reports were fixed-site incidents (152) and pipeline incidents (236); together, incidents of these types made up 94% of total incidents reported.

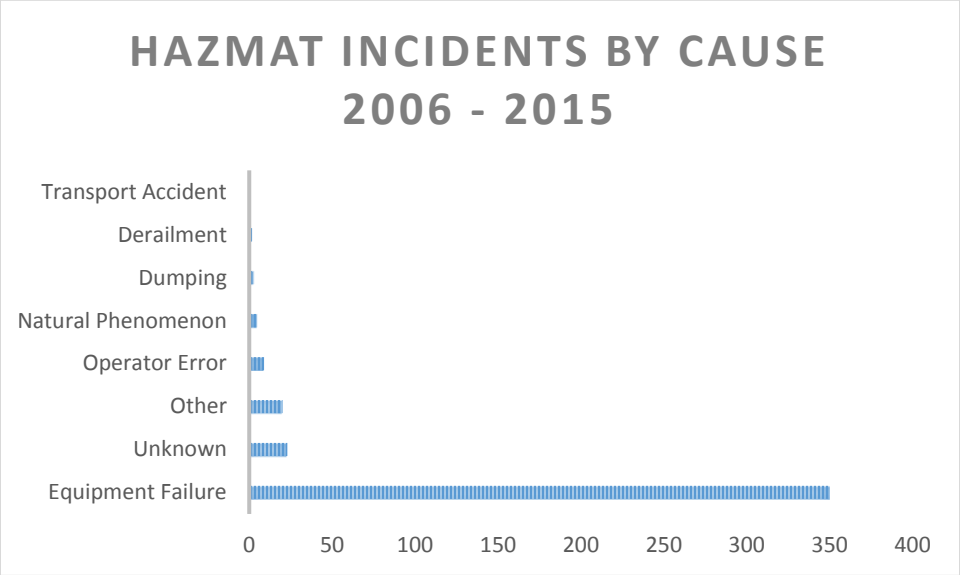
Figure 4.25 Hazardous Materials Spills/Accidents by Type 2006-2015



Source: National Response Center

Equipment failure was by far the most prevalent reason for hazardous materials spills and accidents in Natrona County. Operator error, natural phenomenon, dumping derailment and transportation accidents were also responsible for spills reported in the County. The figure below shows incidents by cause in the County between 2006 and 2015.

Figure 4.26 Hazardous Materials Spills/Accidents by Cause 2006-2015



Source: National Response Center

According to the data, the community of Midwest experienced the highest number of incidents with 258, followed by Casper with 84. Evansville, Alcova, Mills, Edgerton, Arminto, Bishop and Bar Nunn also experienced hazardous materials incidents, but at a much lower rate than the two top communities.

Table 4.40 Hazardous Materials Incidents by Community 2006-2015

City	Incidents
Midwest	258
Casper	84
Evansville	3
Alcova	2
Mills	2
Edgerton	2
Arminto	1
Bishop	1
Bar Nunn	1
Unidentified	58
Total	413

Source: National Response Center

In addition to local first responders, eight Regional Emergency Response Teams across the State of Wyoming respond to a variety of incidents, including those incidents involving hazardous materials. Natrona County is serviced by the Region 2 RERT, located in Casper. The following table shows records of Region 2 RERT mission assignments pertaining to hazardous materials releases, according the 2016 Wyoming State Hazard Mitigation Plan. It should be noted that this data is *regional*, not county-specific.

Table 4.41 Region 2 RERT Mission Assignments – Hazardous Materials: 2004-2015

Type	Number
Fixed Facility	5
Truck/Highway	16
Rail	-
Pipeline	-
Aircraft	2
Orphan Drum	1
Total	24

Source: 2016 Wyoming State Hazard Mitigation Plan

According to the HMPCs, small-level hazardous materials incidents occur frequently throughout the year in the county. Some of the history of incidents since 2006 include:

- 2006: January 12 – HWY 220 Accident involving roll- over of semi-truck carrying sodium cyanide
- 2008: April 25 – Tanker truck oil spill of motor oil on Robertson Road and CY Avenue
- 2009: May 30 – Oil Camp Road, several oil tanks on fire
- 2009: June 19 – Radiological incident at Tuboscope on Zero Road, Wyoming Recycling, and City of Casper Balefill
- 2016: March 2 – Gas leak and explosion in Bar Nunn with one injury

Likelihood of Future Occurrence

According to National Response Center data, Natrona County experiences multiple hazardous materials incidents each year; there is a 100% chance that the County will experience a hazardous materials incident in any given year.

Potential Magnitude of Impacts

Impacts that could occur from hazardous waste spills or releases include:

- Injury
- Loss of life (human, livestock, fish and wildlife)
- Evacuations
- Property damage
- Air pollution
- Surface or ground water pollution/contamination
- Interruption of commerce and transportation

Numerous factors go into the ultimate impacts of a hazardous materials release, including method of release, the type of material, location of release, weather conditions, and time of day. This makes it difficult to nail down precise impacts. Hazardous materials found in the County will have at least one of the impacts listed above, and probably more.

Historical data doesn't provide much to go on, as NRC data doesn't record any fatalities, injuries or economic impacts from hazardous materials incidents in the last ten years.

Vulnerability Assessment

Natrona County and many of the municipalities have energy pipelines, Interstate and state highways, and railroad tracks which carry many types of hazardous materials. A variety of hazardous materials originating in the County or elsewhere are transported along these routes, and could be vulnerable to accidental spills. Consequences can vary depending on whether the spill affects a populated area vs an unpopulated but environmentally sensitive area.

Because of the volatility of some hazardous materials and the increased risk they pose to the facility and the surrounding area, the 1990 Clean Air Act requires facilities that use extremely hazardous substances to develop a Risk Management Plan (RMP). These plans help local fire, police and emergency response personnel prepare for and respond to chemical emergencies. There are 4 RMP facilities located in Natrona County, as noted in the following table.

Table 4.42 RMP Facilities in Natrona County

Community	Number of Facilities
Casper	2
Evansville	1
Midwest	1
Total	4

Source: http://www.rtknet.org

The GIS analysis conducted in the 2017 update of the plan identified critical facilities at risk to hazards, including hazardous materials facilities. See the vulnerability discussion in the flood, landslide, and wildfire hazard sections, each of which identify EPA or Tier II facilities potentially at risk to hazard incidents.

Potential losses can vary greatly for hazardous material incidents. For even a small incident, there are cleanup and disposal costs. In a larger scale incident, cleanup can be extensive and protracted. There can be deaths or injuries requiring doctor's visits and hospitalization, disabling chronic injuries, soil and water contamination can occur, necessitating costly remediation. Evacuations can disrupt home and business activities. Large-scale incidents can easily reach $1 million or more in direct damages.

Future Development

Fixed facilities with hazardous materials are identified and mapped. Transportation routes are also identified. Considerations should be given to hazardous materials when new development is planned to ensure that high concentrations of vulnerable populations are not located nearby (e.g. schools and nursing homes). If an uptick in oil and gas development and extraction occurs, this could result in greater exposure for transportation incidents.

Summary

Table 4.43 Hazardous Materials Hazard Risk Summary

	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Negligible	Limited	Highly Likely	Medium
Casper	Significant	Limited	Highly Likely	Medium
Edgerton	Negligible	Limited	Highly Likely	Medium
Evansville	Significant	Limited	Highly Likely	Medium
Midwest	Negligible	Limited	Highly Likely	Medium
Mills	Limited	Limited	Highly Likely	Medium
Natrona County	Limited	Limited	Highly Likely	Medium

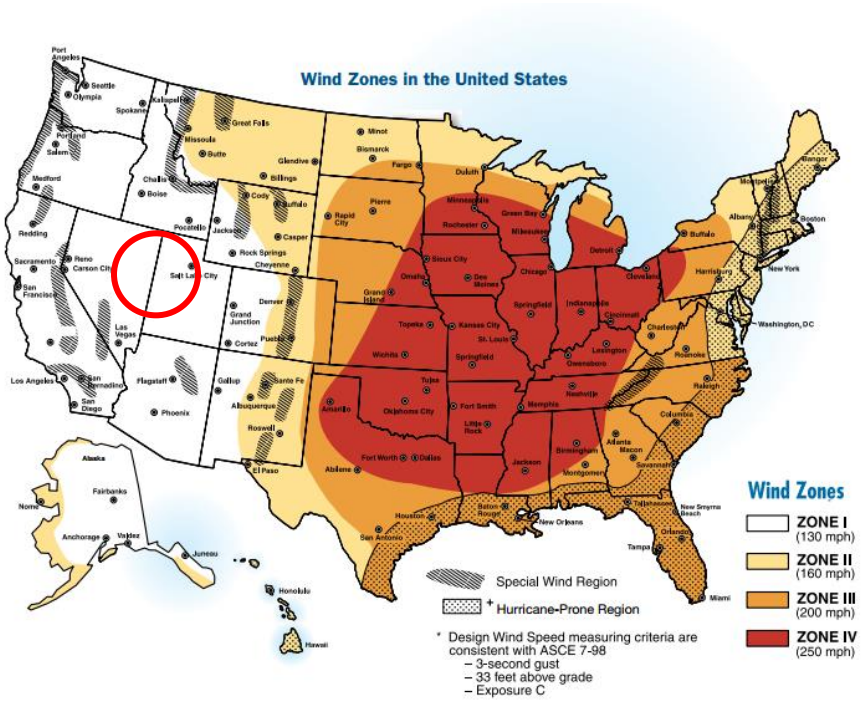
4.3.7 High Winds and Downbursts

Hazard Description

Wind, because of its constant presence in Wyoming, can be overlooked as a hazard. Upon analysis, wind can be a damage-inducing hazard and warrants review in the County. Wyoming's wind is also becoming an economic factor as renewable wind energy is developed around the state.

The wind zone map shown below indicates the potential magnitude of wind speeds. Most of the Planning area is in Zone II, which could expect winds up to 160 mph.

Figure 4.27 Wind Zones in the United States

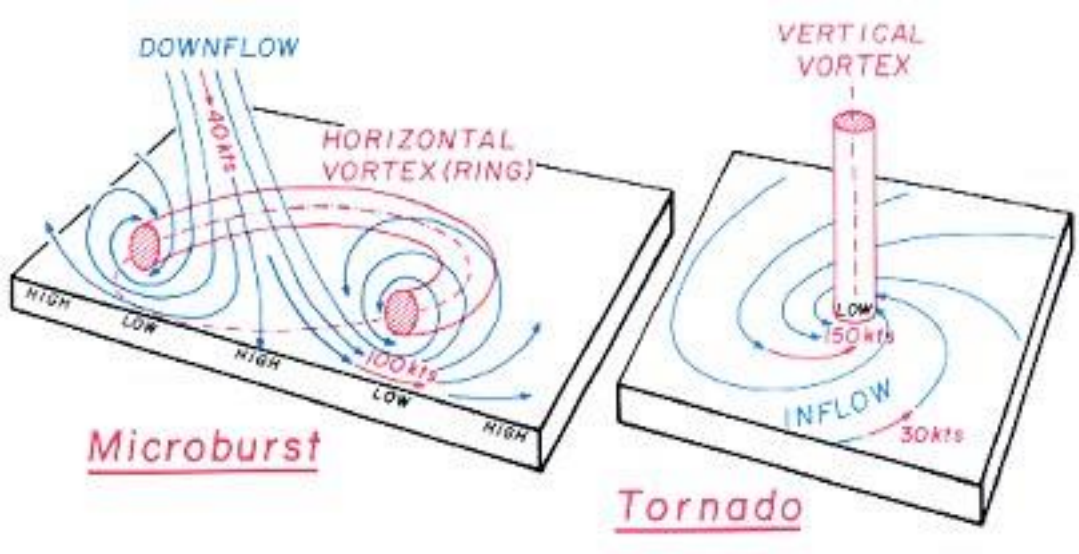


This profile examines the hazard that high winds present including downbursts, a subcategory of high winds. A downburst is a strong down draft which causes damaging winds on or near the ground. Downbursts are much more frequent than tornadoes, and for every one tornado there are approximately 10 downburst damage reports. Downbursts can be associated with either a heavy precipitation or non-precipitation thunderstorm (dry or wet downbursts), and often occur in the dissipating stage of a thunderstorm. Microbursts and macrobursts are categories of downbursts, classified by length of duration, velocity of wind, and radius of impact.

Microbursts generally last between five and 15 minutes, and impact an area less than three miles wide. Macrobursts can last up to 30 minutes with winds up to 130 miles per hour, and can impact areas larger than three miles in radius. Microbursts and macrobursts may induce dangerous wind shears, which can adversely affect aircraft performance, cause property damage and loss of life.

A downburst can occur when cold air begins to descend from the middle and upper levels of a thunderstorm (falling at speeds of less than 20 miles an hour). As the colder air strikes the Earth's surface, it begins to 'roll' outward. As this rolling effect happens, the air expands causing further cooling and having the effect of pulling the shaft of air above it at higher and higher speeds.

Figure 4.28 Schema of Microburst and Tornado



Source: www.erh.noaa.gov

Downbursts can be mistaken for tornadoes by those that experience them since damages and event characteristics are similar. Tornado winds can range from 40 mph to over 300 mph. Downbursts can exceed winds of 165 mph and can be accompanied by a loud roaring sound. Both downbursts and tornadoes can flatten trees, cause damage to homes and upend vehicles. In some instances, aerial surveying is the best method to determine what kind of event has taken place.

Figure 4.29 Aerial Image of Downburst Damage

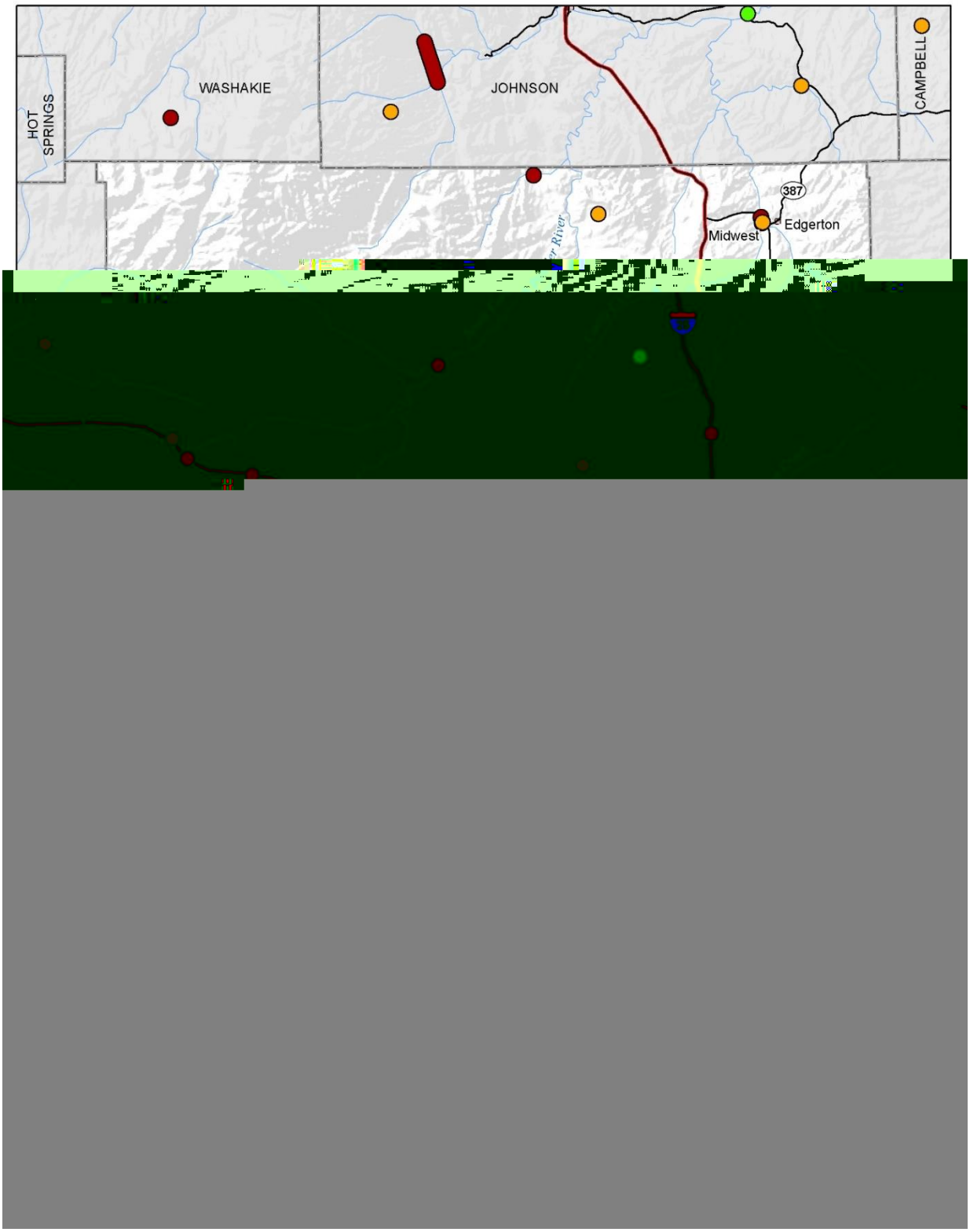
Source: T. Fujita

In this photograph, trees are blown down in a straight line - a very strong indication of a downburst as opposed to a tornado.

Past Occurrences

In the County, most documented wind events causing damage typically range between 50-59 mph; max wind speeds of up to 85 mph have been recorded. It should be noted that the data is limited by what the NCDC is able to record, and what equipment was in place at the time.

Figure 4.30 High Wind Events in Natrona County



Source: NCDC

Table 4.44 Natrona County High Wind History with Impacts 1996-2015

Date	Time	MPH	Deaths	Injuries	Property Damage	Crop Damage
1/4/2008	2045	68	0	0	$50,000	0
1/27/2008	1030	43	0	0	$12,000	0
1/27/2008	530	57	0	0	$10,000	0
12/25/2008	19	59	0	0	$15,000	0
1/8/2009	940	52	0	0	$10,000	0
5/4/2010	1036	52	0	0	$15,000	0
10/24/2010	1230	52	0	0	$50,000	0
12/29/2010	351	53	0	0	$10,000	0
2/13/2011	420	56	0	0	$1,000	0
11/3/2011	1313	56	0	0	$5,000	0
12/29/2011	856	56	0	0	$20,000	0
1/19/2012	550	79	0	0	$30,000	0
3/26/2012	1301	69	0	0	$2,000	0
1/3/2014	930	56	0	0	$20,000	0
8/17/2015	1910	52	0	0	$50,000	0
2/18/2016	416	69	0	0	$20,000	0
Total					$320,000	

Source: NCDC

Table 4.45 Summary of Wind Weather Events and Impacts in Natrona County 1996-2015

MPH	# of Events	Total Property Damage	Total Crop Damage	Total Fatalities	Total Injuries
30-39	24	0	0	0	0
40-49	10	$12,000	0	0	0
50-59	110	$206,000	0	0	0
60-69	73	$72,000	0	0	0
70-79	17	$30,000	0	0	0
>80	1	0	0	0	0
	235	$320,000	0	0	0

Specific examples from high wind incidents that caused damages or casualties include:

On January 4, 2008, a strong pressure gradient across Wyoming produced damaging southwest wind in favored locations from Sweetwater County northeast through Natrona and southern Johnson counties. Sustained wind speeds of 40 to 45 mph were common in this region. Notable peak wind gusts included 78 mph at Casper/Natrona County International Airport and 85 mph at a RAWS site in western Natrona County. The hurricane force wind ripped a 15x20-foot section off the roof of the Casper Events Center. Several power poles were reported down between Pathfinder and Casper. Total property damage was $50K.

On December 25, 2008, favorable southwest flow increased significantly over central Wyoming in advance of a powerful Pacific storm. The winds were strongest across Natrona County where sustained speeds of 40 mph with gusts over 65 mph were common Christmas Day. The wind ripped a portion of a roof from a house in southwest Casper and downed a power line in downtown Casper. At the Natrona County International Airport a peak wind speed of 68 mph was recorded at 9:45 and 10:49MST Christmas Day. A peak gust to 75 mph was clocked the same morning at Fales Rock RAWS. Total property damage was $15K.

On May 4, 2010, favorable upper level dynamics coupled with a cold front associated with an approaching Pacific storm system brought high winds to much of the area. Winds to 113 mph were recorded at ridgetop level on Mount Coffin, and maximum gusts of 76 mph were recorded at lower elevation at the Camp Creek RAWS site. Wind gusts caused roof damage at a machinery plant in Bar Nunn, four miles north of Casper. Eastbound lanes of Interstate 80 on the east side of Rock Springs were closed after a truck was toppled near milepost 107 around 12:30MST. Total property damage was $15K.

On October 24, 2010, a tight pressure gradient ahead of a Pacific storm system brought high wind to Natrona and southeast Fremont counties. Wind gusts up to 60 mph were recorded by automated weather stations. The wind was strong enough to topple a two story bank building under construction in downtown Casper. Total property damage was $50K.

On December 29, 2011, a strengthening pressure gradient ahead of a winter storm system brought high wind to areas east of the Continental Divide. High wind was recorded along the Green Mountains and Rattlesnake Hills north through Natrona and Johnson counties. A large McDonald's sign was blown down onto a roadway near the intersection of CY Avenue and Wyoming Boulevard in southwest Casper at 10:57MST Thursday, December 29. Total property damage was $20K.

On January 19, 2012, high wind was noted throughout the day in the Green Mountains and Rattlesnake Range. A gust of 91 mph was recorded by a Department of Transportation official at the site where two tractor-trailers were toppled approaching South Pass on State Highway 28. Total property damage was $30K.

On January 3, 2014, a vigorous cold front in combination with an upper level disturbance produced high wind and heavy snow across portions of northern and central Wyoming. Gusty southwest winds ahead of the cold front were strong enough to topple an empty semitrailer on Wyoming Boulevard on the south side of Casper. The truck blew over about 9:30MST on Friday, January 3. A brief period of strong westerly wind also occurred near Clark where a peak speed of 89 mph was clocked around 7:00MST. Strong northwest wind behind the cold front favored a period of 60+ mph wind gusts during the early evening across the Interstate 90 corridor through northern Johnson County. Behind the cold front, much colder air filtered into the Wind River Basin. As the upper level disturbance crossed the region it helped to produce snow in Fremont County. Up to 10 inches of snow was reported in Riverton with 6 to 8 inches in Lander. Much of the snow fell during an intense period from mid-evening Friday to around midnight. Total property damage was $20K.

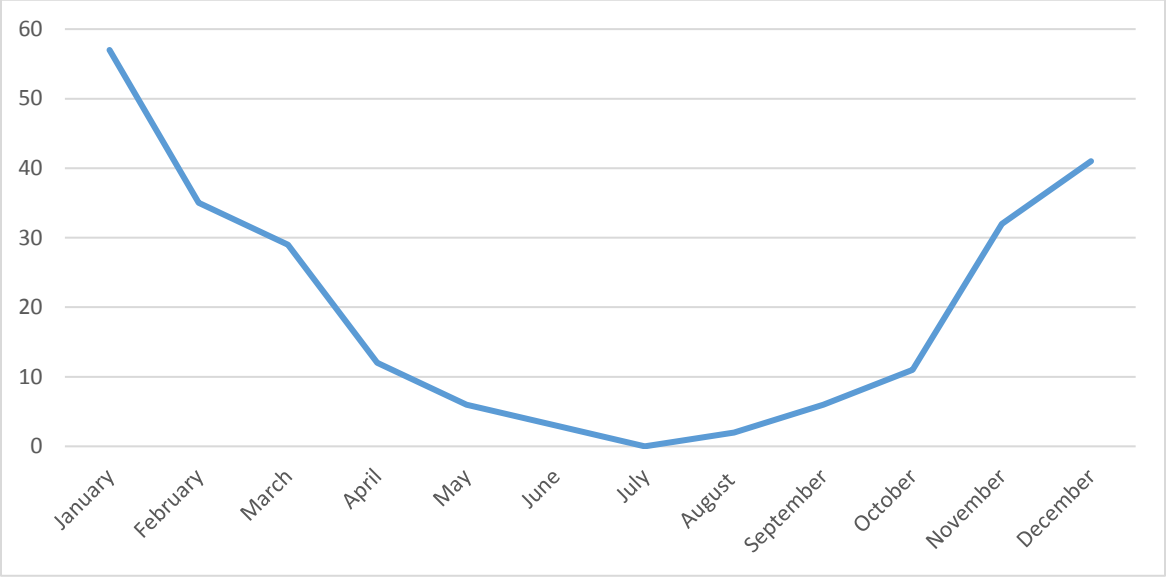
On August 17, 2015, a severe thunderstorm erupted over the southern Bighorn Mountains west of Kaycee in the warm, moist air ahead of a cold front dropping south from Montana. The storm increased in intensity as it moved southeast off the Bighorns and tapped more unstable air over southern Johnson and northern Natrona counties. High winds also plagued both counties and eastern Fremont County in the wake of the cold front. A strong pressure gradient allowed for northerly wind gusting to around 60 mph. The wind was strong enough to damage a storage unit at Alcova in southern Natrona County. A portion of the unit, which was oriented perpendicular to the wind, was torn apart and tossed over 100 feet into the North Platte River. Strong north wind in the wake of a cold front struck a storage unit oriented west-to-east on the north side of the North Platte River. The nearly perpendicular wind eventually tore a portion of the roof and walls from the unit and threw the debris over 100 feet into the river. Total property damage was $50K.

On February 18, 2016, the passage of a potent Pacific cold front in concert with a favorable jet stream position, strong mid-level winds, and a tightening pressure gradient led to widespread high wind east of the Continental Divide. Some foothill locations experienced the strong wind over an extended period spreading across two days. The strongest winds were in the wind prone areas near Clark where a wind gust of 103 mph was recorded on Thursday, February 18. In northern Johnson County, damage was reported in and around the town of Buffalo where wind gusts of 71 to 81 mph were recorded. The damage consisted of three downed light poles, roof damage of varying degrees, and trees toppled. A semi-truck was overturned by high winds along Outer Drive on the south side of Casper around 7:45MST on Friday. Strong wind on the west side of Cody blew down at least one billboard later that afternoon. Wind gusts near or above hurricane force were also recorded outside of Casper and in the Absaroka Range. The strong westerly flow also brought heavy snow to the Tetons. Snowfall of 15 inches was reported at Jackson Hole Mountain Resort. Many locations across Natrona County reported wind gusts over 58 mph. Some of the highest gusts included 79 mph along Outer Drive south of Casper, 73 mph at Twenty Mile Hill, and 66 mph at the airport west of Casper. On Outer Drive, a semi-truck was overturned by the wind around 7:45MST. Total property damage was $20K.

Likelihood of Future Occurrences

NCDC records 237 confirmed and documented high wind incidents specifically impacting the County since 1996. This means that the region averages about 11 high wind incidents per year.

Figure 4.31 High Wind Events by Month for Natrona County 1996-2016



Source: NCDC

The Planning area experiences an average of 11 significant high wind events per year somewhere in the county, with a damaging event being recorded by NCDC approximately once every .8 years. Based on NCDC data, incidence of recorded events appears to spike between October to February.

Vulnerability

Vulnerability as it relates to location is mostly random, as damaging winds have occurred everywhere in the County. Damage from high winds is often described in regional or broad areas, but downburst damage will impact a small area most generally less than three miles in diameter. Because state or presidential emergency or disaster declarations have not been necessary in the aftermath of wind events in the County, and because damage to personal property is dealt with by numerous private insurance companies, it is difficult to estimate actual monetary impacts that have occurred due to damaging winds. See section on Potential Losses for loss estimates based on reported damage.

Specific vulnerabilities from high wind events include damage to poorly constructed buildings, building collapse and damage, flying debris, semi rollovers and car accidents, and downed power lines and electric system damage. Cascading hazards caused by high winds can include power loss and hazardous materials spills; depending on the time of year, winds can also exacerbate snow and blizzards by creating deep snow drifts over roads and affecting the normal flow of traffic. Damages recorded by the NCDC for the county include downed power lines, torn off roofs and building damage, and downed tree limbs and debris.

The HMPC noted a substation in Midwest/Edgerton that could take up to 7 days to replace parts if damaged by wind, due to 1940's era construction.

Potential Losses

The 2016 Wyoming State Hazard Mitigation Plan lists wind events by county over a time period of 55.5 years. Natrona County has 84 recorded events, which results in a 100% chance each year, and a Highly Likely probability. According to NCDC recorded events, the annual occurrence rate for significant, damaging high wind in Natrona County is about 11 times per year and an average annualized loss of $5,245 a year. Natrona County suffered 16 damage-causing wind events between 1996 and 2016, and a cumulative $320,000 in damage as a result of these events ($20,000/event average).

Future Development

During the construction period buildings are vulnerable to wind, and construction materials can become airborne if not properly secured. Future residential or commercial buildings built to code should be able to withstand wind speeds of at least 150 miles per hour.

Summary

Many areas of the United States are prone to damaging wind events, and while Natrona County may not be counted in a high category for occurrences across the nation, it does have a history of such episodes which should be anticipated for the future. Primary damage is structural and utility-borne. Although minimal deaths and injuries have been reported, the frequency of occurrence is due consideration, as well as the hazard to rural citizens and town populations from falling trees, power poles, and flying debris.

Photos and scattered reports document property damage (including damage to private utilities) occurring as a result of wind events, yet cumulative losses due to wind damage have been negligible.

Table 4.46 High Winds and Downbursts Hazard Risk Summary

	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Extensive	Limited	Highly Likely	Medium
Casper	Extensive	Limited	Highly Likely	Medium
Edgerton	Extensive	Limited	Highly Likely	Medium
Evansville	Extensive	Limited	Highly Likely	Medium
Midwest	Extensive	Limited	Highly Likely	Medium
Mills	Extensive	Limited	Highly Likely	Medium
Natrona County	Extensive	Limited	Highly Likely	Medium

4.3.8 Landslide/Rockfall/Debris Flow

Hazard/Problem Description

A landslide is a general term for a variety of mass movement processes that generate a downslope movement of soil, rock, and vegetation under gravitational influence. Landslides are a serious

geologic hazard common to almost every state in the United States. It is estimated that nationally they cause up to $2 billion in damages and from 25 to 50 deaths annually. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Gravity is the force driving landslide movement. Factors that allow the force of gravity to overcome the resistance of earth material to landslide include: saturation by water, erosion or construction, alternate freezing or thawing, earthquake shaking, and volcanic eruptions.

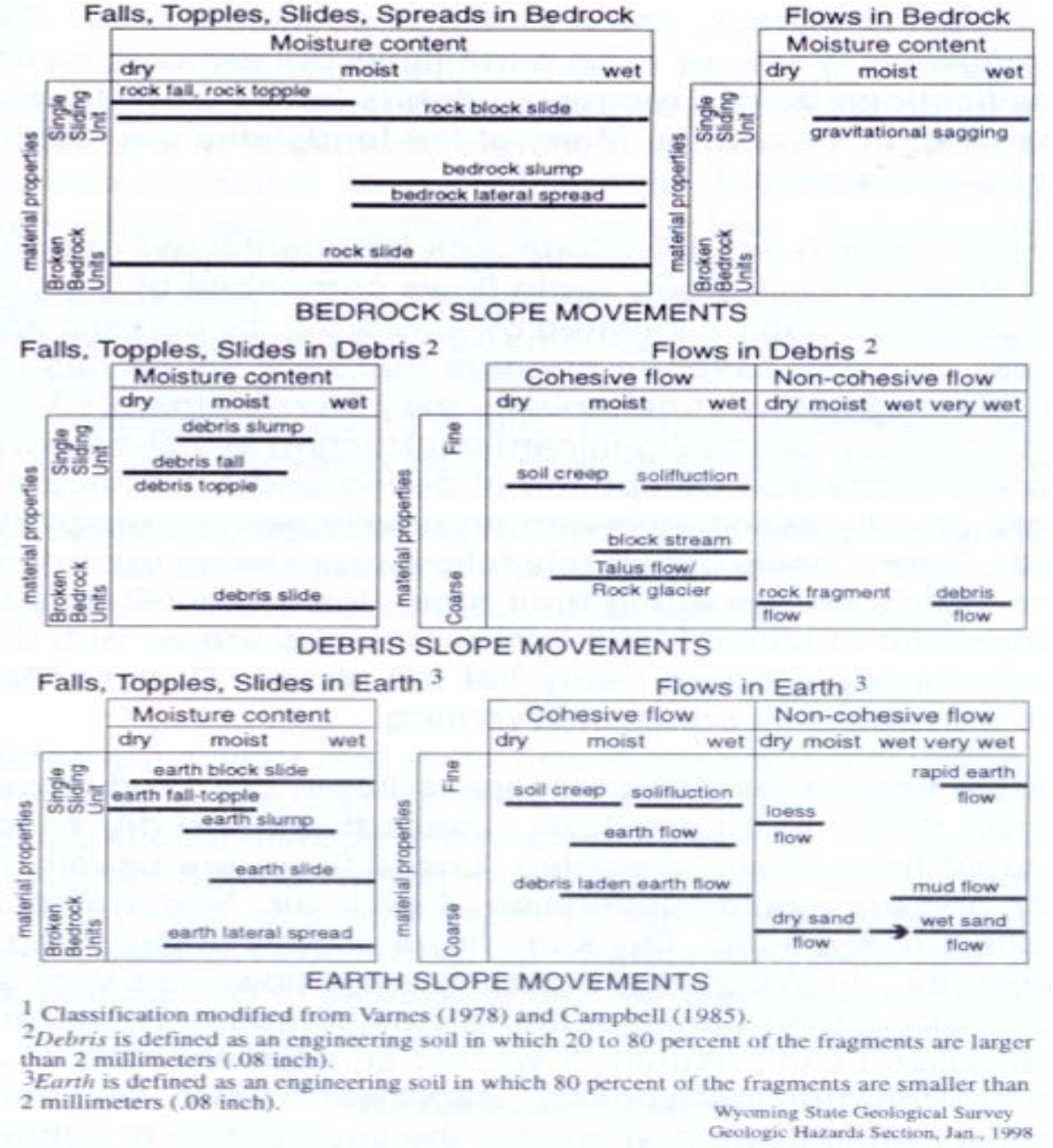
Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Generally significant landsliding follows periods of above-average precipitation over an extended period, followed by several days of intense rainfall. It is on these days of intense rainfall that slides are most likely.

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. Landslide triggering rainstorms often produce damaging floods. Earthquakes often induce landslides that can cause additional damage.

Slope failures typically damage or destroy portions of roads and railroads, sewer and water lines, homes and public buildings, and other utility lines. Even small-scale landslides are expensive due to clean up costs that may include debris clearance from streets, drains, streams and reservoirs; new or renewed support for road and rail embankments and slopes; minor vehicle and building damage; personal injury; and livestock, timber, crop and fencing losses and damaged utility systems.

There are many types of landslides present in Wyoming. In order to properly describe landslide type, the Geologic Hazards Section developed a landslide classification modified from Varnes (1978) and Campbell (1985). As can be seen in Figure 4.32, there are five basic types of landslides that occur in three types of material. Falls, topples, slides, lateral spreads, and flows can occur in bedrock, debris, or earth. While individual landslide types can occur in nature, most landslides are complex, or composed of combinations of basic types of landslides.

Figure 4.32 Wyoming Landslide Classifications



[1] Classification modified from Varnes (1978) and Campbell (1985).
[2] *Debris* is defined as an engineering soil in which 20 to 80 percent of the fragments are larger than 2 millimeters (.08 inch).
[3] *Earth* is defined as an engineering soil in which 80 percent of the fragments are smaller than 2 millimeters (.08 inch).

Wyoming State Geological Survey
Geologic Hazards Section, Jan., 1998

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 triggered by ice wedging, root growth, or ground shaking. Changes to an area or slope such as cutting and filling activities can also increase the risk of a rockfall. Rocks in a rockfall can be of any dimension, from the size of baseballs to houses. Rockfall occurs most frequently in mountains or other steep areas

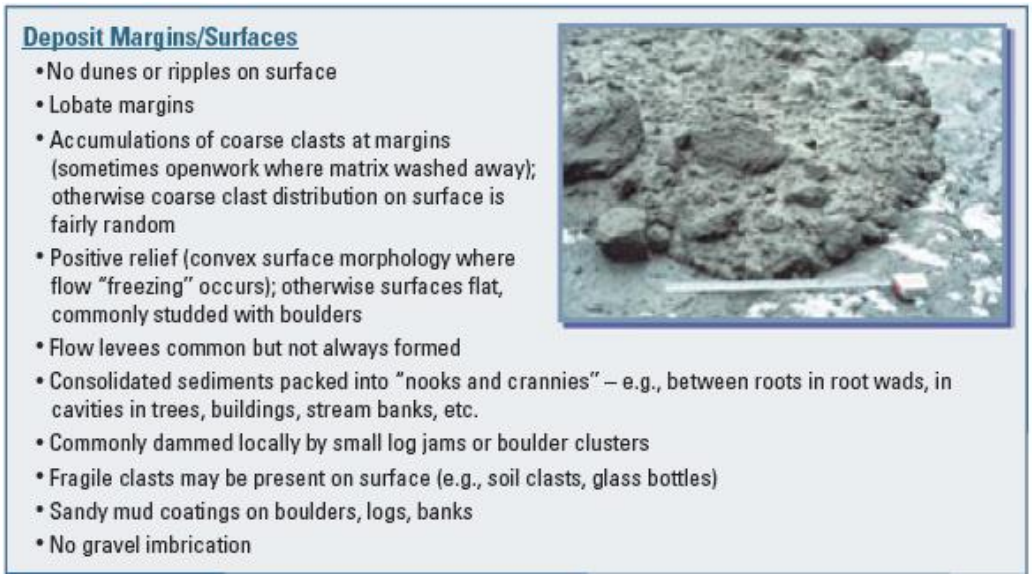
during the early spring when there is abundant moisture and repeated freezing and thawing. Rockfalls are a serious geological hazard that can threaten human life, impact transportation corridors and communication systems and result in other property damage.

Spring is typically the landslide/rockfall season in Wyoming as snow melts and saturates soils and temperatures enter into freeze/thaw cycles. Rockfall and landslides are influenced by seasonal patterns, precipitation and temperature patterns. Earthquakes could trigger rockfalls and landslides too.

Debris Flow

Debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, are common types of fast-moving landslides. They are a combination of fast moving water and a great volume of sediment and debris that surges down slope with tremendous force. These flows generally occur during periods of intense rainfall or rapid snowmelt and may occur with little onset warning, similar to a flash flood. They usually start on steep hillsides as shallow landslides that liquefy and accelerate to speeds that are typically about 10 miles per hour, but can exceed 35 miles per hour. Figure 4.33 describes identifying characteristics of debris flows. 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 from many different sources can combine in channels, and their destructive power may be greatly increased. When the flows reach flatter ground, the debris spreads over a broad area, sometimes accumulating in thick deposits that can wreak havoc in developed areas. Mudflows are covered under the National Flood Insurance Program; however, landslides are not.

Figure 4.33 Field Evidence of Debris Flow

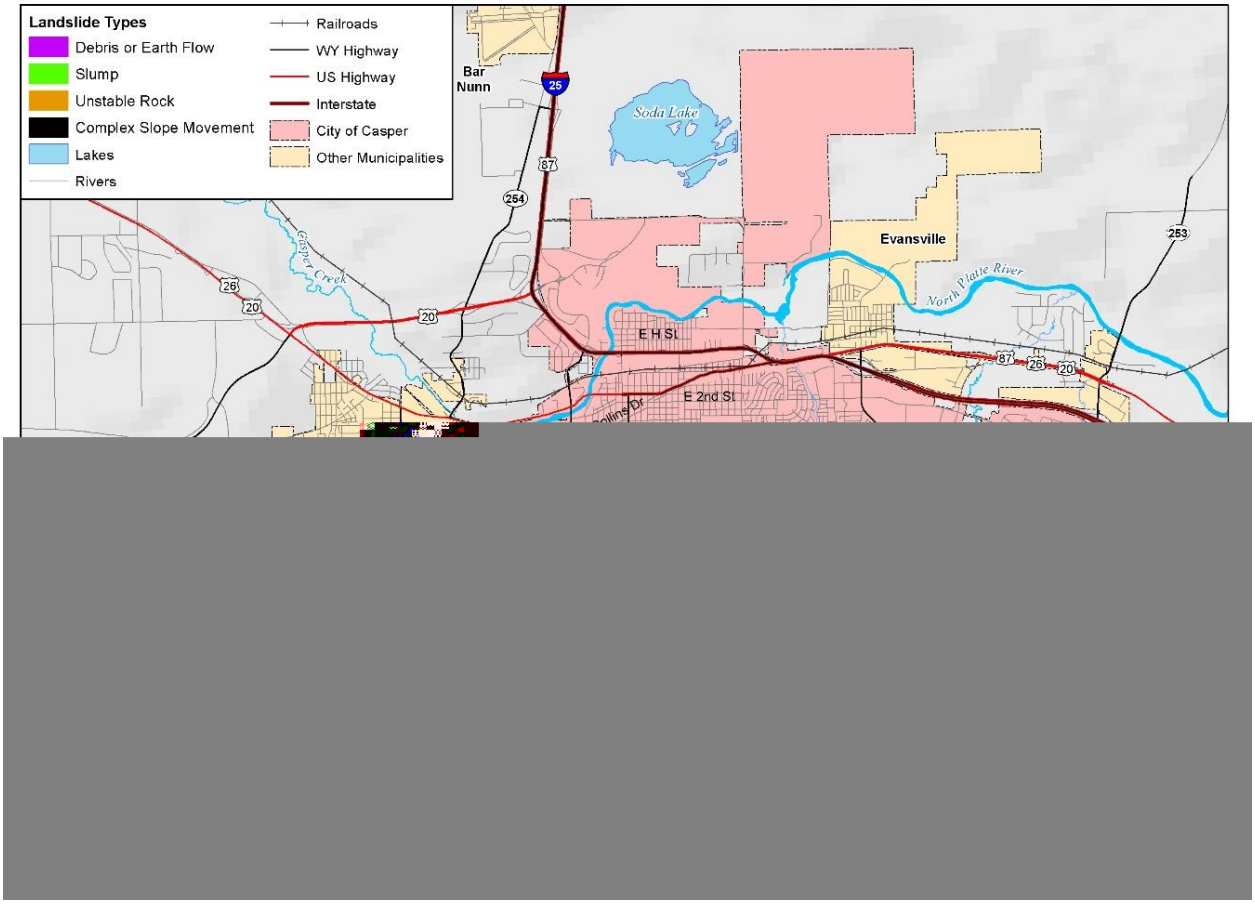


Geographical Area Affected

Landslides are one of the most common geologic hazards in Wyoming. Figure 4.34 below shows mapped landslides in the County. The map below is based on GIS data from the Wyoming State Geological Survey. Note the relatively high concentration of landslide deposits near Casper shown on the subsequent map. Landslide areas also exist throughout Natrona County. Most have had very little effect on property, except those located on the north side of Casper Mountain where some homes are located. Narrows on Hwy 220 and the Wolf Creek drainage are also areas of concern. The most affected jurisdiction would be unincorporated areas of Natrona County. Mills and Bar Nunn are not affected based on available mapping.

Figure 4.34 Natrona County Landslide Areas

Figure 4.35 Casper Landslide Areas



Past Occurrences

Since landslides, debris flows, and rockfalls occur regularly in Wyoming, previous occurrences are limited to those that caused a particular high amount of damage or incurred some other cost or unique impact. The HMPC reported debris flows in the spring of 2013 on Sheepherder Hill burn scar after wildfires in the area. There have also been debris flows on Alcova Lake Shore Drive and associated rockfall risk.

Frequency/Likelihood of Occurrence

The probability of a landslide causing damage in the County is difficult to determine because of the poor historic data. However given it is reasonable to assume that damaging events have between 10 and 100 percent chance of occurrence in next year, or a recurrence interval of 10 years or less. Therefore, landslides, rockfalls or debris flows are **likely** to occur. Heavy periods of precipitation or significant development could have an effect on slope stability. Typically there is a landslide/rockfall 'season' that coincides with increased freeze-thaw cycles and wetter weather in the spring and early summer.

Potential Magnitude

There are three measures of future landslide impacts – historic dollar damages, estimated yearly damages, and building exposure values. There are not enough current data to estimate historic or yearly dollar damages. In general terms, landslides can threaten human life, impact transportation corridors and communication systems, and cause damage to property and other infrastructure. Actual losses can range from mere inconvenience to high maintenance costs where very slow or small-scale destructive slides are involved. The potential magnitude of landslides, rockfall and debris flows in the County would be **limited**. However even a small isolated event has potential to close state or US highways in the region that can result in long detours for days or weeks. With the added cost of detours, and the potential for life safety impacts, some landslides could have greater costs.

Vulnerability Assessment

Population

The overall vulnerability of population is **low**. The general population is not overly vulnerable to landslides, but rockfall can cause serious injury or death.

General Property

During the 2017 development of this plan a GIS analysis of exposure to landslide hazard areas was performed. Table 4.47 summarizes landslide exposure in the county, based on an intersect of improved parcels with landslide hazard areas. There are 124 properties in landslide hazard zones based on this analysis.

Table 4.47 Landslide Exposure by Jurisdiction

Jurisdiction	Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure
Casper	Commercial	1	1	$5,629,648	$5,629,648	$11,259,296
	Residential	2	2	$541,281	$270,641	$811,922
	Total	3	3	$6,170,929	$5,900,289	$12,071,218
Unincorporated	Res Vacant Land	1	1	$0	$0	$0
	Residential	7	7	$2,431,837	$1,215,919	$3,647,756
	Total	8	8	$2,431,837	$1,215,919	$3,647,756
	Sub Total	11	11	$8,602,766	$7,116,207	$15,718,973
Complex Slope Movement Landslide						
Unincorporated	Commercial	2	2	$110,197	$110,197	$220,394
	Exempt	1	1	$0	$0	$0
	Res Vacant Land	1	1	$0	$0	$0
	Residential	109	118	$30,335,164	$15,167,582	$45,502,746
	Sub Total	113	122	$30,445,361	$15,277,779	$45,723,140
	Grand Total	124	133	$39,048,127	$22,393,986	$61,442,113

Essential Infrastructure, Facilities, and Other Important Community Assets

Transportation networks are the most exposed aspect of the Planning area to landslide and debris flow incidents. Residents and visitors alike are impacted by landslides when roads are damaged by landslides. This includes Highway 487 and Highway 220 near Casper. The loss of transportation networks could potentially cause secondary damage to the overall County's infrastructure, including revenue, transportation availability, emergency response mechanisms and other essential capabilities by preventing the means of these resources from activating or moving between locations.

The table below indicates two critical facilities in the unincorporated area of Natrona County potentially at risk to landslides.

Table 4.48 Critical Facilities at Risk to Landslides in Natrona County

Landslide	Jurisdiction	Critical Facility Type	Name
Complex Slope Movement	Unincorporated	EPA FRS Location	BROKEN WRENCH LLC
Debris or Earth Flow	Unincorporated	EPA FRS Location	KINDER ENTERPRISES INCORPORATED

Future Development

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Human activities such as property development and road construction can also exacerbate

the occurrence of landslides. Future development in areas on the north side of Casper Mountain should be done carefully to prevent landslide damage to property or people. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. Improving mapping and information on landslide hazards and incorporating this information into the development review process could prevent siting of structures and infrastructure in identified hazard areas.

Summary

Overall, landslides, rockfalls and debris flows range from **low** to **medium** significance hazards in the County. Landslides have the potential for direct property impacts including residential structures but more likely infrastructure corridors including roads and highways, power line corridors, and gas lines.

Table 4.49 Landslide Hazard Risk Summary

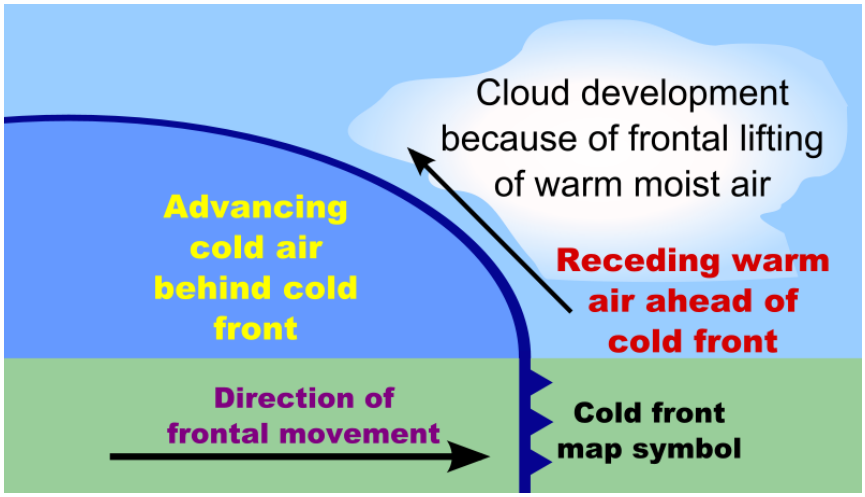
	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Negligible	Negligible	Unlikely	Low
Casper	Limited	Limited	Occasional	Medium
Edgerton	Negligible	Negligible	Unlikely	Low
Evansville	Negligible	Negligible	Unlikely	Low
Midwest	Negligible	Negligible	Unlikely	Low
Mills	Negligible	Negligible	Unlikely	Low
Natrona County	Limited	Limited	Occasional	Medium

4.3.9 Severe Thunderstorms (includes Hail and Lightning)

Hazard/Problem Description

Severe thunderstorms in Natrona County are generally characterized by heavy rain, often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. According to the National Weather Service, a thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. This chapter profiles several sub-hazards that can impact the County in different ways – monsoon, hail and lightning. Flooding as a result of the monsoon is addressed in the Flood profile.

Figure 4.36 Formation of a Thunderstorm



Source: NASA. http://rst.gsfc.nasa.gov/Sect14/Sect14_1c.html

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 feet. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at Earth's surface and causes strong winds associated with thunderstorms.

The term monsoon generally refers to a seasonal wind shift, or monsoon circulation, that produces a radical change in moisture conditions in a given area or region. In the southwestern United States, this shift in wind direction is primarily the result of two meteorological changes:

- The movement northward from winter to summer of the huge upper level subtropical high pressure system, specifically known as the Bermuda High, and
- The intense heating of the Mojave Desert creates rising air and surface low pressure, called a thermal low.

These two features then combine to create a strong southerly flow that helps bring in moisture (i.e., from the Gulf of Mexico, the Gulf of California, and the Pacific Ocean) that lifts and forms thunderstorms when it encounters Wyoming.

Hail

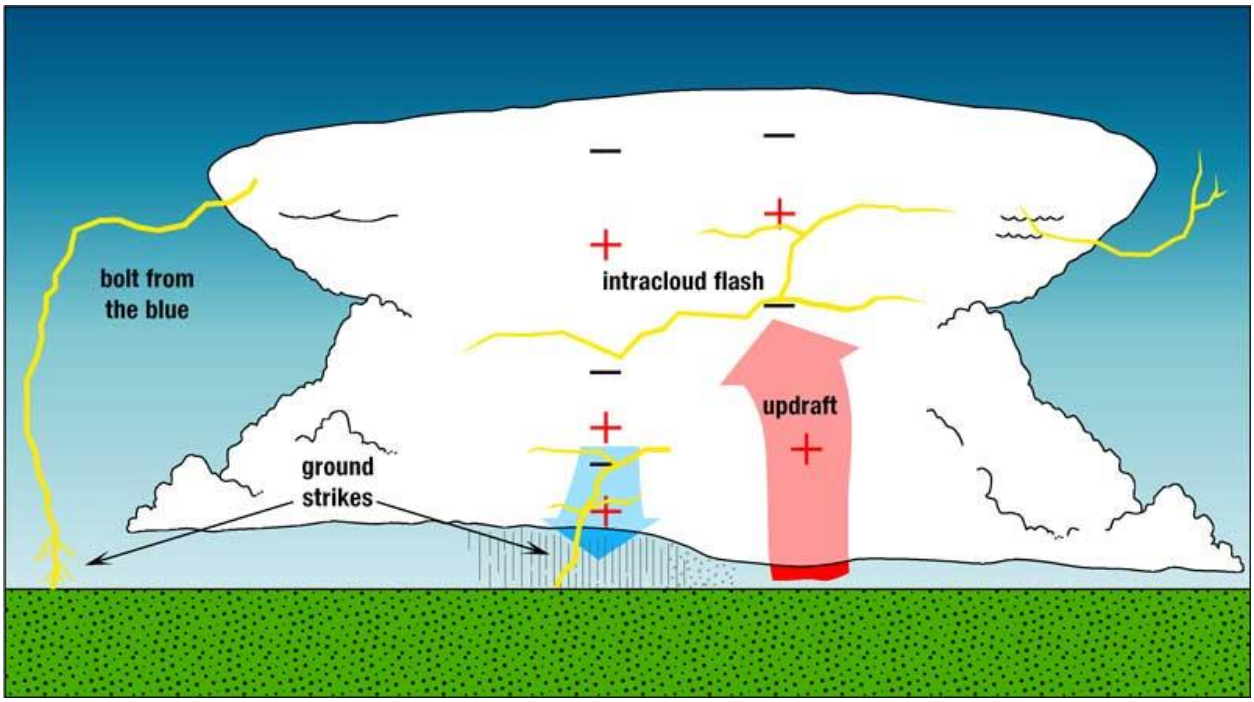
Hail is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail is sometimes associated with severe storms within Natrona County. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 miles per hour (mph). Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

Lightning

Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or total destruction. Damage may also be indirect, when the current passes through or near an object, which generally results in less damage.

Cloud-to-ground lightning is the most damaging and dangerous type of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

Figure 4.37 Cloud to Ground Lightning



Source: National Weather Service

Location

Thunderstorms are generally expansive in size. The entire county is susceptible to any of the effects of a severe thunderstorm, including monsoon, hail and lightning. The typical thunderstorm is 15 miles in diameter, and lasts 30 minutes. Thunderstorms generally move from west to east across the county.

Extent

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. The table below indicates the hailstone measurements utilized by the National Weather Service.

Table 4.50 Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

Damaging hail events occur sporadically throughout the County, usually associated with severe summer storms and wind events. Hail up to 3 inches in diameter has been recorded by the NCDC in Natrona County

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide. The LAL is reproduced below and the planning area is susceptible to all levels:

Table 4.51 Lightning Activity Level Scale

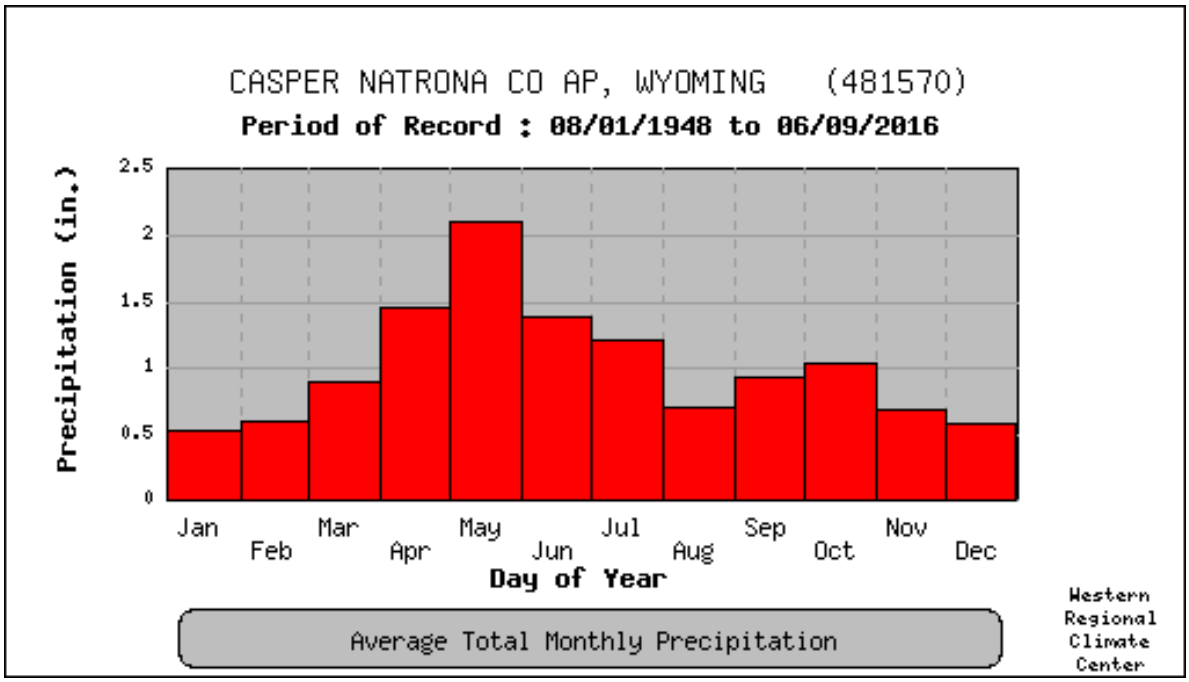
Level	Description
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning.

Source: National Weather Service. Natrona County is at risk to experience lightning in any of these categories.

Previous Occurrences

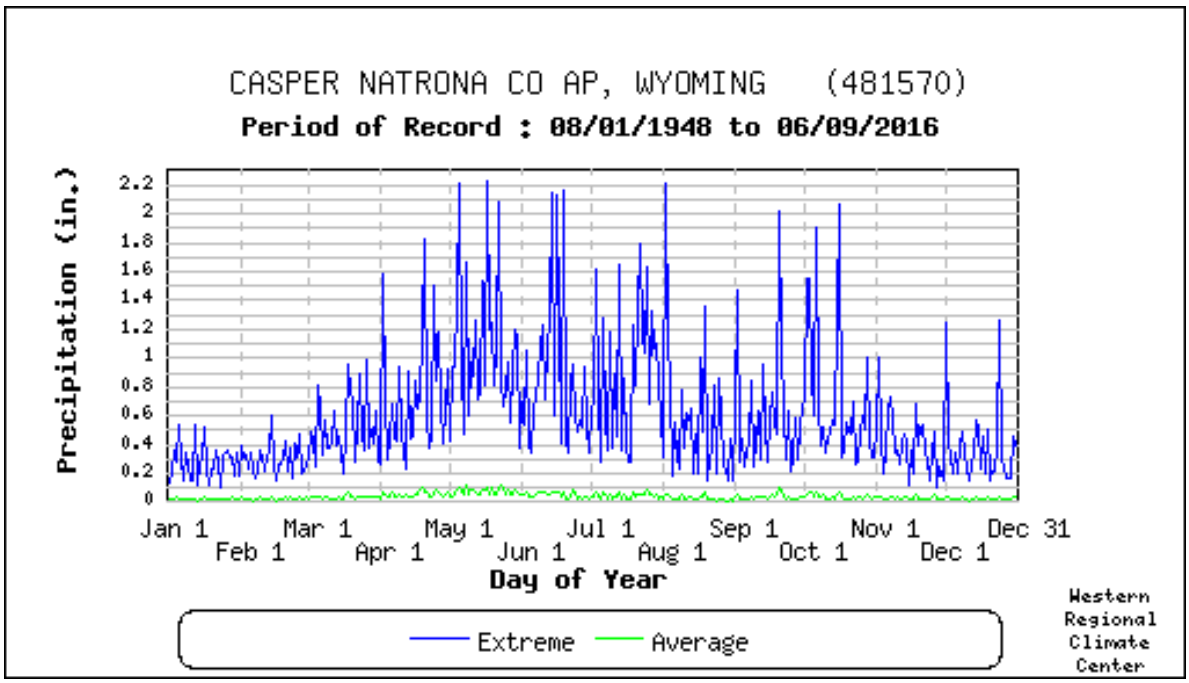
Average monthly precipitation totals for Natrona County are shown in Figure 4.38. Precipitation extremes for the County are shown in Figure 4.39. Many of these extremes have occurred between April and July.

Figure 4.38 Natrona County Monthly Average Total Precipitation (Casper Coop Station)



Source: Western Regional Climate Center

Figure 4.39 Natrona County Daily Precipitation Average and Extremes (Casper Coop Station)



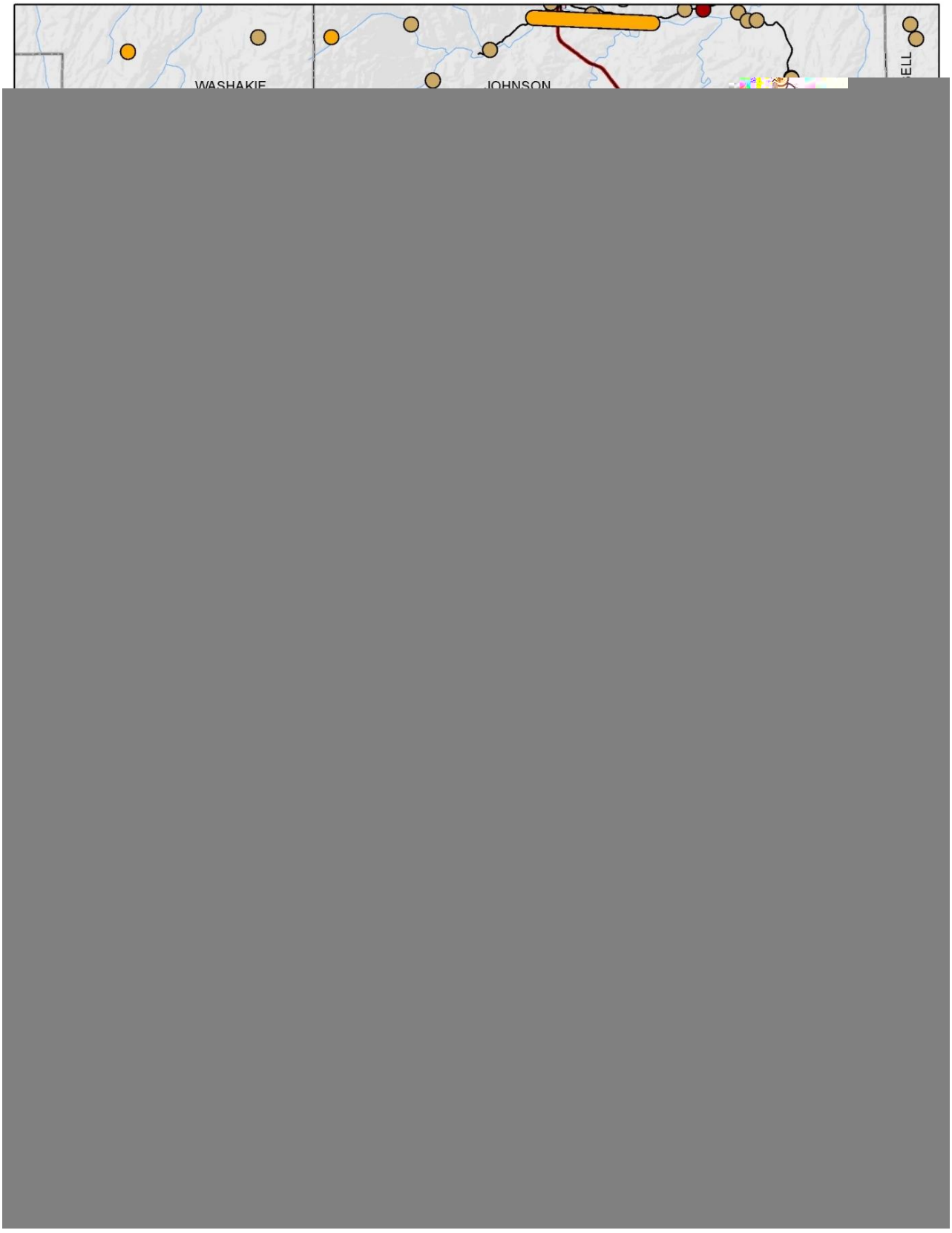
Source: Western Regional Climate Center

Heavy rain, thunderstorms, lightning, and hail in the County are many in number and occur on a yearly basis. The NCDC has not recorded a heavy rain incident between 1960 and 2015.

Hail

The map below exhibits hail events within the NOAA SVRGIS database. This data has the United States severe report database (tornadoes 1950-2016, hail/wind 1955-2016) converted into shapefile file format as well as a Geographic Information System database.

Figure 4.40 Natrona County Hail Events



The NCDC records any hail events with hailstones that are .75 inch or larger in diameter, or any hail of a smaller diameter which causes property and/or crop damage, or casualties. According to the NCDC definition, there have been 123 separate hail incidents in the County since 1955. The cumulative hail incidents had a total recorded property damage of $125,000. No deaths and one injury have been associated with these storms in the region during this timeframe. Statewide, 4 injuries have been reported since 1955. Most hail-related injuries are minor and go unreported.

Table 4.52 Natrona County Hail History with Impacts 1955-2015

Location	Date	Time	Hail Size	Deaths	Injuries	Property Damage	Crop Damage
Midwest	7/20/2000	1940	1.75	0	1	$108,000	0
Powder River	6/22/2013	1147	2.75	0	0	$10,000	0
Unknown	7/24/1994	1745	1	0	0	$5,000	0
Petrie	6/22/2013	1148	1.75	0	0	$2,000	0
Powder River	6/22/2013	1125	1.5	0	0	$2,000	0

Source: National Climactic Data Center

Historically, 5 of the 123 NCDC recorded incidents had some level of recorded impact. While most storms don't have much impact, history shows a few outliers, summarized below:

On July 24, 1994, numerous car windshields were damaged by hail up to one inch in diameter from a lone thunderstorm over central Wyoming. Total property damage was $5K.

On July 20, 2000, a large hailstorm caused extensive damage to homes and vehicles. At least 90 sparrows were killed. Unofficial reports of some softball size hail. Total property damage was $108K.

On June 22, 2013, strong to severe thunderstorms erupted over the eastern Wind River Mountains during the morning hours and moved east-northeast across Fremont and Natrona counties. A favorable wind profile helped the storms become severe and produce hail up to the size of baseballs at Powder River. There were numerous reports of quarter to golf ball sized hail in a swath from Castle Gardens to around Natrona. As the storm approached Casper at least three funnel clouds were observed, one of which briefly touched down northeast of Evansville. Total property damage was $14,000.

Lightning

Vaisala's National Lightning Detection Network (NLDN) recorded 347,035 cloud to ground lightning flashes in Wyoming in 2015; they also record an average of 279,632 cloud to ground lightning flashes per year between 2006 and 2015 for the state. This ranks Wyoming 39th nationally for flashes per square mile, averaging 2.9 cloud to ground lightning flashes per square mile, per year.

Nationally, Wyoming ranks 36th in number of lightning fatalities, 33rd in injuries, and 40th in property damage from 1959 to 1994 according to the National Oceanic and Atmospheric

Administration, National Severe Storms Laboratory (NOAA, NSSL). Wyoming is number one in the nation in lightning deaths per capita according to the National Weather Service in Salt Lake City. According to the NCDC, lightning has been responsible for 8 deaths, 75 injuries, over $1 million in property damage and $91,000 in crop damage in Wyoming between 1996 and 2015.

The NCDC records lightning incidents that have some sort of measurable impact; Table 4.53 includes all lightning incidents recorded by the NCDC in Natrona County.

Table 4.53 Natrona County Lightning History 1969– 2015

Location	Date	Begin Time	Fatalities	Injuries	Property Damage	Crop Damage
Casper	5/8/2006	1410	0	0	$65,000	0
Mills	5/30/2009	1300	0	0	$150,000	0
Freeland	8/12/2013	1330	0	0	$35,000	0
Total			0	0	$250,000	0

On May 8, 2006, lightning struck the peak of a roof at a house on Platte River Road igniting a fire within the structure. Smoke quickly spread throughout the house and into the attic. A portion of the home's cement foundation was blown apart. The home's lone resident was not injured but did report that she felt the house shake when the bolt struck. Total property damage was $65K.

On May 30, 2009, a lightning strike destroyed or damaged five oil tanks about 20 miles west of Casper near the intersection of county roads 201 and 210. The strike occurred about 1:00MST blowing the lid off one tank containing about 400 barrels of crude oil. The fire quickly spread to a nearby tank and burning crude oil ignited the other tanks. Two additional propane tanks were burned but did not explode. A nearly century old storage building at the site was also completely destroyed. Total property damage was $150K.

On August 12, 2013, a 160-ton haystack was set ablaze by a lightning strike. The fire burned through the night but did not spread beyond the stack. The value of the 190 bales of hay that were burned was estimated at about $35K.

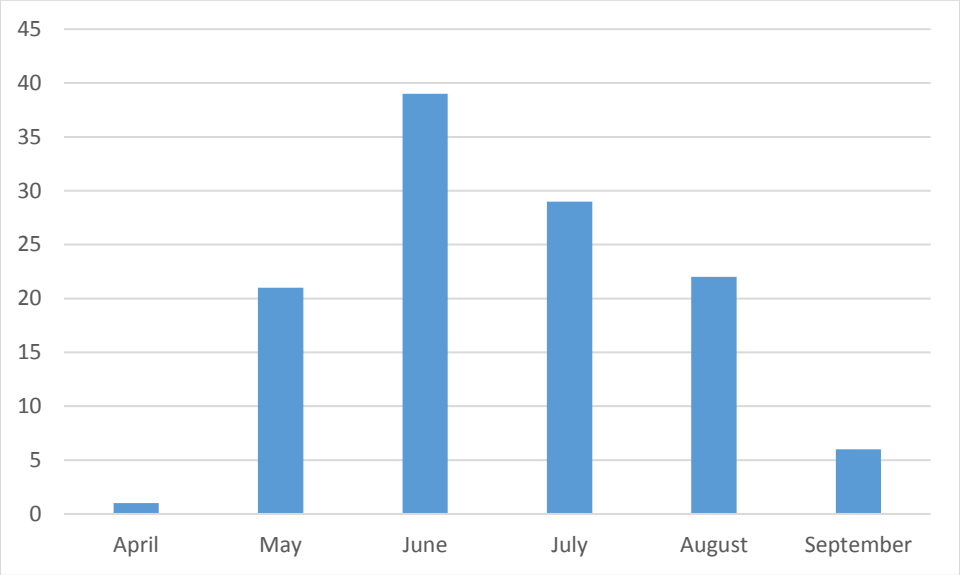
Probability of Future Occurrences

Hail

With 123 hail events over 61 years, hail is estimated to occur at least 2 times per year in Natrona County.

Figure 4.41 displays the month that hail events occur. Hail has only been recorded to occur from April to September. The highest amount of events occur in June and July.

Figure 4.41 Month of Occurrence - Hail Events in Natrona County 1955 to 2016



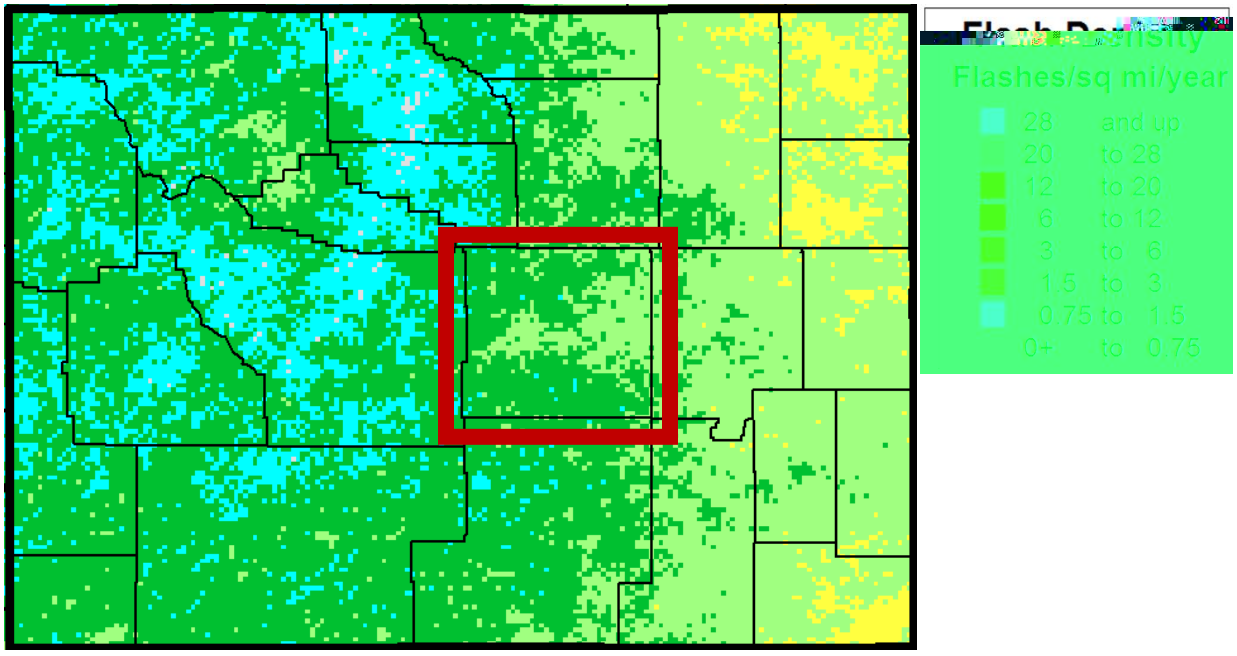
Source: National Climactic Data Center

Lightning

Nationwide, lightning strikes are routinely monitored by Vaisala, Inc. with accuracies to within a 0.625-mile (1 kilometer) resolution. The Wyoming annual lightning strike frequency is depicted in Figure 4.42 for the period of 2005 through 2014. Clearly the eastern plains have more than three times the cloud to ground lightning strikes as the western half of the state. Despite annual variation, the locations of maximum and minimum strikes do not change much from year to year. A warming climate may also affect the frequency of lighting; in 2014 researchers at the University of Berkeley conducted a study that found that for every one degree Celsius rise in the average global temperature, there will be a 12 percent increase in the amount of lightning strikes.

(Source: Science Magazine, http://www.sciencemag.org/content/346/6211/851.abstract;)

Figure 4.42 Average annual lightning flash density (flashes/sq. mi/year) 2005-2014 over Wyoming.



Source: Illustration courtesy of Vaisala Inc.

U.S. statistics show that one in 345,000 lightning flashes results in a death and one in 114,000 results in an injury nationwide. According to meteorologists at Vaisala, Inc., the odds for an individual being hit by lightning sometime in the course of an 80-year lifespan is about 1 in 3,000.

Vulnerability Assessment

Population

Exposure is the greatest danger to people from severe thunderstorms. People can be hit by lightning, pelted by hail, and caught in rising waters. Serious injury and loss of human life is rarely associated with hailstorms.

While national data shows that lightning causes more injuries and deaths than any other natural hazard except extreme heat, there doesn't seem to be any trend in the data to indicate that one segment of the population is at a disproportionately high risk of being directly affected. Anyone who is outside during a thunderstorm is at risk of being struck by lightning. Aspects of the population who rely on constant, uninterrupted electrical supplies may have a greater, indirect vulnerability to lightning. As a group, the elderly or disabled, especially those with home health care services relying on heavily on an uninterrupted source of electricity. Resident populations in nursing homes, residential facilities, or other special needs housing may also be vulnerable if electrical outages are prolonged. If they do not have a back-up power source, rural residents and agricultural operations reliant on electricity for heating, cooling, and water supplies are also especially vulnerable to power outages.

Economy

Economic impact of severe thunderstorms are typically short term. Lightning can cause power outages and fires. Hail can destroy exposed property; an example is car lots, where entire inventories can be damaged. Generally, long-term economic impacts center more on hazards that cascade from a severe thunderstorm, including wildfires ignited by lightning and flooding.

Built Environment

The Natrona County Planning Area experiences a rainy season in the summer. These summer storms can include significant precipitation, winds, and hail. According to historical hazard data, severe weather is an annual occurrence in Natrona County. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrences in the County. Utility outages, downing of trees, debris blocking streets and damage to property can be a direct result of these storm events. Given the nature of these types of storms, the entire County is potentially at risk.

Natural, Historic and Cultural Resources

There are no indications that cultural or historic resources are more vulnerable to lightning than as previously accounted for as general structures. Natural resources may be vulnerable to indirect impacts of lightning, such as wild fires 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 more dangerous impacts, so populations utilizing the campgrounds may have a higher vulnerability.

Lightning doesn't just strike unprotected people, as both the NCDC and the HMPCs reported that lightning causes the death of unprotected livestock. The 1996 strike in Burlington killed 11 head of cattle.

Structure fire ignition is also a concern; the 2010 strike in Wapiti started an attic fire, culminating in extensive damage to the home.

Finally, lightning can also have many cascading impacts, including power failure and ignition of wildfires.

Risk Summary

Natrona County will continue to experience hail on an annual basis. Hail damage to property is expected to be highest in the municipalities; much of the damage to both property and crops is covered under insurance policies.

Table 4.54 Severe Thunderstorms Hazard Risk Summary

	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Limited	Limited	Highly Likely	Medium
Casper	Limited	Limited	Highly Likely	Medium
Edgerton	Limited	Limited	Highly Likely	Medium
Evansville	Limited	Limited	Highly Likely	Medium
Midwest	Limited	Limited	Highly Likely	Medium
Mills	Limited	Limited	Highly Likely	Medium
Natrona County	Limited	Limited	Highly Likely	Medium

4.3.10 Tornado

Hazard Description

A tornado is a swirling column of air extending from a thunderstorm to the ground. Maximum winds in tornadoes are often confined to extremely small areas, and vary tremendously over very short distances, even within the funnel itself. Tornadoes can have wind speeds from 40 mph to over 300 mph, the majority displaying wind speeds of 112 mph or less. Erratic and unpredictable, they can move forward at up to 70 miles per hour, pause, slow down and change directions. Most have a narrow path, less than 100 yards wide and a couple of miles long. However, damage paths from major tornadoes can be more than a mile wide and 50 miles long.

Based on national statistics for 1970 – 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care. Tales of complete destruction of one house next to a structure that is totally unscathed are well documented. Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions or has any glass, brick or other debris blown into the interior, the tornado winds can be life threatening. In order to examine tornado activity and the potential impact on Natrona County and its residents, it is important to understand how tornadoes are rated.

Rating a Tornado

In 1971, Dr. T. Theodore Fujita of the University of Chicago devised a six-category scale to classify U.S. tornadoes into intensity categories, F0 through F5. These categories are based upon the estimated maximum winds occurring within the funnel. The Fujita Tornado Scale (or the "F Scale") became the definitive scale for estimating wind speeds within tornadoes based upon the damage done to buildings and structures. It is used extensively by the National Weather Service in investigating tornadoes, and by engineers in correlating damage to building structures and techniques with different wind speeds caused by tornadoes.

Table 4.55 Fujita Scale Description

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages signboards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.

Recent Changes to Tornado Rating Scale

Devastating tornadoes in Jarrell, Texas on May 1997 and Moore/Oklahoma City on May 1999 demonstrated that wind estimates in the original F-scale may be too high. From 2000 to 2004, the Wind Science and Engineering Research Center at Texas Tech University, in cooperation with numerous expert meteorologists, civil engineers and the National Weather Service (NWS), developed an Enhanced Fujita Scale, or EF-scale. In addition to improving the ranking process, it was essential to the development team that the new EF-scale support and be consistent with the original F-scale. The EF-scale documentation includes additional enhanced descriptions of damage to multiple types of structures and vegetation with photographs, a PC-based expert system, and enhanced training materials.

In February 2007, the Enhanced Fujita scale replaced the original Fujita scale in all tornado damage surveys in the United States. The following table compares the estimated winds in the original F-scale with the operational EF-scale that is currently in use by the NWS.

Table 4.56 The Enhanced Fujita Tornado Scale

	Fujita Scale		Operational EF-Scale	
F Number Fastest	Fastest 1/4 – mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85
1	73-112	79-117	1	86-110
2	113-157	118-161	2	111-135
3	158-207	162-209	3	136-165
4	208-260	210-261	4	166-200
5	261-318	262-317	5	Over 200

Geographical Areas Affected

The entire area of the Natrona County is susceptible to tornadoes. While some areas may see more tornadoes than others, this is more of a statistical anomaly than a causal result.

Past Occurrences

Tornado statistics, especially prior to the 1970s, must be viewed as incomplete since many twisters have occurred without being witnessed. Wyoming's open rangelands experience little if any damage from these storms, so many go unreported. Many documented tornadoes occurring in Natrona County are given low ratings on the Fujita Scale (F0s and F1s) simply because these tornadoes are often formed over open land and result in little or no damage.

Since 1950, there have been 35 tornadoes recorded for Natrona County by the National Climatic Data Center. From 1950-2016, there were eight injuries, no fatalities, and $352,680 in total recorded property damage in the County. A full accounting of those tornadoes can be found in the following table. The HMPC noted a specific tornado in 1987 near Bar Nunn that ripped roofs off of two homes.

Table 4.57 Tornado History 1950-2016, Natrona County

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Natrona Co.	5/28/1962	1130	F0	-	-	0	0
Natrona Co.	6/7/1962	1400	-	-	-	$25,000	0
Natrona Co.	6/11/1962	1630	F2	-	4	$25,000	0
Natrona Co.	6/12/1962	1600	F1	-	-	$30	0
Natrona Co.	6/15/1962	1600	F1	-	-	$25,000	0
Natrona Co.	7/27/1962	1505	F1	-	-	0	0
Natrona Co.	9/2/1968	1418	-	-	-	$30	0
Natrona Co.	5/15/1969	1457	-	-	-	$30	0
Natrona Co.	5/29/1971	200	F2	-	3	0	0
Natrona Co.	8/9/1974	1743	F1	-	-	$30	0
Natrona Co.	5/8/1975	1705	F1	-	-	$30	0
Natrona Co.	7/20/1978	1840	F2	-	1	$25,000	0

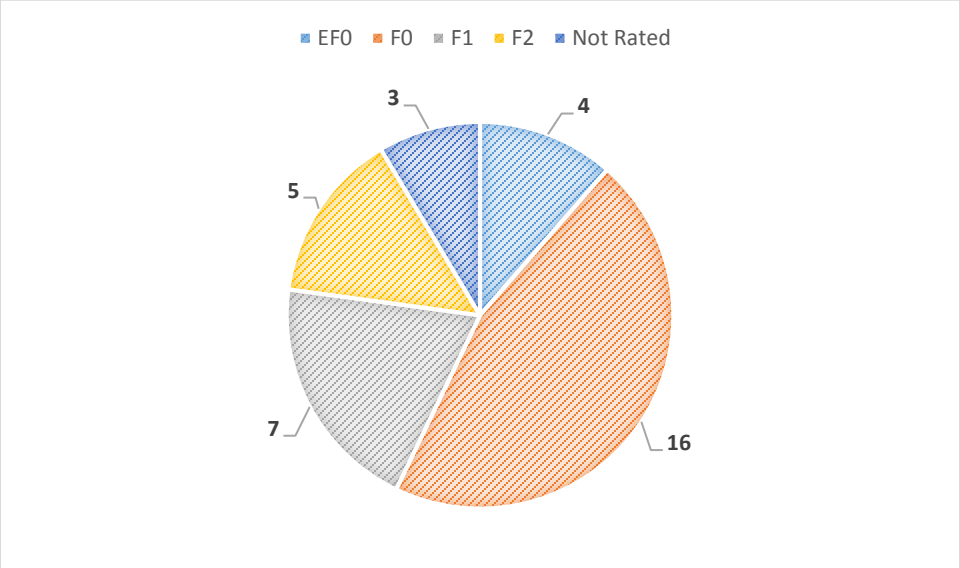
Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Natrona Co.	7/27/1979	2110	F0	-	-	0	0
Natrona Co.	5/24/1980	1830	F0	-	-	0	0
Natrona Co.	6/5/1982	2001	F0	-	-	$30	0
Natrona Co.	6/13/1984	1610	F0	-	-	0	0
Natrona Co.	6/18/1984	1455	F0	-	-	0	0
Natrona Co.	6/12/1986	2000	F1	-	-	0	0
Natrona Co.	6/18/1987	1520	F2	-	-	$250,000	0
Natrona Co.	7/21/1987	1950	F2	-	-	0	0
Natrona Co.	7/7/1988	1750	F1	-	-	$2,500	0
Natrona Co.	7/7/1988	1820	F0	-	-	0	0
Natrona Co.	7/7/1988	1825	F0	-	-	0	0
Natrona Co.	7/8/1988	1400	F0	-	-	0	0
Natrona Co.	6/7/1991	1410	F0	-	-	0	0
Natrona Co.	6/2/1995	1525	F0	-	-	0	0
Evansville	5/26/1998	1130	F0	-	-	0	0
Powder River	6/9/1998	1355	F0	-	-	0	0
Natrona	6/3/2001	1140	F0	-	-	0	0
Alcova	6/26/2001	1425	F0	-	-	0	0
Casper	9/8/2003	1530	F0	-	-	0	0
Allendale	5/7/2008	1412	EF0	-	-	0	0
Fry	6/22/2013	1306	EF0	-	-	0	0
Alcova	8/12/2013	1230	EF0	-	-	0	0
Paradise Valley	5/23/2014	1235	EF0	-	-	0	0
Totals				0	8	$352,680	$-

Source: National Climatic Data Center

Additionally, the 2010 Natrona County plan noted tornadoes or funnel clouds occurring on June 4 and August 26 of 2006; July 23 and 25 and August 2 and 22 of 2007; June 18 of 2008; and June 20, July 3 and August 24 of 2009.

The NCDC data allows for examination and statistical analysis of tornadoes occurring in the county. 57% of the historical tornadoes were rated F0 or EF0.

Figure 4.43 Natrona County Tornados by Rating: 1950-2016



The data also allows for the development of profiles on historical time periods of tornadoes. Figure 4.44 and Figure 4.45 give historical perspective on the time of year and time of day that tornadoes in the planning area have occurred.

Figure 4.44 Natrona County Historical Tornadoes by Month: 1950-2016

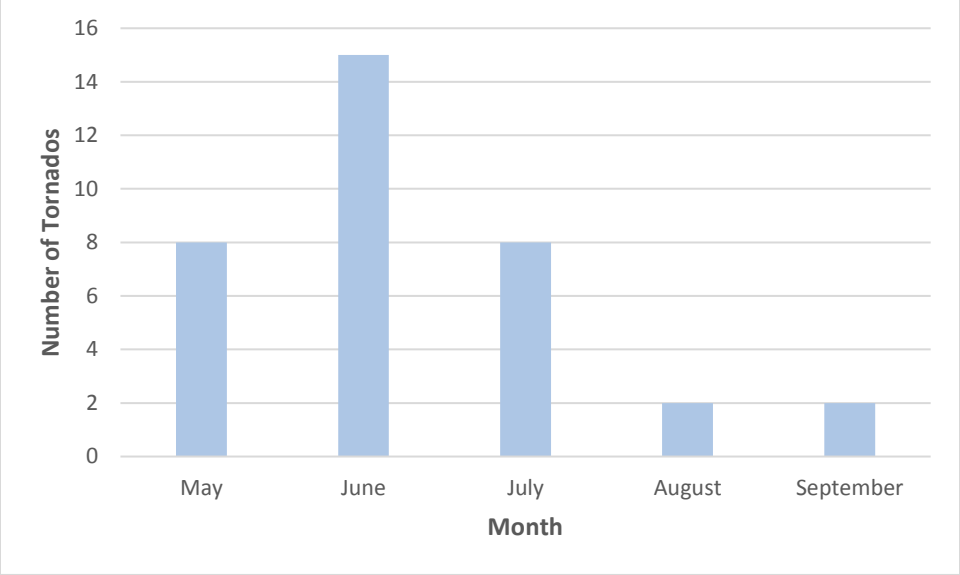
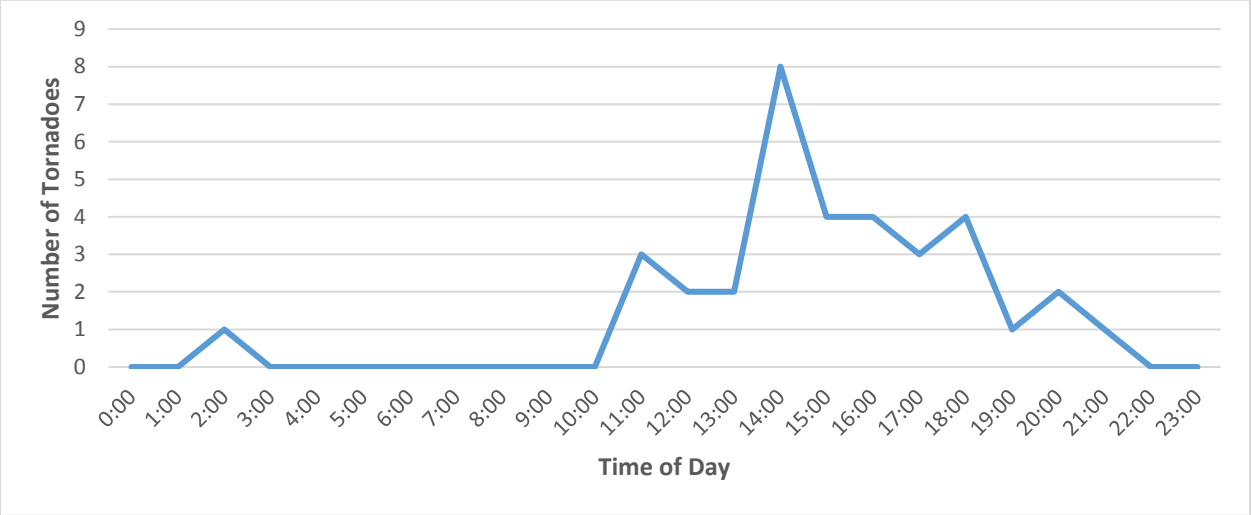


Figure 4.45 Historical Tornadoes by Time of Day: 1950-2016



Most tornadoes recorded in Natrona County cause no recorded injuries, no recorded fatalities, and little to no damage to property ($2,500 - $25,000 range). Of the 35 tornadoes that have been recorded by the NCDC in Natrona County from 1950 to 2016, 12 have caused property damage and none have caused crop damage.

Frequency

On average, Natrona County experiences a tornado every 1.87 years. Recorded tornadoes in the County occurred during the months of May through September; most of the tornadoes occurred between 11 a.m. and 11 p.m. Historical ratings vary between F0 and F2 on the F-scale; after the advent of the EF-scale, the planning area has experienced four EF-0 tornadoes. Most recorded tornadoes in the County were rated as F-0 or EF-0.

NCDC has recorded eight injuries and no fatalities attributed to these tornadoes. Cumulatively, the storms have caused $352,680 in recorded property damage, and no recorded crop damage. Almost two-thirds of the recorded property damage occurred June 18, 1987 when an F2 tornado hit Casper and caused $250,000 in property damage in and around the city.

Likelihood of Occurrence

According to the NCDC, a tornado occurs somewhere in the planning area every two years. An average tornado occurs in June in the evening, is rated EF-0 or EF-1, and causes less than $25,000 worth of damage to property, though it mostly strikes rural areas causing no damage. This is due more to chance than any environmental factor, however, as inhabited areas are statistically equally at risk of a tornado strike; the potential for injuries, fatalities and damage in these areas is much greater.

Potential Magnitude of Impacts

The National Weather Service considers tornadoes to be among nature's most violent storms. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Tornadic winds can cause people and autos to become airborne, rip ordinary homes to shreds, and turn broken glass and other debris into lethal missiles. Even weaker tornados can cause large economic damages.

According to NCDC records, the storm of record for Natrona County is the Casper tornado in 1987; the storm caused $250,000 in property damage, and no injuries or fatalities were recorded.

Though the strength of the tornado often dictates the impacts, it is important to remember that the location (rural or urban) of the tornado is just as important when assessing these risks. Impacts can vary depending on multiple factors, including the size and strength of a tornado, and its path.

Vulnerability Assessment

Because of its rural composition, people or property within the county have not had a history of being severely impacted during past tornado incidents. While the F-Scale ratings of historical tornadoes in the county are low, those ratings are partially based on recorded damage. Recorded damage may have been much more substantial if these tornadic events had impacted one of the many communities in the planning area, rather than timber, outlying range, and farm acreage.

Tornadoes occur at random locations throughout the jurisdiction; for that reason all structures, critical facilities, essential services, and populations are considered vulnerable.

Future Development

Any future development that is exposed and above ground will be vulnerable to a direct or indirect hit by a tornado. In areas where building codes are not in place and enforced, buildings may not be built to withstand tornado-force winds.

Summary

Tornadoes are a credible threat, and will continue to occur in Natrona County. While the County has been relatively lucky in its tornado history in its past, it is not immune to the threat of a much larger and more ferocious tornado. Depending on a tornado's size, ferocity and path, it can cause devastating damage to people, property and infrastructure.

Table 4.58 Tornado Hazard Risk Summary

	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Negligible	Limited	Highly Likely	Low
Casper	Negligible	Limited	Highly Likely	Low
Edgerton	Negligible	Limited	Highly Likely	Low
Evansville	Negligible	Limited	Highly Likely	Low
Midwest	Negligible	Limited	Highly Likely	Low
Mills	Negligible	Limited	Highly Likely	Low
Natrona County	Negligible	Limited	Highly Likely	Low

4.3.11 Severe Winter Weather

Hazard/Problem Description

The National Weather Service defines a storm as "any disturbed state of the atmosphere, especially affecting the Earth's surface, and strongly implying destructive and otherwise unpleasant weather." Winter storms occur during the winter months and produce snow, ice, freezing rain, sleet, and/or cold temperatures. Winter storms are an annual occurrence in climates where precipitation may freeze and are not always considered a disaster or hazard. Disasters occur when the severe 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 may be helpful for determining 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.[5]

Heavy snow can immobilize the planning region, isolating communities, stranding commuters, stopping the flow of supplies, and disrupting 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 days until damages are repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

[5] This information is drawn from the National Weather Association Online Glossary, which may be accessed at http://www.weather.gov/glossary/

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 in the County, 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. Natrona County is prepared with the delivery of extra oxygen as a preventative measure if a large storm is forecasted. The dialysis center also has a generator hookup and contract with a generator company after previous occurrences. All fire stations have backup generators to ensure doors can be opened. Other issues associated with severe winter storms include the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can pose significant budget impacts, as can repairing the associated damages caused by downed power lines, trees, structural damages, etc. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly.

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. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities. Extreme cold temperatures can destroy crops and cause utility outages, leaving people without water or power until the utility companies are able to restore service.

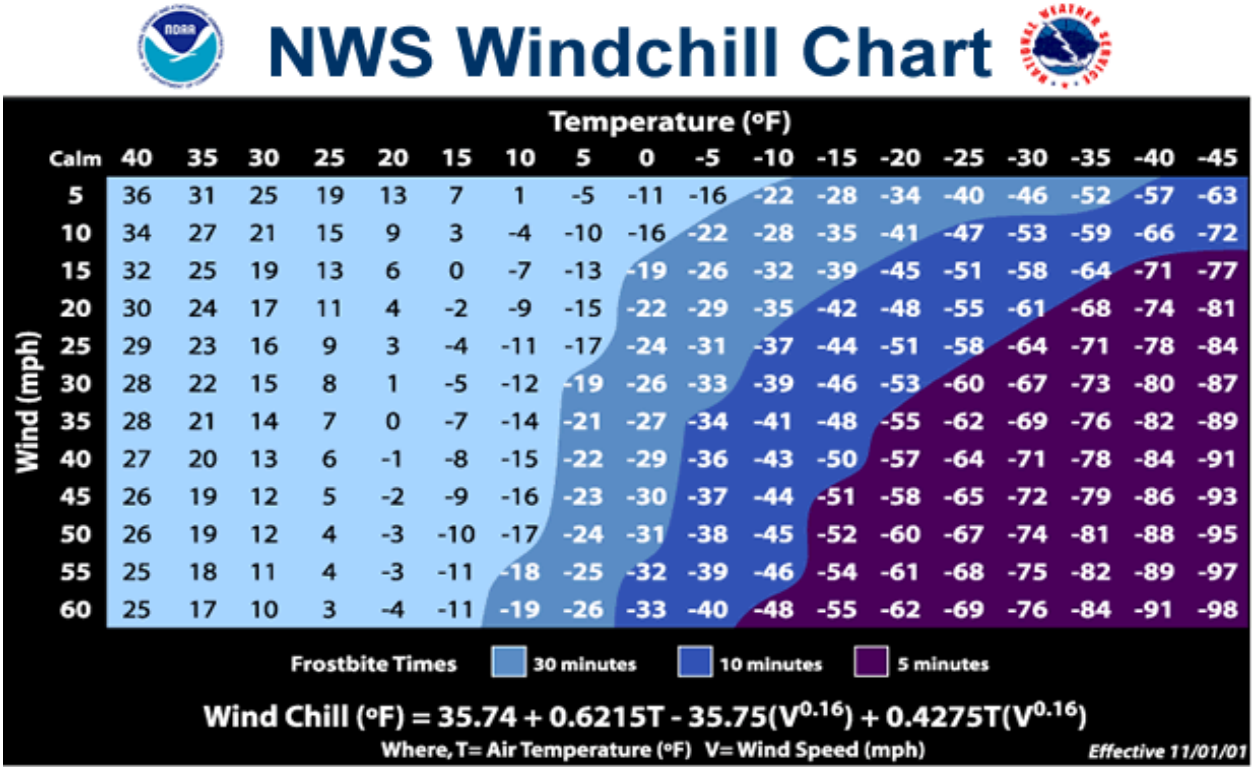
What constitutes extremely cold temperatures varies across different areas of the United States, based on normal climate temperatures for the time of year. In Wyoming, cold temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter lows, the cold is considered extreme and begins to impact the daily operations of the county. Extreme cold/wind chill impacts inanimate objects, plants, animals and water supplies.

The effects of extremely cold temperatures are amplified by strong to high winds that can accompany winter storms. Wind-chill measures how wind and cold feel on exposed skin and is not a direct measurement of temperature. As wind increases, heat is carried away from the body faster, driving down the body temperature, which in turn causes the constriction of blood vessels, and increases the likelihood of severe injury or death to exposed persons. Animals are also affected by wind-chill however cars, buildings, and other objects are not.

In 2001, the NWS implemented an updated Wind-Chill Temperature index. 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.

Figure 4.46 National Weather Service Wind-Chill Chart



Geographical Area Affected

Winter storms are a yearly feature of the Wyoming climate and may occur anywhere in the state. Generally, severe winter storm events are considered regional, which implies 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. However, even in these instances, the impacts and effects of a regional hazard are still felt within the planning area. Therefore, while the percent of the planning area directly affected ranges from less than 10% to 100% depending on the specific circumstances, if any portion of the planning area is impacted by the storm, then the entire planning area suffers indirect impacts. Sheltering of stranded travelers on I-25 can be an issue, even from storms affecting Colorado. Midwest can quickly be overwhelmed with shelter needs when I-25 is closed to Casper.

Past Occurrences

Monthly temperature extremes and averages for Natrona County are shown in the following figure. Monthly snowfall extremes and averages for the County are also shown.

Figure 4.47 Natrona County Daily Temperature Average and Extremes (Casper Coop Station)

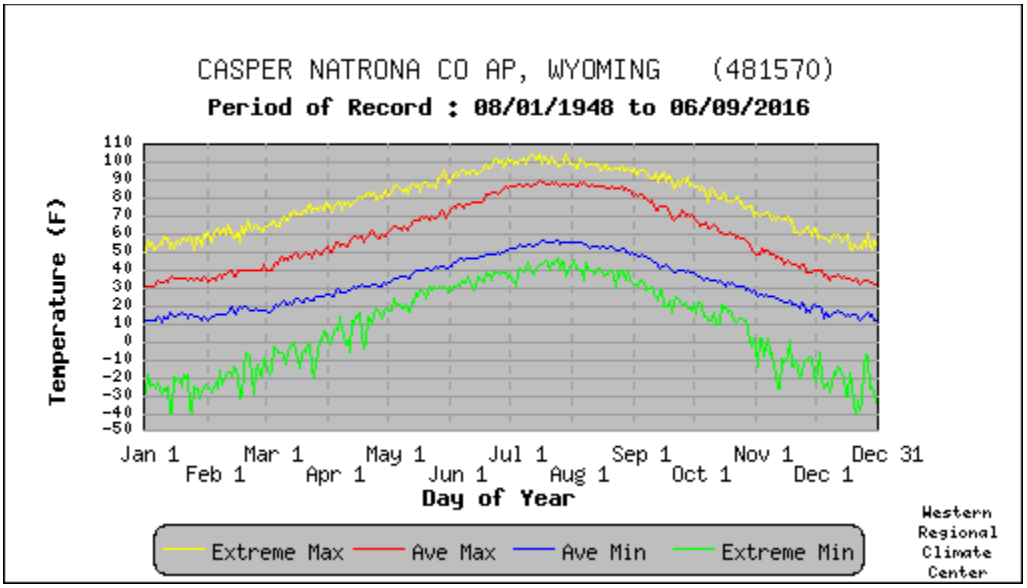
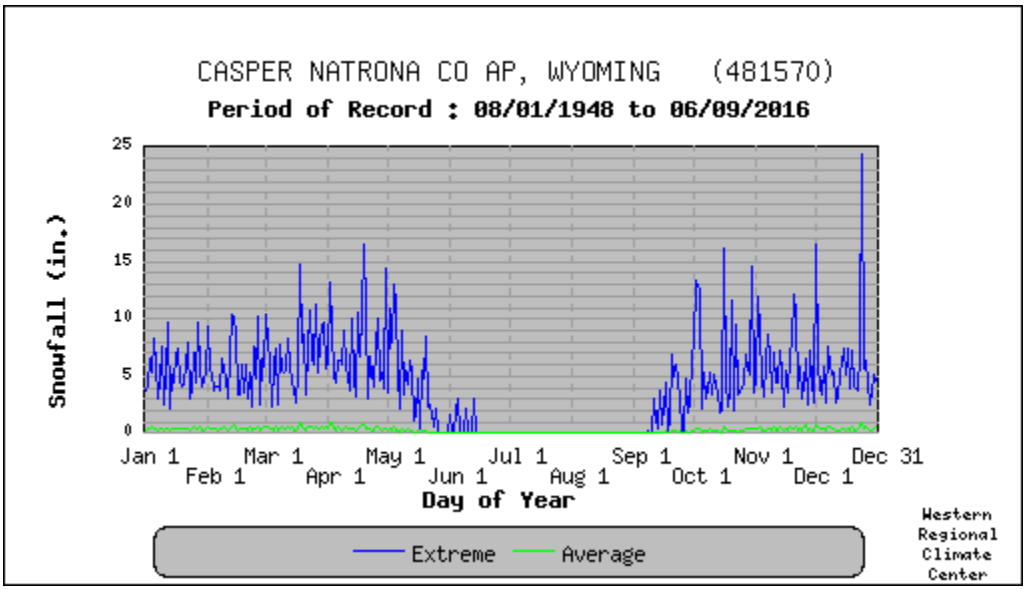


Figure 4.48 Natrona County Daily Snowfall Average and Extremes (Casper Coop Station)



The winter storm history in Natrona County extends from 1996 to December 2016. The County has experienced 212 winter storm incidents during this timeframe. There has been one winter storm in the County that has caused recorded damage.

Table 4.59 Summary of NCDC Winter Weather Events in Natrona County 1996- 2016

Year	# of Winter Storm Events	# of Blizzard Events	# of Cold/Wind Chill Events	# of Heavy Snow Events	Total Events
1996	6	3	12	13	34
1997	4	1	0	4	9
1998	9	0	0	10	19
1999	3	0	0	2	5
2000	7	0	0	5	12
2001	2	1	0	5	8
2002	0	1	0	7	8
2003	19	0	0	1	20
2004	0	0	0	9	9
2005	0	0	0	3	3
2006	7	0	0	0	7
2007	13	0	0	1	14
2008	19	0	0	0	19
2009	22	0	0	0	22
2010	14	0	0	4	18
2011	18	0	0	0	18
2012	5	0	0	0	5
2013	19	0	0	1	20
2014	20	0	4	0	24
2015	15	0	0	0	15
2016	10	0	0	0	10
Totals	212	6	16	65	299

Source: NCDC

On October 3, 2013, a potent early season winter storm moved into Wyoming and continued through much of Friday, October 4. Snow began in the higher elevations of western Wyoming early Thursday morning. Rain across the lower elevations changed to snow during the afternoon and evening hours of Thursday as colder air moved across Wyoming from west to east. With impressive upper level dynamics and ample moisture, snowfall rates approached two inches an hour at some locations. The wet, heavy snow fell on trees that still had full foliage and brought many limbs and trees down onto streets and power lines. Natrona County was hardest hit with 14,000 customers without power at the peak of the storm. Several warming shelters were established Friday along the I-25 corridor to help those without heat. The heavy snow also brought many road closures to central Wyoming. In Casper, snowfall of 16.2 inches was the tenth highest storm total since records began in 1937 and held a liquid water content of 2.14 inches. The highest snowfall amounts fell in the higher elevations with over two feet of snow recorded in the higher elevations of the Wind River, Bighorn, and Absaroka ranges, as well as Casper Mountain. The highest amount was at the Reno Hill SNOTEL where 34 inches of snow was recorded. Many lower elevation locations east of the Continental Divide reported 6 to 12 inches of snow. Most areas of Natrona County received over a foot of snow including 16.2 inches at the Casper Airport and up to 22 inches in the foothill areas of Casper Mountain. The heavy, wet snow fell on trees that still had full foliage and caused branches and in some cases whole trees to fall. Many of these landed on power lines and caused widespread power outages. Around 14,000 customers were without power at the peak of the storm. Property damage totaled $3M.

The HMPC noted a past occurrence when a nursing home had to relocate persons during a storm event when their generator ran out of fuel. In 2012, a severe cold snap resulted in tree mortality.

Frequency/Likelihood of Occurrence

Winter storms are an annual occurrence in Wyoming, often occurring multiple times each winter, and affecting entire regions in their size and scope. Since 1996, the County has averaged almost 14 days with a recorded severe winter incident per year.

Potential Magnitude

The damages caused by severe winter storms and blizzards very 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. Impacts from the storm dictate the magnitude of the event, emphasizing that the amount of snow may not always directly correlate to how bad the storm is. Damaged power lines and dangerous or impassable roadways may forestall the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or even the provision of basic utilities such as heat and running water. When events happen with a long warning time, it is possible to pre-mitigate the effects of insufficient supply levels or to pre-test emergency generators, which may prevent some of the previously described impacts from occurring. Unanticipated storms increase the number of people stranded, both in cars and at public locations, which may increase the number of injuries and deaths attributed to the event (often caused by exposure) and place uneven and unanticipated strains on public sheltering capacities. The weight of the snow, driven by the water content of the fall, increases the potential for damages caused to structures and trees. Lighter snow caused by extreme cold increases the damages caused to livestock, agriculture and landscaping due to freezing conditions. Winter storms which go through periods of thaw and freeze prolong dangerous icy conditions, increasing the likelihood of frozen and damaged water pipes, impassable or dangerous roadways, damaged communication lines, or more extensive damages to infrastructure and structures caused by seeping water freezing under roofs, porches, patios, inside sidings, or causing damage to vehicles.

Winter storms usually cover a significant part of the State, and as such are easier to describe regionally than on a county by county basis.

Vulnerability Assessment

Population

The threat to public safety is typically the greatest concern during severe winter storms. While virtually all aspects of the population are vulnerable to severe winter weather, there are segments of the population that are more vulnerable to the potential indirect impacts of a severe winter storm than others, particularly the loss of electrical power. As a group, the elderly or disabled, especially those with home health care services that rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes or other special needs housing may also be vulnerable if

electrical outages are prolonged. If they do not have a back-up power source, rural residents and agricultural operations reliant on electricity for heating and water supplies are also especially vulnerable to power outages.

Severe winter weather also increases the vulnerability of the commuting population. While there is no way to quantify which of these accidents occur during severe winter storms versus regular winter storms, the numbers indicate that winter driving conditions raise the vulnerability of the commuting population.

General Property

Property vulnerabilities to severe weather include damage caused by high winds, ice, or snow pack and subsequently melting snow. Vehicles may be damaged by the same factors, or temporarily un-useable due to the driving conditions created by severe winter weather. 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. Very wet snow packs down densely and is very heavy. This 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. These records are probably tracked via insurance or other private vendors. Crops, livestock and other agricultural operations are also highly vulnerable to severe winter storms.

Essential Infrastructure, Facilities, and Other Important Community Assets

The physical structures which comprise essential infrastructure are as vulnerable as those outlined in the General Property subsection of this profile. Severe winter weather may also disrupt the availability of services from essential infrastructure, including utility delivery (gas, electric and water), telephone service, emergency response personnel capabilities, road plowing, and childcare availability. Severe winter storms may even halt the operation of an area for periods of time, making the vulnerability of the counties even higher.

As mentioned previously, ice or heavy accumulations of snow, particularly with blowing and drifting, can temporarily impact the roadway system. These accumulations also require vast amounts of overtime for county and local highway and streets departments to remove snow and melt ice. Ice storms or high winds in winter storms can cause extensive loss of overhead utility lines due to buildup either on the lines or on adjacent trees that either collapse due to the weight or blow down onto the utility lines. Services such as telephone, electricity, and cable TV are frequently affected by winter storms. The overall vulnerability of essential infrastructure is medium.

Natural, Historic and Cultural Resources

Natural resources may be damaged by the severe winter weather, including broken trees and death of unsheltered wildlife. Unseasonable storms may damage or kill plant and wildlife, which may impact natural food chains until the next growing season. Historical areas may be more vulnerable

to severe winter storms due to construction and age of structures. Cultural resources generally experience the same vulnerabilities outlined in General Property, in addition to lost revenue impacts due to transportation impacts. The overall vulnerability of these resources is medium.

Future Development

Where building codes are applicable, future residential or commercial buildings built to code should be able to withstand snow loads from severe winter storms. Future power outages or delays in power delivery to future developments may be mitigated by construction considerations such as buried power lines. Future development will also require future considerations for snow removal capacity including equipment, personnel, and logistical support. Adequate planning will help establish the cost-effective balance.

Public education efforts may help minimize the risks to future populations by increasing knowledge of appropriate mitigation behaviors, clothing, sheltering capacities, and decision making regarding snow totals, icy roads, driving conditions, and outdoor activities (all of which are contributors to decreased public safety during severe winter storms). New establishments or increased populations who are particularly vulnerable to severe winter storms (such as those with health concerns or those who live in communities that may be isolated for extended periods of time due to the hazard) should be encouraged to maintain at least a 72-hour self-sufficiency as recommended by FEMA. Encouraging contingency planning for businesses may help alleviate future economic losses caused by such hazards while simultaneously limiting the population exposed to the hazards during commuting or commerce-driven activities.

Summary

Winter Storms are generally a medium significance hazard in the County.

Table 4.60 Winter Storm Hazard Risk Summary

	Geographic Extent	Potential Magnitude	Probability of Future Occurrence	Overall Significance
Bar Nunn	Significant	Limited	Highly Likely	Medium
Casper	Significant	Limited	Highly Likely	Medium
Edgerton	Significant	Limited	Highly Likely	Medium
Evansville	Significant	Limited	Highly Likely	Medium
Midwest	Significant	Limited	Highly Likely	Medium
Mills	Significant	Limited	Highly Likely	Medium
Natrona County	Significant	Limited	Highly Likely	Medium

4.3.12 Wildfire

Hazard/Problem Description

Wildfire is defined as a highly destructive fire or any instance of uncontrolled burning in grasslands, brush or woodlands. Wildfire has encroached into urban interface situations as more people move closer to forest settings. 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. The term "wildland/urban interface" or WUI is widely used 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. "Aspect" refers to the direction in which a slope faces. "Fuel" consists of combustible material, including vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire.

Wildfires can occur at any time of the year, but are most likely to occur during the spring, summer or fall. Thunderstorms that contain lightning frequently start wildfires, but they can also be caused by humans. Wyoming's semi-arid climate and rural character make the state vulnerable to catastrophic wildland fires, which comprise more than 50% of all fires in Wyoming.

As the population and the wildland/urban interface in Wyoming increases, the more significant the risk of wildland fire hazard. 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 wildland/urban interface has grown into these densely packed forests, the potential for catastrophic wildland fires has increased as well. Fires have historically played a natural role on western landscapes. For example, some species of trees occupy sites following fire until replaced by more shade-tolerant species. In some cases regeneration of vegetation can be enhanced by fire. Fires may have positive or negative effects, or both, depending upon the resources at risk in the fire area.

Geographical Area Affected

While brushfires could ignite anywhere across the county, the wildland and wildland-urban interface areas are of most concern and are shown in Figure 4.49 based on the Wildland Urban Interface Hazard Assessment. This assessment was produced by a joint venture of the Wyoming State Forestry Division, USFS, BLM, NPS, and other interested parties. This Geographic Information System (GIS)-based mapping effort builds on the Front Range Redzone Project in Colorado (the first fire-hazard mapping program of its kind). The Assessment maps fire hazard incorporating population density against slope, aspect, and fuels. With the mapping analysis evaluating areas of varying wildfire vulnerability, the final output results in a Risk, Hazard, and Value (RHV) map displaying areas of concern (Redzones) for catastrophic wildland fires.

The following figures show RedZone areas, based on available data.

Figure 4.49 Wildland Fire Redzones

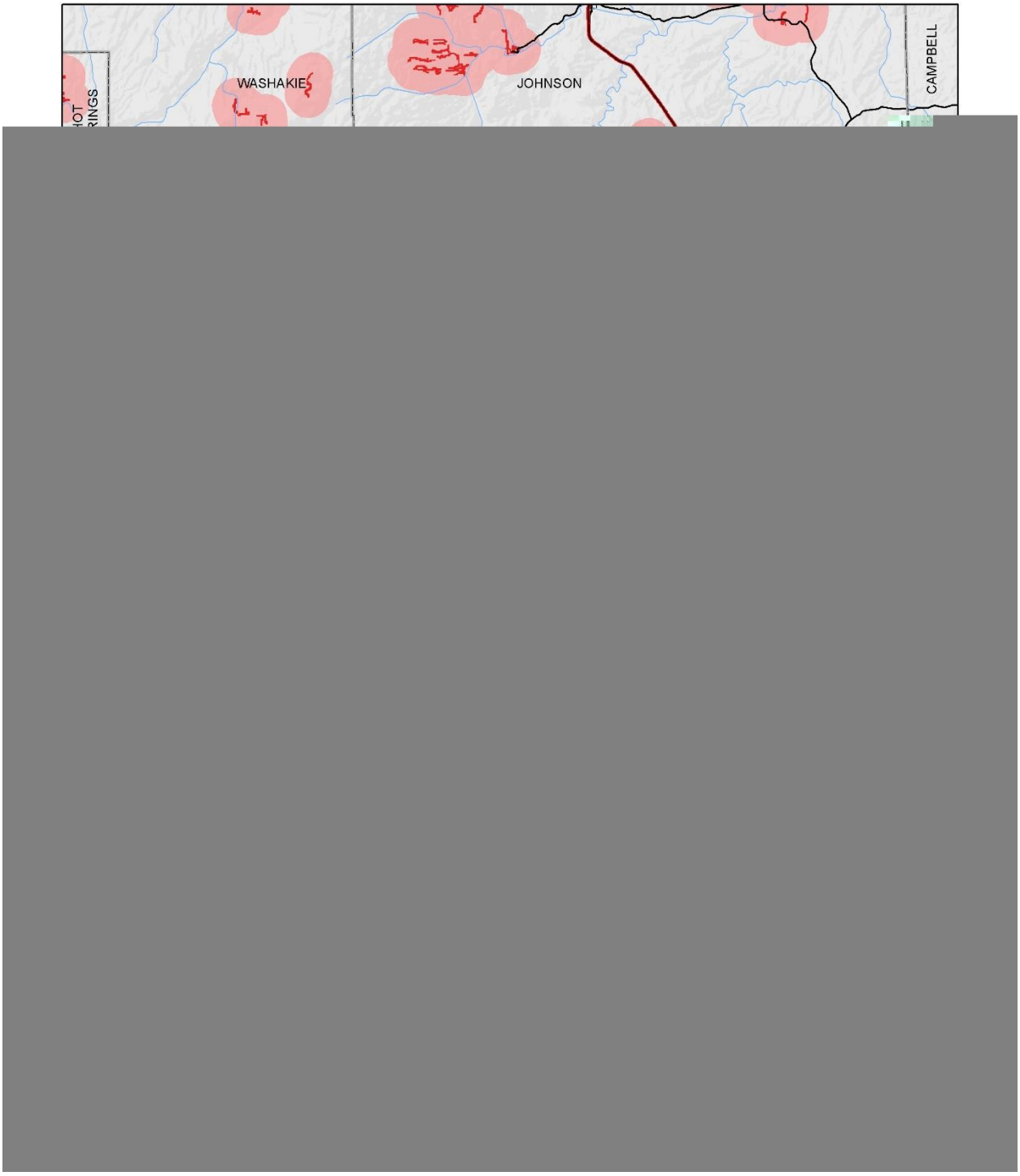
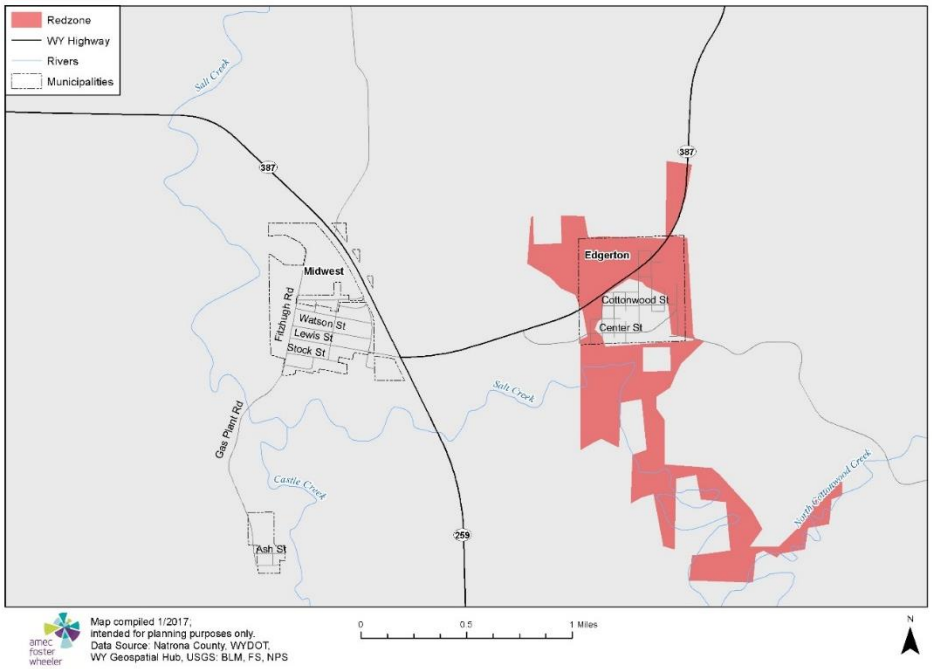


Figure 4.50 Casper Redzones

Figure 4.51 Midwest and Edgerton Redzones



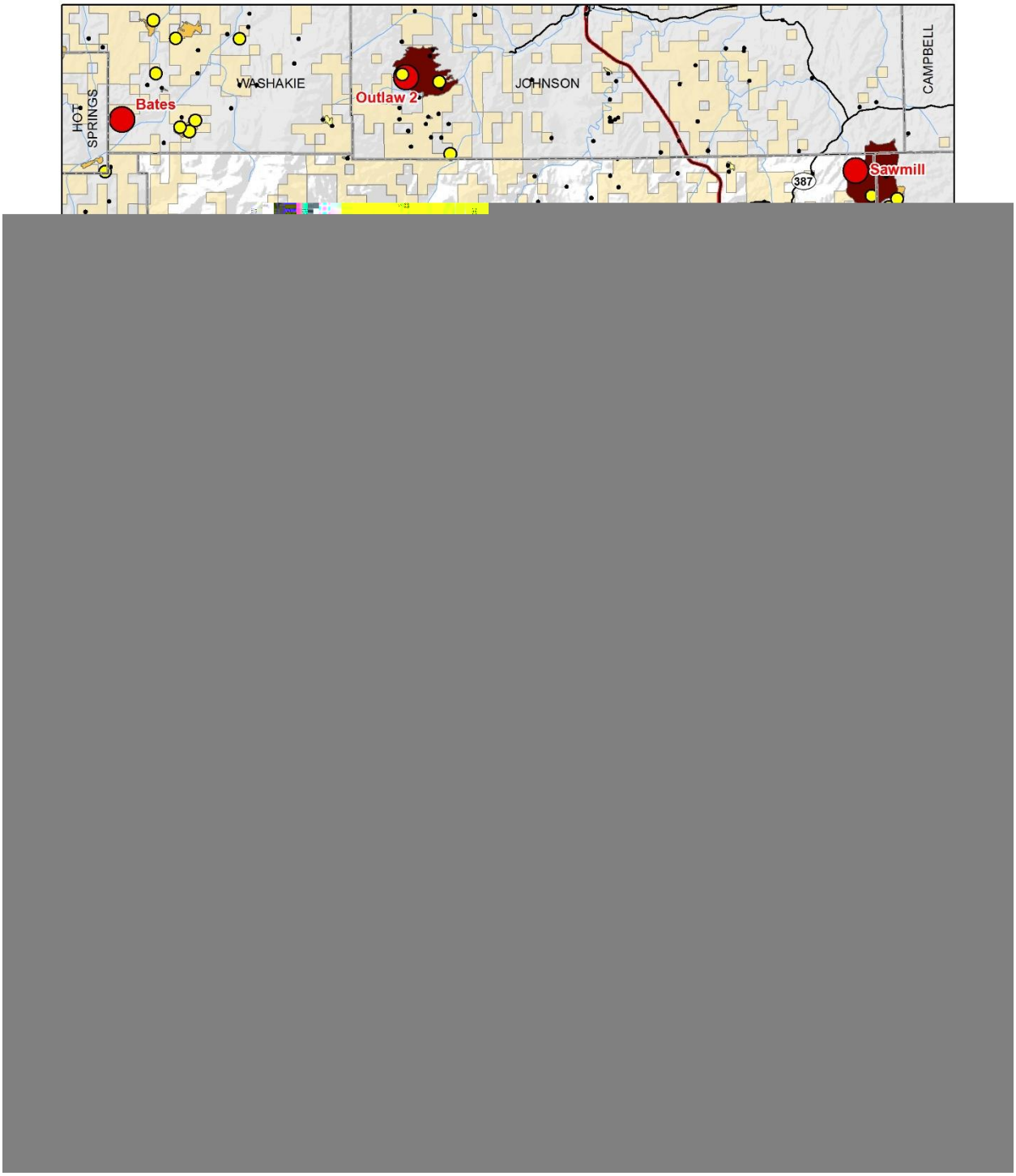
Past Occurrences

The Federal Wildland Occurrence Database was used to analyze fire history in Natrona County.

The Federal Wildland Fire Occurrence database, maintained by the USGS and other agencies, includes perimeter and point GIS layers for fires on public lands throughout the United States. The data includes fires dating back to 1980. The Bureau of Land Management, and US Forest Service reports include fires of 10 acres and greater. The database is limited to fires on federal lands. Some fires may be missing altogether or have missing or incorrect attribute data. Some fires may be missing because historical records were lost or damaged, fires were too small for the minimum cutoffs, documentation was inadequate, or fire perimeters have not yet been incorporated into the database. Also, agencies are at different stages of participation. For these reasons, the data should be used cautiously for statistical or analytical purposes.

The following figure shows a map of wildfires that have affected the area based on the Federal Wildland Occurrence Database. Most of the recorded fires occurred in the eastern part of the county.

Figure 4.52 Wildland Fire Occurrences in Natrona County 1935 - 2015



Historically, most significant fires in Natrona County have occurred in the eastern areas of the county. There have been several fires affecting over 1,000 acres, and many smaller fires throughout the county. According to the Federal Wildland Occurrence data, a total of 38 fires burned 159,858 acres; many of these fires were relatively small, burning only a few acres. The

largest fire in the County occurred in 2006, when the Sawmill fire burned 16,503 acres. The following table describes wildfires in Natrona County that burned 1,000 or more acres between 1980 and 2015. During the HMP Risk and Goals Meeting, it was noted that Bar Nunn was evacuated in 2016 due to a nearby wildfire. It was also noted that there have been two major wildland fires between 2014 and 2016 which the BLM has done studies on.

Table 4.61 Wildfires over 1,000 acres in Natrona County: 1980-2015

Fire Name	Acres Burned	Cause	Year
Sawmill	16,503	Natural	2006
Sheepherder Hill	15,556	Human/Natural	2012
Geary D. 2	14,700	Natural	1996
Jackson Canyon	11,765	Natural	2006
Station AKA Cole Creek	9,516	Human	2015
Cole Creek	9,290	Human	1996
Henderson	8,390	Natural	2000
Goat Mtn	6,661	Natural	1985
Deadhorse	5,900	Natural	2000
Poison Spider	3,166	Natural	2006
Geary Dome	2,879	Human	2010
205	2,573	Human	2011
33 Mile	2,514	Natural	2000
Mudsprings	2,266	Human	1991
Arapahoe	2,073	Human	2011
Sherwood	2,000	Natural	1980
Ormsby	1,667	Natural	1995
Casper Cre	1,354	Natural	2001
Sage Hen	1,271	Natural	2005
Hemmingway	1,069	Natural	2000
Lawn Creek	1,033	Human	1998

Source: Federal Wildland Occurrence Database

NCDC tracks wildfire incidents, including damages. The systems records $10.34 million in property damage caused by fires since the year 2000, with major damages concentrated in four burns.

Table 4.62 Wildfire Property Damage Natrona County: 2000-2015

Fire	Year	Property Damages
Jackson Canyon	2006	$1.24 million
Bone Creek	2007	$100,000
Sheep Herder Hill	2012	$4 million
Station AKA Cole Creek	2015	$5 million
Total		$10.34 million

Source: NCDC

The 2005 CWPP notes that historically, fires occur infrequently at the higher elevations in the county, and relatively frequently at the lower elevations.

Frequency/Likelihood of Occurrence

Wildfires are **highly likely** to occur in each jurisdiction within Natrona County each year, meaning that there is nearly a 100% chance of a fire happening in any given year. It is important to note that the risk of wildfires occurring may increase during times of drought, especially prolonged droughts such as the statewide Wyoming drought that began between 1999 and 2000 and the 1988 drought in northwestern Wyoming.

It is important to note that this probability is based on total fires; many fires recorded in Natrona County are relatively small in size or cause relatively little property damage.

Potential Magnitude

According to the NCDC, the most damage caused by a single fire is $5 million. It is important to note that these are property damages; in the $5 million fire, it was estimated that the fire itself cost an additional $5 million in suppression costs that were not accounted for in the property damage data. Much more damaging fires could be possible given the development in WUI areas.

Wildfires can have significant economic impacts as they often coincide with the busy tourist season in the summer months. It is important to note that the magnitude of a wildfire can be intensified by drought; drought can also cause significant complications to firefighting operations.

Vulnerability Assessment

The principal wildfire mitigation plan for Natrona County is the "Natrona County Wildfire Hazard Assessment and Mitigation Plan" completed in 2005. Wildland fire hazard assessment was conducted on the landscape and community scales. The landscape scale considered the entire county. Five communities were identified for the community-level assessment, as well as an assessment for isolated home sites. Communities were designated based on common characteristics for wildland fire assessment.

The 2005 Natrona County Wildfire Protection Plan identified the following communities for community-specific planning. See that document for additional descriptions of these communities and mitigation recommendations.

- Alcova Reservoir – moderate to high vulnerability
- Rattlesnake – high to extreme vulnerability
- Casper Mountain Complex - high to extreme vulnerability
- Goose Egg – high to extreme vulnerability
- South Bighorn Mountain – high to extreme vulnerability

The planning process also included planning for isolated home sites, though they were not given a specific vulnerability rating.

The 2005 Natrona County CWPP identified issues that exacerbate fire hazards, protection capabilities and overall vulnerability. These include:

- Fuel hazards within or adjacent to WUI communities;
- Prevention and home site protection is lacking in WUI communities;
- Infrastructure, particularly roads and driveways, is inadequate in some locations;
- Fire protection capability and mitigation is lacking with regard to:
  - Firefighter safety;
  - Firefighter effectiveness;
  - Need for new equipment, technology and training;
  - Need for closer interagency collaboration, teamwork and training;
  - Absence of evacuation plans where needed;
  - Need for additional county standards, requirements or protocol with regard to rural subdivision roads, fire mitigation, fuel management or FireWise principles;
  - Community-based strategies for fuel reduction projects;
  - Uncertain priorities as to where mitigation and improvement work should be conducted.

Population

The most exposed population are those living in the wildland-urban interface (WUI) zones, where residential properties are directly intruding into traditional wildland areas. The exposure of the population in these zones increases with the exposure of the corresponding general property, examined in the section below. Other exposed groups include children, the elderly, or those with breathing conditions who may be exposed to high levels of smoke.

Population at-risk estimates were developed by multiplying the average household size from the U.S. Census for the county by the number of residential structures within the Redzone. These results are shown in the table below. It is important to note that many of these structures may include seasonal homes that could be vacant, although the likelihood of them being occupied during fire season is higher.

General Property

GIS is a tool that is used to compare, capture, input, output, store, manipulate, analyze, model, and display spatial data. In the case of the Wildland Urban Interface Hazard Assessment, wildfire hazard vulnerability is determined by comparing values such as slope, vegetation, housing density, and aspect. The following is from the *Wyoming Wildland Urban Interface Hazard Assessment Methodology*—a report written by the Wyoming State Forestry Division:

"The Wildland Urban Interface Hazard Assessment uses three main layers to determine fire danger—Risk, Hazard, and Values. The following lists include the data used to create each of the three layers.

1) Risk – Probability of Ignition
    a. Lightning Strike density
    b. Road density
    c. Historic fire density
2) Hazard – Vegetative and topological features affecting intensity and rate of spread
    a. Slope
    b. Aspect
    c. Fuels – Interpreted from GAP Vegetation information.
3) Values – Natural or man-made components of the ecosystem on which a value can be placed
    a. Housing Density – Life and property
4) Non-flammable areas Mask – a mask was created to aid in the analysis for areas that will not carry fire such as water and rock areas. These areas show in the final assessment as a zero value for hazard."

The statewide Wildland Urban Interface Hazard Assessment and its resultant outputs serve two primary purposes: assisting in prioritizing and planning mitigation projects and creating a communications tool to which agencies can relate to common information and data. With the mapping analysis evaluating areas of varying wildfire vulnerability, the final output will result in a Risk, Hazard, and Value (RHV) map displaying areas of concern (Redzones) for catastrophic wildland fires.

Another method of estimating vulnerability is to determine the value of structures that are located within Redzones, or wildland fire building exposure values. Wildland fire building exposure value is the value of buildings that can be potentially damaged by wildland fire in an area. The total building exposure value is $917,900,339 according to this analysis. The Redzone analysis also includes a buffer zone to exhibit potential areas at risk within two miles of the Redzone; since wildfires can spread rapidly, it is important to consider areas close to the Redzone boundary. According to the Redzone Buffer analysis, the total building exposure value is $2,929,510,041. The table below summarizes exposure by jurisdiction. The following table shows the exposure values within the Redzones in the County.

Table 4.63 Building Exposure within the RedZone

Jurisdiction	Building Count	Improved Value	Est. Content Value	Total Exposure
Bar Nunn	522	$90,555,706	$46,070,426	$136,626,132
Casper	1,254	$234,695,278	$117,347,639	$352,042,917
Edgerton	38	$1,988,923	$1,602,821	$3,591,744
Unincorporated	2,177	$280,137,954	$145,501,592	$425,639,546
Total	3,991	$607,377,861	$310,522,478	$917,900,339

5 MITIGATION STRATEGY

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

5.1 Mitigation Strategy: Overview

This section describes the mitigation strategy process and mitigation action plan for the Natrona County Hazard Mitigation Plan. It describes how the HMPC met the following requirements from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPC led to this mitigation strategy and action plan. Section 5.2 below identifies the goals of this plan and Section 5.4 describes the mitigation action plan.

5.2 Goals and Objectives

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

Up to this point in the planning process, the HMPC had organized resources, assessed hazards and risks, and documented mitigation capabilities; the resulting goals and mitigation actions were developed and updated based on these tasks. During the original development as well as 2017 update of this plan, the County held a series of meetings designed to achieve a collaborative mitigation strategy as described further throughout this section.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and

are more specific and measurable and are sometimes developed in mitigation planning as an intermediate step between goals and mitigation actions or projects.

The update of goals for Natrona County was initiated through a facilitated discussion at two planning workshops held in February and March 2017. The HMPC members were provided a PowerPoint presentation that explained goals, objectives and actions and listed examples of each. A worksheet with the 2010 plan goals was provided to allow HMPC members to provide suggestions for revisions. Through a facilitated discussion the group felt that the goals and objectives remained valid, with some minor wording revisions to reflect current conditions. Objective 2.2 below was added to further define the multi-jurisdictional and collaborative nature of this plan.

The updated goals and objectives for the Natrona County Hazard Mitigation plan are listed below.

Goal 1: Continue to implement actions to mitigate the effect of hazards through education, ordinances and resolutions, and proper project analysis, to enhance life safety and reduce the property losses.

Objective 1.1: The County and jurisdictions will participate in activities and support mitigation projects that enhance the protection of citizens from hazards.

Objective 1.2: The County and jurisdictions will create public awareness campaigns to educate citizens of the possible hazards associated with all hazards that affect the planning area.

Goal 2: Continue coordination among all entities of Natrona County to assess all hazards and take various actions to reduce or eliminate the risk factors of those hazards.

Objective 2.1: The County and jurisdictions will participate and support projects that ensure emergency services are properly equipped and trained to provide the level of service the community deserves.

Objective 2.2: Continue multi-jurisdictional collaboration on hazard mitigation projects to the benefit of all jurisdictions

Goal 3: Reduce the economic impact on the local economy caused by the effects of hazards in the communities.

Objective 3.1: Communities working together shall develop policies for hazard prone areas that either limit development or provide additional mitigation measures within those areas.

5.3 Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

The next step in the mitigation strategy is to identify and analyze a comprehensive range of specific mitigation actions and projects to reduce the effects of each hazard on new and existing buildings and infrastructure. During the 2017 Plan update, the HMPC analyzed viable mitigation options by hazard that supported the identified goals. The HMPC was provided with the following list of categories of mitigation actions, which originate from the Community Rating System:

- **Prevention**: Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- **Property protection**: Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
- **Structural**: Actions that involve the construction of structures to reduce the impact of a hazard.
- **Natural resource protection**: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Emergency services**: Actions that protect people and property during and immediately after a disaster or hazard event.
- **Public information/education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

In order to identify and select mitigation actions to support the mitigation goals, each hazard identified and profiled in Chapter 4 was evaluated. At the mitigation strategy workshops the HMPC was also provided a matrix showing examples of potential mitigation action alternatives for each of the above categories, for each of the identified hazards. The HMPC was also provided a handout that explains the categories and provided further examples. Finally, another reference document titled "Mitigation Ideas" developed by FEMA was distributed. This document lists the common alternatives for mitigation by hazard grouped by the FEMA categories of Plans and Regulations, Structure and Infrastructure Projects, Education and Awareness, Natural Systems Protection and Emergency Services. The HMPC was asked to consider both future and existing buildings in considering possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Appendix B provides the matrix of alternatives considered. Each proposed action was written on a large sticky note and posted on flip charts in the meeting rooms underneath the hazard it addressed. The result was a number of new project ideas with the intent of reducing the impacts of the identified hazards.

The mitigation strategy builds on existing local authorities, policies, programs, and resources, as well as the ability to expand on and improve these existing tools. Those capabilities are noted in Chapter 2 and can be assessed to identify gaps to address or strengths to enhance through new mitigation actions. For instance, gaps in design or enforcement of existing regulations could be addressed through additional personnel or a change in procedure or policy.

Based upon the key issues identified in the risk assessment the HMPC came to consensus on proposed mitigation actions for each hazard for their jurisdictions. Certain hazard impacts were best reduced through multi-hazard actions. A lead for each new action was identified to provide additional details on the project so they could be captured in the plan. Final action strategies are discussed in Section 5.4.

5.3.1 Prioritization Process

Once the mitigation actions were identified, the HMPC was provided FEMA's recommended prioritization criteria STAPLEE to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE is an acronym for the following:

- Social: Does the measure treat people fairly? (e.g., different groups, different generations)
- Technical: Is the action technically feasible? Does it solve the problem?
- Administrative: Are there adequate staffing, funding, and other capabilities to implement the project?
- Political: Who are the stakeholders? Will there be adequate political and public support for the project?
- Legal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- Economic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- Environmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

Other criteria used to assist in evaluating the priority of a mitigation action includes:

- Does the action address hazards or areas with the highest risk?
- Does the action protect lives?
- Does the action protect infrastructure, community assets or critical facilities?
- Does the action meet multiple objectives (Multiple Objective Management)?

At the mitigation strategy workshops, the HMPC used STAPLEE to determine which of the new identified actions were most likely to be implemented and effective. Keeping the STAPLEE criteria in mind, each member 'voted' for the new mitigation actions by sticking a colored dot on the sticky note on which the action was written. The number of dots next to each action was totaled as an indication of relative priority and translated into 'high,' 'medium' and 'low.' The results of the STAPLEE evaluation process produced prioritized mitigation actions for implementation within the planning area.

The process of identification and analysis of mitigation alternatives allowed the HMPC to come to consensus and to prioritize recommended mitigation actions for their jurisdictions. During the voting process, emphasis was placed on the importance of a benefit-cost review in determining project priority as this is a requirement of the Disaster Mitigation Act regulations; however, this was a planning level analysis as opposed to a quantitative analysis. Quantitative cost-benefit analysis will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan.

Each mitigation action developed for this plan contains a description of the problem and proposed project, the entity with primary responsibility for implementation, any other alternatives considered, a cost estimate, expected project benefits, potential funding sources, and a schedule

for implementation. Development of these project details for each action led to the determination of a high, medium, or low priority for each.

5.4 Mitigation Action Plan

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

This section outlines the development of the updated mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan's goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

5.4.1 Progress on Previous Mitigation Actions

As part of the update process Natrona County reviewed the previously identified actions in the 2010 plan to assess progress on implementation. These reviews were completed using a worksheet and a facilitated discussion to capture information on each action including if the action was completed or deferred to the future. Actions that were not completed were discussed for continued relevance and were either continued in this plan or in some cases recommended for deletion.

The County and the majority of their participating jurisdictions have been very successful in implementing actions identified in this plan, thus, working steadily towards meeting the plan’s goals. Progress on mitigation actions previously identified in these planning mechanisms are detailed in the mitigation action strategy that follows. These completed actions were also discussed with the plan participants to showcase progress and stimulate ideas amongst the respective jurisdictions. Reasons that some actions have not been completed include low priority, lack of funding, or lack of administrative resources. See Table 5.1 for more details on progress on implementation.

5.4.2 Continued Compliance with NFIP

Given the significance of the flood hazard in the planning area and as required by DMA, an emphasis will be placed on continued compliance with the National Flood Insurance Program (NFIP). Natrona County and jurisdictions that participate in the NFIP including Casper, Mills, and Evansville will continue to make every effort to remain in good standing with the program. This includes continuing to comply with the NFIP’s standards for updating and adopting floodplain maps and maintaining and updating the floodplain zoning ordinance. Actions related to continued compliance include:

- Continued designation of a local floodplain manager whose responsibilities include reviewing floodplain development permits to ensure compliance with the local floodplain management ordinances and rules;
- Suggest changes to improve enforcement of and compliance with regulations and programs;

- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance.

Also to be considered are the flood mitigation actions contained in this plan that support the ongoing efforts by participating counties to minimize the risk and vulnerability of the community to the flood hazard, and to enhance their overall floodplain management program. It is also important to note that the City of Casper is a participant in the Community Rating System which underscores the City's commitment to managing its floodplains above and beyond the FEMA minimum standards and keeping flood insurance affordable.

5.4.3 Mitigation Action Plan

The mitigation action plan presents the recommendations developed by the County planning team, outlining how each jurisdiction can reduce the risk and vulnerability of people, property, infrastructure, and natural resources to future disaster losses. The actions are captured in Table 5.1 including a description of the action, priority, hazards intended to be mitigated, the parties responsible for implementation, and an action identification number to make actions easier to track and reference in the future. Some mitigation actions are detailed further in the pages that follow. These details include the action description, hazard(s) mitigated, lead and partner agencies responsible for initiating implementation, costs, and timeline. Many of the action items included in this plan are a collaborative effort among local, state, and federal agencies and stakeholders in the planning area.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The jurisdictions are not obligated by this document to implement any or all of these projects. Rather, this mitigation strategy represents the desires of each community to mitigate the risks and vulnerabilities from identified hazards. The participating jurisdictions also realize that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to their overall goals, as listed in this plan.

Where feasible it is recommended that mitigation be integrated and implemented through existing planning mechanisms. Specific related mechanisms are noted in the table where applicable and also discussed in Chapter 6.

Table 5.1 Mitigation Action Strategy

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
MJ-1	Alert and Warning System	Natrona County Emergency Management Director	Currently budgeted	On-going	High/No	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, Natrona County	All hazards	Completed/Continuing Phase 1 is complete with 95% of sirens installed. The project will continue as funding allows.
MJ-2	Develop a Ready, Set, Go Program for All Hazards	Natrona County Emergency Management Director	Absorbed into prepared-ness budget line.	Jan 2019	Low/No	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, Natrona County	All hazards	New in 2017.
MJ-3	Public Education (CERT) and 72 Hour Preparedness Training	Natrona County Emergency Management Director	Currently budgeted	On-going	High/No	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, Natrona County	All hazards	Completed/Continuing. CERT Training occurs twice a year. This project was updated to include 72 Hour Preparedness Training to encourage self-sufficiency for all hazard events.

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
MJ-4	Wyoming Firewise	Natrona County Emergency Management Director	Currently budgeted	On-going	High/No	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, Natrona County	Wildfire	Completed/Continuing. Firewise activities are ongoing on a quarterly basis and include education and awareness on defensible space and other mitigation techniques.
MJ-5	Electronic Mass Notification System	Natrona County Emergency Management Director	$100,000	By 2013	Medium/No	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, Natrona County	All hazards	Completed. CodeRed has been installed for mitigation of loss of life by mass notification of dangerous weather or other hazard events.
MJ-6	Continue to offer immunizations to residents and educate the public about novel diseases	Natrona County Public Health Preparedness	Variable depending on outbreak	Ongoing annually and during disease outbreaks	Low/No	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, Natrona County	Biological disease	New in 2017
NC-1	Updated floodplain mapping	Natrona County Emergency Management Director	$35,000	Complete	Medium/Yes	Natrona County	Flood	Completed. The Glendale St Letter of Map Revision was completed May 2015 and has been incorporated into new maps.

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
C-1	Garden Creek Detention Basin	City of Casper - Engineering	$1,245,000	NA	NA	City of Casper	Flood	Deleted. This project is no longer recommended.
C-2	Industrial Avenue Storm Sewer Improvements	City of Casper - Engineering	$250,000	By 2018	High/Yes	City of Casper	Flood	Deferred. Not completed due to other priorities. An updated project narrative was developed in 2017
C-3	Emigrant Gap Draw Channel Improvements	City of Casper - Engineering	$850,000	By 2020	Medium/Yes combination of Federal, State, County and City funds	City of Casper; Natrona County	Flood	New in 2017 Identified in City of Casper 2013 Stormwater Management Master Plan; County and NRCS potential partners
C-4	Sun Drive Detention Pond on Sage Creek	City of Casper - Engineering	$500,000	By 2020	Medium/Yes HMGP, City of Casper 1% Sales Tax Funds, and WYDOT funds	City of Casper; WYDOT	Flood	New in 2017 Identified in City of Casper 2013 Stormwater Management Master Plan; WYDOT partner

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
C-5	Eastdale Creek Diversion to Sage Creek	City of Casper - Engineering	$2,500,000	By 2021	Medium/Yes HMGP, City of Casper 1% Sales Tax Funds, and WYDOT funds	City of Casper; WYDOT	Flood	New in 2017 Identified in City of Casper 2013 Stormwater Management Master Plan; WYDOT partner Reduce flooding of Interstate 25 (I-25) and approximately five (5) private properties.
C-6	North Platte River Restoration	City of Casper - Engineering	Varies based on project	2021	High/Yes	Casper, Natrona County, Mills	Flood, wildfire	New in 2017 This project links the HMP with implementation of priority projects in the Platte River Revival River Restoration Master Plan with flood and wildfire benefits.
C-7	Cyber Threat Prevention, Protection, Response and Recovery	City of Casper in partnership with Natrona County	$5-10k/yr.	On-going by 2020	High/No – currently budgeted	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills, and Natrona County	Technological Human Caused Cyber & Network Threats	New in 2017
C-8	City of Casper Central Service Center Hardening Project	City of Casper - Engineering	$520,000	By 2013	Medium/Yes	City of Casper	All hazards	Completed

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
C-9	City of Casper Events Center Hardening Project	City of Casper - Engineering	$600,000	By 2020	Medium/Yes	City of Casper	All hazards	Completed. This project included security hardening and generator installation
C-10	Flood Hazard Notification and Education	City of Casper- Planning Tech	$20,000	2018 and annually	Medium/Yes	City of Casper	Flood	Completed/Continuing The City has created webpages designed to provide citizens with floodplain information as well as mapping information See updated narrative developed in 2017.
M1	Chamberlain Street bank stabilization	Town of Mills - Engineering Director	$380,000	By 2019	High/Yes	Town of Mills in coordination with County River Master Plan	Flood	Deferred but still a priority. There is one home and some land that is being negatively impacted by streambank erosion.
M2	Hardening of the Town of Mills fire department	Town of Mills - Fire Department - Chief	TBD	By 2020	High/Yes	Town of Mills	All hazards	Completed. A generator was installed in 2013 with help from a FEMA grant.
E1	Stabilization of ditch bank and installation of storm sewer pipe along the existing	Town of Evansville Engineering Director	$150,000	By 2020	Medium/Yes	Town of Mills	Flood	Deferred due to other priorities but still a needed project.

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
E2	Hardening of the Town of Evansville Police Department for Flood and Severe Weather	Town of Evansville - Police Department Chief	TBD	By 2020	Medium/Yes	Town of Evansville	All hazards	Deferred. Not completed due to lack of funding but still needed.
E3	Hardening of the Town of Evansville Community Center	Town of Evansville - Planning - Mayor	TBD	By 2013	Medium/Yes	Town of Evansville	All hazards	Complete.
E4	Address evacuation of Evansville due to Train Derailment or other hazards, including developing an alternate route	Town of Evansville Police Department Chief	TBD	By 2020	High/Yes	Town of Evansville	Hazardous Materials, Floods, wildfire	New in 2017
BN1	Develop additional emergency access/egress for Bar Nunn	Town of Bar Nunn Administration	TBD	By 2020	High/Yes	Town of Bar Nunn	Hazardous Materials, wildfire	New in 2017

ID	Mitigation Project	Responsible Party	Budget (estimates)	Timeline for Completion	Priority /Additional Funding Sources needed?	Jurisdiction that will benefit	Hazard(s) Mitigated	2017 Status and comments
BN2	Cheat grass/flash fuels eradication	Town of Bar Nunn Maintenance	$20,000	Spring 2020	High/ Budgeted/Mitigation grant funding/Donation of labor/equipment	Town of Bar Nunn	Wildland Fire	New in 2017
ED1	Water storage and treatment facility fire break	Town of Edgerton Public Works	$7,000	2020	High/ Town of Edgerton general fund FEMA Mitigation grant funding/Donation of labor/equipment	Town of Edgerton Town of Midwest	Wildland Fire	New in 2017
MW1	North boundary fire break	Town of Midwest Public Works	$7,000	Spring 2019	High/ Budgeted/Mitigation grant funding/Donation of labor/equipment	Town of Midwest	Wildland Fire	New in 2017

5.4.4 Mitigation Actions – Additional Information

The following narratives provide additional information on the mitigation actions identified in the previous action strategy table by County and municipality.

County and Multi-Jurisdictional Actions

New or Continuing Projects

Mitigation Project Title	**MJ- 1 Alert and Warning System**
Hazard(s) Mitigated	Earthquake, Flood, Winter Storms, Thunderstorm, Dam Failure, Wildfire, Terrorism, Hazardous Materials, High Winds
Project Description, Issue/Background	Natrona County utilizes several avenues of mass notification measures with the purpose to warn people throughout Natrona County of impending or actual disaster/emergencies. The Warning systems may be utilized to warn or alert officials, emergency response personnel, and the general public in the event of local, state and national disasters and emergencies and other natural and technological events. Current warning resources include outdoor warning siren systems, mobile sirens and public address systems utilized primarily by emergency vehicles, the NOAA all hazards alert radio system via the National Weather Service in Riverton, Wyoming. Specialized weather alter radios with accessory equipment to include a strobe light and pillow vibrator are offered to hearing impaired citizens. All such avenues are utilized to warn the public of an emergency event or disaster. The Emergency Alert System (EAS) is also another means of notification utilized in Natrona County. The EAS is set to monitor radio stations and the National Weather Service. It can be activated by the 24 hour warning point and goes out via a public safety frequency to all local radio and television stations. In addition, the Natrona County School District as well as Casper College have instituted their own mass notification systems within their student and staff population. The Natrona County Emergency Management Agency continues the effort to provide education and training on existing notification systems available throughout Natrona County as well as exploring new technology to include SMS (short messaging system), voice and email avenues of notification. The outdoor warning siren system is largely in place as of Spring 2017 with the majority of the system operational. Due to public feedback the County is no longer using the voice message on siren system to lessen confusion.
Related planning mechanisms	
Jurisdictions that will benefit	Natrona County, Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills
Responsible Office/ Agency	Natrona County Emergency Management
Partners	Two-Way Radio Service Natrona County School District #1

	Casper College Anadarko Petroleum Corporation Communication Technologies, Inc. National Weather Service - Riverton, WY
Priority (High, Medium, Low)	Low
Cost Estimate	$5-25k
Benefits (Avoided Losses)	mitigate loss of life, injury
Potential Funding source	FEMA, WOHS, Local budget
Timeline for Completion	Identified in 2010 and continuing. The remainder of the outdoor warning siren system is mostly completed by spring as of Spring 2017 and expanded with new housing development thereafter. As funding becomes available reverse 911 system and additional mass notification systems will be implemented. Public education is still in progress.

Mitigation Project Title	**MJ-2 - Develop a Ready, Set, Go Program for All Hazards**
Hazard(s) Mitigated	Wildfire, Flood, Terrorism, Hazardous Materials
Project Description, Issue/Background	The Ready, Set, Go Program outlines actions that citizens can do to prepare themselves and their property for an evacuation to mitigate loss of life, injury, and essential personal property. Originally intended for wildfire hazards, the principles can be applied to all hazards. Several hazards could result in mass-evacuations including floods, hazardous materials incidents and terrorism. This project would result in a plan and public education program to mitigate loss of life and injury in future hazard events.
Related planning mechanisms	Community Wildfire Protection Plan
Jurisdictions that will benefit	Natrona County, Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills
Responsible Office/ Agency	Natrona County Emergency Management
Partners	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills
Priority (High, Medium, Low)	Low
Cost Estimate	$25,000
Benefits (Avoided Losses)	mitigate loss of life, injury, and essential personal property
Potential Funding source	FEMA, WOHS, Local budget
Timeline for Completion	New in 2017. Complete by Jan 2019

Mitigation Project Title	**MJ- 3 Public Education (CERT) and 72 Hour Preparedness Training**
Hazard(s) Mitigated	Earthquake, Flood, Winter Storms, Thunderstorm, Dam Failure, Wildfire, Terrorism, Hazardous Materials, High Winds
Project Description, Issue/Background	Public surveys in 2010 and during the 2017 HMP update showed a high demand for more public education on the hazards that affect Natrona County and how to prepare for such hazards. An education program consisting of billboards, newspaper articles, booths at public gatherings, slides at local movie theaters, and video productions to be shown on both local television stations as well as through cable television. Different hazards will be emphasized during different times of the year. The CERT classes started in March of 1999. Presently approximately 850 persons have been trained. We will be targeting school crises management teams, church teams, building teams as well as neighborhood teams. The emphasis will be to help the participants prepare their families as well as working as a team in the case of a disaster/emergency on an “all hazards” approach. This project is being planned for as a perpetual project as funding allows.
Related planning mechanisms	
Jurisdictions that will benefit	Natrona County, Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills
Responsible Office/ Agency	Natrona County Emergency Management
Partners	Natrona County School District # 1 NALCO/EXXON Chemical EV. Design Citizen Corps Council Many Local Businesses
Priority (High, Medium, Low)	Low
Cost Estimate	$500 per class plus response equipment
Benefits (Avoided Losses)	mitigate loss of life, injury, and essential personal property
Potential Funding source	FEMA, WOHS, Local budget
Timeline for Completion	Ongoing annually and continuing. No ending date

Mitigation Project Title	**MJ- 4 Wyoming FireWise**
Hazard(s) Mitigated	Wildfire
Project Description, Issue/Background	This project was identified in 2010 Plan and is ongoing. The project is for education, establishing the different areas of risk, mapping, and designing examples of ways to reduce the impact of wildfire damage to homes and other structures. The Wyoming FireWise committee has also been applying for and receiving grants for cost share on fuel reduction/mitigation projects. Casper Mountain has served as the pilot project for this endeavor and will serve as an example to the rest of the state of Wyoming. Funds were also applied for the construction of fuel breaks to lessen the impact of a wild fire. The committee is comprised of State Forestry, BLM, private landowners, fire districts and Emergency Management. Aerial mapping was completed and updated 2016 maps will be available for inclusion in the future updates. The hiring of temporary summer help to map out, with GPS, homes and other structures was completed and is now ready to be entered into GIS system once it is up and running. Several homeowners signed up for personal reviews of their property located on Casper Mountain. This committee has also expanded this project to educate homeowners in the Rattle Snake Mountain Range, South Big Horn Mountains and the Alcova Reservoir area. Fire breaks along west side of Casper Mountain were completed by fall of 2010. Fire breaks projects on central part of Casper Mountain were completed by fall of 2006.
Related planning mechanisms	Community Wildfire Protection Plan
Jurisdictions that will benefit	Natrona County, Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills
Responsible Office/ Agency	Wyoming FireWise committee
Partners	Bar Nunn, Casper, Edgerton, Evansville, Midwest, Mills State Farm Insurance, Wyoming State Forestry, Natrona County Emergency Management, BLM, University of Wyoming Agricultural Extension Office, Casper Mountain Fire District, Natrona County Fire Protection District, Natrona County Assessor's Office Private Citizens
Priority (High, Medium, Low)	Low
Cost Estimate	Variable depending on treatment areas
Benefits (Avoided Losses)	Benefits of the project include the placement of water sources with easy access by firefighters in the event of a fire. Firebreaks will slow and/or stop an advancing fire giving firefighters the chance to attack or gain more time to evacuate. The education process has already been working in that landowners are starting to improve their properties making them more fire resistant and therefore making their homes more survivable.
Potential Funding source	State Legislature, Local budget
Timeline for Completion	Identified in 2010 Plan. Ongoing through 2020.

Natrona County Completed Mitigation Actions Identified in 2010 Plan

- Electronic Mass Notification System: CodeRed has been installed for mitigation of loss of life by mass notification of dangerous weather or other hazard events.

City of Casper

New or Continuing Projects

Mitigation Project Title	**Lower Eastdale Creek Channel Improvements**
Hazard(s) Mitigated	Flood/Flash Flood
Project Description, Issue/Background	Eastdale Creek is a medium sized, well-developed drainage basin passing through the central section of the City of Casper. It is bordered on the west by the Saint Mary Street storm sewer system and on the east by Sage Creek. The development in the basin begins at 29th Street and runs north, and the portion of the basin south of there is only sparsely developed as it extends just to the base of Casper Mountain. The total drainage area encompasses 2,370 acres. The channel slope is steep in the upstream reaches and flattens toward the outfall at the North Platte River. Eastdale Creek possesses multiple flooding problems within the developed area, with multiple storm sewers unable to even convey the 10-year flood. Overtopping occurs for the 100-year flood at South Jefferson Street, Drake Place and Bryan Evansville Road. Interstate 25 is also impacted and flooded at the underpass for East Yellowstone Highway and at the frontage road on the north side during the 100-year flood event. The impact to Bryan Evansville Road is a particular concern since it is directly adjacent to the Sam H. Hobbs Regional Wastewater Treatment Plant. The proposed Lower Eastdale Creek Channel Improvements would allow the current 10-year storm event to be conveyed within the proposed channel and culverts, and would convey the future 100-year storm event assuming the Eastdale Creek Diversion to Sage Creek were completed. The existing culverts and open channel along Hereford Lane, from Bryan Evansville Road upstream approximately 1,000 linear feet, cannot even convey the 5-year storm event. Overtopping of a private driveway and Bryan Evansville Road, as well as ditch overspill onto private property east of the channel, happen on a regular basis, often multiple times each year. The proposed improvement include multiple box culverts at 700 Hereford Lane and at Bryan Evansville Road, along with widening of the earthen channel. The estimated cost to construct these channel improvements is $325,000. No property acquisition will be necessary for this project as storm drainage easements have been secured in recent years and will allow for the complete construction project.
Related planning mechanisms	City of Casper 2013 Stormwater Management Master Plan

Jurisdictions that will benefit	City of Casper
Responsible Office/ Agency	City of Casper - Engineering Division
Partners	
Priority (High, Medium, Low)	High
Cost Estimate	$325,000
Benefits (Avoided Losses)	Reduce localized flooding of approximately five (5) private properties and a parallel road section.
Potential Funding source	HMGP and City of Casper 1% Sales Tax Funds
Timeline for Completion	Construction time estimated at 3 months, desired completion date of 11/01/18.

Mitigation Project Title	Industrial Avenue Storm Sewer Improvements
Hazard(s) Mitigated	Flood/Flash Flood
Project Description, Issue/Background	Located in the heart of the Old Yellowstone District, Industrial Avenue houses warehouses, auto body shops, and other industrial businesses. The Old Yellowstone District is a redevelopment area adjacent to the downtown core. West Yellowstone Highway, a street immediately adjacent to Industrial Avenue, has undergone reconstruction, incorporating the city's "Design Standards for Commercial/Downtown Streetscape and Parks," including trees, benches, and decorative lights. Completion of this project has spurred some redevelopment within the adjacent areas. Industrial Avenue is located within the 500-year flood plain of the North Platte River. Flat topography in the area creates numerous drainage challenges, further compounded by existing undersized 8-inch and 12-inch storm sewer serving the approximately 10-acre drainage basin. Replacement of the undersized storm sewers with 24-inch storm sewers will help alleviate the drainage issues for the 25 lots immediately adjacent and provide impetus for additional business growth in the area. The estimated cost to replace the undersized storm sewers along Industrial Avenue between Spruce Street and Elm Street is $100,000. To accommodate the existing drainage conditions, the roadway is inverted. To bring the roadway up to current standards, with a crowned pavement section, curb and gutter, and sidewalk would cost an additional $150,000. This cost does not include the additional cost for trees, benches, decorative lights, or other enhancements identified in the downtown design standards.
Related planning mechanisms	2010 Natrona County Multi-Jurisdiction Hazards Mitigation Plan
Jurisdictions that will benefit	City of Casper
Responsible Office/ Agency	City of Casper - Engineering Division
Partners	Old Yellowstone District
Priority (High, Medium, Low)	High
Cost Estimate	$250,000
Benefits (Avoided Losses)	Reduce localized flooding of approximately twenty-five (5) private properties and associated streets and alleys.
Potential Funding source	HMGP and City of Casper 1% Sales Tax Funds
Timeline for Completion	Construction time estimated at 3 months, desired completion date of 11/16/18.

Mitigation Project Title	Emigrant Gap Draw Channel Improvements
Hazard(s) Mitigated	Flood/Flash Flood
Project Description, Issue/Background	Emigrant Gap Draw is a large, mostly undeveloped drainage basin with its outfall to the North Platte River located near the far west edge of the City of Casper. There is some rural development in the upper portion of the basin, and no true urban development anywhere within the basin. The total drainage area encompasses 9,025 acres. The channel slope is only moderate to gradual throughout, although nearby ridges are steep in portion of the basin. Emigrant Gap Draw possesses one particular flooding area of concern in the lower portion of the basin where the drainage comes into the City of Casper city limits. Under current conditions the drainage channel can convey the 10-year flood event, but a 100-year flood event would result in a flow rate of approximately 930 cubic feet per second spilling into a residential area just south of the channel and inundating at least 9 homes. The proposed channel improvements are designed to widen the channel, flatten the slope (reducing erosion), repair an existing berm, and allow the 100-year flood event to pass through the channel without spilling into the nearby residential neighborhood. The length of the channel improvements project will be approximately 2,100 feet long and a drop structure would be installed at the upstream end of the project. The estimated cost to construct the channel improvements is $750,000. Property necessary to construct the improvements is estimated to cost an additional $100,000.
Related planning mechanisms	City of Casper 2013 Stormwater Management Master Plan
Jurisdictions that will benefit	City of Casper, Natrona County
Responsible Office/ Agency	City of Casper - Engineering Division
Partners	Natrona County and possibly National Resources Conservation Service
Priority (High, Medium, Low)	Medium
Cost Estimate	$850,000
Benefits (Avoided Losses)	Reduce localized flooding of approximately twenty-five (5) private properties and associated streets and alleys.
Potential Funding source	Some combination of Federal, State, County and City funds.
Timeline for Completion	Construction time estimated at 4 months, desired completion date of 11/1/19.

Mitigation Project Title	**Eastdale Creek Diversion to Sage Creek**
Hazard(s) Mitigated	Flood/Flash Flood
Project Description, Issue/Background	Eastdale Creek is a medium sized, well-developed drainage basin passing through the central section of the City of Casper. It is bordered on the west by the Saint Mary Street storm sewer system and on the east by Sage Creek. The development in the basin begins at 29th Street and runs north, and the portion of the basin south of there is only sparsely developed as it extends just to the base of Casper Mountain. The total drainage area encompasses 2,370 acres. The channel slope is steep in the upstream reaches and flattens toward the outfall at the North Platte River. Eastdale Creek possesses multiple flooding problems within the developed area, with multiple storm sewers unable to even convey the 10-year flood. Overtopping occurs for the 100-year flood at South Jefferson Street, Drake Place, and Bryan Evansville Road. Interstate 25 is also impacted and flooded at the underpass for East Yellowstone Highway and at the frontage road on the north side during the 100-year flood event. The impact to I-25 is most significant since it is a major traffic corridor for the general public and emergency vehicles. The proposed Eastdale Creek Diversion to Sage Creek would place a cap on the flood flow at 700 cubic feet per second in Eastdale Creek, diverting approximately 830 cubic feet per second to Sage Creek. This will require a diversion channel between 1,200 and 1,500 feet long, two 78" diameter concrete pipes of 240 feet in length, and a 9'x7' concrete box culvert of 625 feet in length. These conveyance improvements will ensure that the diverted flows are delivered into the Sage Creek drainage, but further downstream channel improvement (2,000 feet in length) will be required in Sage Creek to allow for this added flow during a 100-year flood event. The primary benefit of the project would be the flooding mitigated on the I-25 underpass below East Yellowstone Highway. The estimated cost to construct the diversion channel, culverts and downstream channel improvements is $2,400,000. Property necessary to construct the improvements is estimated to cost an additional $100,000. Coordination and possible funding by the Wyoming Department of Transportation will be considered due to the significant positive impact to Interstate 25 and East Yellowstone Highway.
Related planning mechanisms	City of Casper 2013 Stormwater Management Master Plan
Jurisdictions that will benefit	City of Casper, Wyoming Department of Transportation (WYDOT)
Responsible Office/ Agency	City of Casper - Engineering Division
Partners	Wyoming Department of Transportation (WYDOT)
Priority (High, Medium, Low)	Low

Cost Estimate	$2,500,000
Benefits (Avoided Losses)	Reduce flooding of Interstate 25 (I-25) and approximately five (5) private properties.
Potential Funding source	HMGP, City of Casper 1% Sales Tax Funds, and WYDOT funds
Timeline for Completion	Construction time estimated at 6 months, desired completion date of 11/01/20.

Mitigation Project Title	**Flood Hazard Education**
Hazard(s) Mitigated	Flood/Flash Flood
Project Description, Issue/Background	The City of Casper desires to expand its efforts to notify and engage the citizens within the city that are located in a flood hazard area. The City has created webpages (available at casperwy.gov) designed to provide citizens with floodplain information as well as mapping information (available at casperwy.geosmart.gov). Plans are to continue outreach through utility billing notices, direct mailers, and community presentations with an estimated cost of $15,000 to $20,000.
Related planning mechanisms	2010 Natrona County Multi-Jurisdiction Hazards Mitigation Plan
Jurisdictions that will benefit	City of Casper
Responsible Office/ Agency	City of Casper - Planning
Partners	
Priority (High, Medium, Low)	High
Cost Estimate	$20,000
Benefits (Avoided Losses)	Raise awareness so citizens can take action such as purchase of flood insurance
Potential Funding source	City of Casper 1% Sales Tax Funds
Timeline for Completion	2018 and annually

Mitigation Project Title	**North Platte River Restoration**
Hazard(s) Mitigated	Flood, Erosion, Wildfire
Project Description, Issue/Background	This project links the HMP with implementation of priority projects in the Platte River Revival River Restoration Master Plan with flood and wildfire benefits. The river restoration includes wetland creation, floodplain re-connection, channel re-construction/stabilization and revegetation. Also includes remove of Russian Olive trees, an invasive species that impede flood flows.
Related planning mechanisms	Platte River Revival River Restoration Master Plan
Jurisdictions that will benefit	City of Casper, Natrona County, Mills
Responsible Office/ Agency	City of Casper - Engineering
Partners	Natrona County
Priority (High, Medium, Low)	High
Cost Estimate	Varies depending on project
Benefits (Avoided Losses)	Reduced flooding and erosion; Raise flood awareness so citizens can take action such as purchase of flood insurance
Potential Funding source	City of Casper 1% Sales Tax Funds, NRCS

Mitigation Project Title	**Cyber Threat Prevention, Protection, Response and Recovery**
Hazard(s) Mitigated	Terrorism, Technological Human Caused-Cyber
Project Description, Issue/Background	The embedding of technology into critical infrastructure now requires continuous access to web and network resources to conduct daily operations, maintenance, and communications. Vital government resources such as emergency services, banking, finance, transportation and utility distribution rely on technological components that can be compromised through cyber-attacks. The ability to successfully respond to cyber-related threats is to proactively mitigate through the adoption and practice of the following interdependent functions: prevention, protection, detection, identification, response, and recovery. Implementing these strategic functions are measures of progressive posturing required to offset the consistent frequency in which malicious actions can quickly penetrate and compromise system integrity. Access to effective cyber and network security training for personnel is also needed in order to stay aware of current trends pertaining to this evolving issue within the industry and profession.
Related planning mechanisms	
Jurisdictions that will benefit	City of Casper, Natrona County
Responsible Office/ Agency	City of Casper – IT and GIS
Partners	Natrona County
Priority (High, Medium, Low)	High
Cost Estimate	$5-10k/yr.
Benefits (Avoided Losses)	Reduce the potential for cyber-crime and associated disruptions of government business.
Potential Funding source	City budget
Timeline for Completion	On-going by 2020

Completed Projects

The following projects identified in the 2010 HMP were completed between 2010-2017.

City of Casper Central Service Center Hardening Project

The City of Casper operates a Central Service Center. Located just off Interstate 25 and Bryan Stock Trail, the Service Center is strategically located to provide support and service to the

community and various city facilities. Housing the city garage and Streets Division, the Service Center provides support not only to the Street Division fleet of excavators, dozers, road graders, trucks and scrapers, but also to emergency service vehicles, including police and fire.

Housing the bulk of the City's heavy equipment and the only City facility with the capability to service this equipment along with emergency service vehicles, it is imperative that the Service Center maintain operations in the event of an emergency. The immediate need is the installation of an emergency generator with associated switch gear. The estimated cost for this installation is $520,000. Maintaining operations will allow continued service to the citizens of Casper and surrounding communities. This project was completed in May of 2014 with Optional 1%#13 Sales Tax funds for a total cost of $394,056.

City of Casper Events Center Hardening Project

The City of Casper operates a multi-use Events Center located just off Interstate 25 and Events Drive/ East Road. The Events Center is a strategic facility as identified by the Center for Disease Control, Wyoming Department of Health, City of Casper-Natrona County Department of Health, and the City of Casper for the purposes of terrorism preparedness and emergency response stockpiling and distribution center, inoculation center, and business continuity incident command center.

The Events Center with its higher elevation location, convenient access, numerous parking lots, spacious grounds, large arena floor, sizeable ancillary rooms and multifaceted services make it a primary facility for the aforementioned activities. The Events Center's functioning in these capacities has a direct impact on the citizens of Casper, Mills, Bar Nunn, and Evansville. As a long-term shelter for post event housing this facility could become the temporary home for 2,645 individuals.

For the Events Center to effectively serve, as mentioned above, decisive action to ensure uninterrupted electrical power supply is needed. In 2010 the immediate need was the installation of an emergency generator with associated gear and engineering fees. The estimated cost of this purchase and installation is $600,000. This project was completed in December 2016 with One Cent #15 Sales Tax funds allocated to the Events Center Upgrades for a total cost of $490,786.

Town of Mills

New or Continuing Projects

Mitigation Project Title	**Chamberlain Street bank stabilization**
Hazard(s) Mitigated	Flood
Project Description, Issue/Background	This project was identified in the 2010 HMP and deferred due to other priorities but still a needed project. There is one home and some land that is being negatively impacted by streambank erosion. The intent of the project is bank stabilization. In order to stabilize the bank additional storm water inlets are needed, as the current storm water system cannot capture enough storm water in addition the area that continually washes out will be stabilized and any remaining storm water will be channelized and diverted downstream from the washout area. This project will protect Chamberlain Street from washout as well as the private property the washouts occur upon.
Related planning mechanisms	Platte River Revival River Restoration Master Plan
Jurisdictions that will benefit	Town of Mills
Responsible Office/ Agency	Town of Mills Engineering Director
Partners	County, Casper
Priority (High, Medium, Low)	High
Cost Estimate	$380,000
Benefits (Avoided Losses)	Prevent erosion and avoid potential property loss
Potential Funding source	Some combination of Federal, State, County and City funds.
Timeline for Completion	Complete by 2020

Completed Projects

Hardening of the Town of Mills Fire Department

The intent of this project was to create a safe room for tornado sheltering purposes and an emergency services operation staging area. This dual purpose area can be used on a daily basis for

training. In the event of any hazards event, the room would be utilized to continue the services required by the Town of Mills emergency personnel.

2017 Status: Completed; A generator was installed in 2013 with help from a FEMA grant.

Town of Evansville

New or Continuing Projects

Mitigation Project Title	**Hardening of the Town of Evansville Police Department**
Hazard(s) Mitigated	Flood
Project Description, Issue/Background	The town's Police Department building is susceptible to stormwater flooding, particularly the basement which has been inundated in the past. This would include flood proofing the facility, focused mainly on the entrance. Included in this project would the strengthening of the walls, reconfiguring the entrance to provide protection from heavy rains and sealing any openings that may also promote water infiltration. Upgraded sump pumps may also be needed.
Related planning mechanisms	
Jurisdictions that will benefit	Town of Evansville
Responsible Office/ Agency	Town of Evansville - Police Department Chief
Partners	
Priority (High, Medium, Low)	High
Cost Estimate	$50,000-$70,000
Benefits (Avoided Losses)	mitigate impacts to Police Department and ensure continuity of services during flood and severe weather events
Potential Funding source	FEMA, WOHS, Local budget
Timeline for Completion	Continuing project from 2010 but was not completed due to lack of funding. Complete by 2020

Mitigation Project Title	**Stabilization of ditch bank and installation of storm sewer pipe along the existing drainage ditch on Oildale Street behind Smith RV.**
Hazard(s) Mitigated	Flood
Project Description, Issue/Background	This project was identified in the 2010 HMP and deferred due to other priorities but still a needed project. Currently, runoff form the City of Casper is conveyed to the non- engineered detention pond south of U.S. 20/26 in the WYDOT ROW. Runoff from the detention pond is conveyed in undersized storm sewer piping across the Smith RV Lot to the north to an existing drainage ditch along Oildale Street. The drainage channel then conveys the storm water to the east, then to the north where it enters a storm sewer system in Copper Avenue. The banks of the existing drainage ditch are failing and causing sloughing and erosion on the Smith RV Lot. During the July 3, 2009 storm event, the drainage portion of Oildale Street was severely under-cut and failed along the north side of the drainage ditch. Stabilization of the drainage ditch and installation of properly sized storm sewer pipe will prevent erosion and provide better conveyance of storm water through this area of Town.
Related planning mechanisms	
Jurisdictions that will benefit	Town of Evansville
Responsible Office/ Agency	Town of Evansville Engineering Director
Partners	City of Casper, WYDOT
Priority (High, Medium, Low)	Medium
Cost Estimate	$150,000
Benefits (Avoided Losses)	Prevent erosion and provide better conveyance of storm water through this area of Town.
Potential Funding source	Some combination of Federal, State, County and City funds.
Timeline for Completion	Complete by 2020

Mitigation Project Title	**Address evacuation of Evansville due to Train Derailment or other hazards, including developing an alternate route**
Hazard(s) Mitigated	Flood, Wildfire, Hazardous Materials, Terrorism,
Project Description, Issue/Background	This project would address evacuation of Evansville due to wildfires, hazardous materials incidents, train derailments or other hazards, including evaluation of options including potentially developing an alternate route. The Town's location adjacent to the North Platte River and the railroad make evacuation complex depending on the incident. This would entail working with County emergency management to formally plan for evacuation and identify all feasible routes.
Related planning mechanisms	
Jurisdictions that will benefit	Town of Evansville
Responsible Office/ Agency	Town of Evansville - Police Department Chief
Partners	Natrona County Emergency Management
Priority (High, Medium, Low)	High
Cost Estimate	$20,000
Benefits (Avoided Losses)	mitigate loss of life, injury
Potential Funding source	FEMA, WOHS, Local budget
Timeline for Completion	New in 2017. Complete by 2020

Completed Projects

Hardening of the Town of Evansville Community Center.

The intent of this project was to create a safe room for tornado sheltering purposes and an emergency services operation staging area. This dual purpose area can be used on a daily basis for training. In the event of any hazards event, the room would be utilized to continue the services required by the Town of Evansville emergency personnel.

2017 Status: Completed

Town of Barr Nunn

New projects

Mitigation Project Title	**Develop additional emergency access/egress for Bar Nunn**
Hazard(s) Mitigated	Wildfire, Hazardous Materials, Terrorism,
Project Description, Issue/Background	This project would address evacuation of Barr Nunn due to wildfires, hazardous materials incidents or other hazards, including evaluation of options including potentially developing an alternate route. The Town was forced to evacuate due to a wildfire/grass fire in 2016 (Ridgecrest Fire). The concern about limited evacuation options was also noted in the public survey completed during the 2017 update of this plan.
Related planning mechanisms	Community Wildfire Protection Plan
Jurisdictions that will benefit	Bar Nunn
Responsible Office/ Agency	Bar Nunn – Administration
Partners	Natrona County Emergency Management
Priority (High, Medium, Low)	Low
Cost Estimate	$15,000 to review and plan for alternatives.
Benefits (Avoided Losses)	mitigate loss of life, injury
Potential Funding source	FEMA, WOHS, Local budget
Timeline for Completion	New in 2017. Complete in 2021

Mitigation Project Title	**Cheat grass/flash fuels eradication**
Hazard(s) Mitigated	Wildland fire
Project Description, Issue/Background	Through the planning process, the Town of Bar Nunn, in consultation with the community, identified wildland fire as the current threat with the most significant probability of occurrence and resulting loss. In 2014, a large grass fire resulted in a burn scar which has now been invaded by dense strands of cheat grass. The invasive cheat grass is a flash fuel with a high probability of ignition and the rapid spread of wildland fire.

	The Town of Bar Nunn in conjunction with the Bar Nunn Fire Department is requesting a mitigation project consisting of eradicating the cheat grass and weedy flash fuels through spraying and construction of fire breaks. This project will aid in establishing and/or strengthening defensible space.
Related planning mechanisms	Town Council meetings with community attendance and participation. Planning involved the Fire Chief and Town Maintenance Supervisor.
Jurisdictions that will benefit	Town of Bar Nunn
Responsible Office/ Agency	Town of Bar Nunn Maintenance
Partners	Bar Nunn Fire Department Natrona County Weed and Pest Department
Priority (High, Medium, Low)	High
Cost Estimate	$20,000
Benefits (Avoided Losses)	Structure protection.
Potential Funding source	Budgeted Mitigation grant funding Donation of labor and/or equipment usage from community partners
Timeline for Completion	Spring 2020

Town of Edgerton

New projects

Mitigation Project Title	**Water Storage and Treatment Facility fire break**
Hazard(s) Mitigated	Wildland Fire
Project Description, Issue/Background	Through the planning process, the Town of Edgerton, in consultation with the community, identified a mitigation objective of reducing the risk and vulnerability of critical infrastructure; specifically, the water storage and treatment facility. The water storage and treatment facility serves both the Town of Edgerton and the Town of Midwest. The water is piped to the Town of Edgerton water storage and treatment facility from the City of Casper via a forty mile long underground pipeline. The objective is to reduce the risk of wildland fire threat to the electrical service to and electrical operating systems inside the facility. The mitigation action is the construction of a 50 foot wide fire break around the perimeter of the facility. This mitigation action will reduce the probability of wildland fire encroaching on the facility, thus reducing the potential of the water service and quality being compromised. The fire break will be constructed by removing vegetation within the defined area. Effort will be given to stabilization of the soil to prevent wind blowing and control soil erosion.
Related planning mechanisms	
Jurisdictions that will benefit	Town of Edgerton Town of Midwest
Responsible Office/ Agency	Town of Edgerton Public Works
Partners	Salt Creek Emergency Services (Volunteer Fire Department)
Priority (High, Medium, Low)	High
Cost Estimate	$7,000
Benefits (Avoided Losses)	
Potential Funding source	Town of Edgerton general fund FEMA Mitigation grant funding Donation of labor and/or equipment usage from community partners
Timeline for Completion	2020

Town of Midwest

New projects

Mitigation Project Title	**North boundary fire break**
Hazard(s) Mitigated	Wildland fire
Project Description, Issue/Background	Through the planning process, the Town of Midwest, in consultation with the community, identified wildland fire as the current threat with the most significant probability of occurrence and resulting loss. The area of immediate concern being the north side of the town's boundary, specifically along the northern edge of the alley ways behind the residential buildings on Navy Row and Burek Street. The objective is to enhance the fire interruption capabilities of the existing alleys and reduce the probability of wildland fire encroaching on the structures within the town. The mitigation action is to construct a 50 foot wide fire break along the alley ways. This mitigation action will enhance fire break effectiveness of the alley way between the residential structures and the grass/brush fields to the north of town. The fire break will be constructed by removing vegetation within the defined area. Effort will be given to stabilization of the soil to prevent wind blowing and control soil erosion.
Related planning mechanisms	Town Council meetings with community attendance and -participation.
Jurisdictions that will benefit	Town of Midwest
Responsible Office/ Agency	Town of Midwest Public Works
Partners	Salt Creek Emergency Services (Volunteer Fire Department)
Priority (High, Medium, Low)	High
Cost Estimate	$7,000
Benefits (Avoided Losses)	Structure protections
Potential Funding source	Budgeted Mitigation grant funding Donation of labor and/or equipment usage from community partners
Timeline for Completion	Spring 2019

6 PLAN ADOPTION, IMPLEMENTATION AND MAINTENANCE

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

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. This chapter provides an overview of the strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

6.1 Formal Adoption

The purpose of formally adopting this plan is to secure buy-in from participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan. The governing board for each participating jurisdiction has adopted this local hazard mitigation plan by passing a resolution. A copy of the generic resolution and the executed copies are included in Appendix C, Plan Adoption. This plan will be updated and re-adopted every five years in concurrence with the required DMA local plan update requirements.

6.2 Implementation

Natrona County has made demonstrated progress toward successful plan implementation since this plan's initial development. Continued implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the benefits to the counties, communities and stakeholders. This effort is achieved through the routine actions of monitoring meeting agendas for hazard mitigation related initiatives, coordinating on the topic at meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities. **Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development.**

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the County and municipalities

will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

6.2.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the County will be responsible for the plan implementation and maintenance. The County, led by Emergency Management, will reconvene its HMPC for plan implementation and maintenance. This HMPC will be the same committee (in form and function, if not actual individuals) that developed this HMP and will also be responsible for the next formal update to the plan in five years.

The County's HMPC will:

- 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;
- Ensure hazard mitigation remains a consideration for community decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to county and municipal officials; and
- Inform and solicit input from the public.

The HMPC will not have any powers over respective County staff; it will be purely an advisory body. The primary duty is to see the plan successfully carried out and to report to the county commissioners, municipal boards, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on county websites (and others as appropriate).

6.3 Maintenance

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

6.3.1 Maintenance Schedule

The emergency management coordinator is responsible for initiating plan reviews and consulting with the heads of participating departments in the County. In order to monitor progress and update the mitigation strategies identified in the action plan, the county and the standing HMPC will conduct an annual review of this plan and/or following a hazard event. An annual mitigation action progress report will be prepared by the HMPC and kept on file to assist with for future updates.

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 unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. The County will inquire with WOHS and FEMA for funds to assist with the update. Funding sources may include Emergency Management Performance Grants, Pre- Disaster Mitigation, Hazard Mitigation Grant Program (if a presidential disaster has been declared), and Flood Mitigation Assistance grant funds. The next plan update should be completed and reapproved by WOHS and FEMA Region VIII within five years of the FEMA final approval date. The planning process to prepare the update should begin no later than 12 months prior to that date.

6.3.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of new or altered hazards
- Increased vulnerability as a result of new development.

Updates to this plan will:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate new action recommendations or changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the County will adhere to the following process:

- A representative from the responsible office identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the department lead on action status and provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.

Updating of the plan will be by written changes and submissions, as the HMPC deems appropriate and necessary, and as approved by the respective participating agencies. In keeping with the five-year update process, the HMPC will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the governing council.

6.3.3 Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other existing plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. As described in the capability assessment, the participating jurisdictions already implement policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. Where applicable, these existing mechanisms could include:

- Natrona County Development Plan 2016
- Casper 2013 Stormwater Management Master Plan
- Casper Platte River Revival River Restoration Master Plan
- Community comprehensive plans
- County or community land development codes
- County or community emergency operations plans
- Threat and Hazard Identification and Risk Assessments (THIRA)
- Community Wildfire Protection Plans (CWPP)
- Transportation plans
- Capital improvement plans and budgets
- Recovery planning efforts
- Watershed planning efforts
- Wildfire planning efforts on adjacent public lands
- Other master planning efforts
- Other plans, regulations, and practices with a mitigation aspect

HMPC members involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc., as appropriate. As an action step to ensure integration with other planning mechanisms the County Emergency Manager will discuss this topic at the annual meeting of the HMPC previously described in the Maintenance Schedule. The HMPC will discuss if there are opportunities to incorporate the plan into other planning mechanisms and who would be responsible for leveraging those opportunities. As described in Section 6.2 Implementation, incorporation into existing planning mechanisms will be done through the process of:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes;
- Ensuring that the related planning process cross-references the hazard mitigation plan, where appropriate, and

- Monitoring community budget meetings for other community program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan.

6.3.4 Continued Public Involvement

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public hearings.

When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to the local media outlets, primarily newspapers, or through public surveys. As part of this effort, at least one public meeting will be held (or a public survey developed) and public comments will be solicited on the plan update draft.

APPENDIX A - PLANNING PROCESS DOCUMENTATION

From: Clarissa Daugherty <cdaugherty@natronacounty-wy.gov>
Sent: Thursday, January 05, 2017 9:58 AM
To: To:; Aaron Buck; Air Methods Charles; Air Methods Jeremy; Audrey Gray; Bryon Preciado; Casper College Security; Casper Mountain Fire (E-mail; Chief Tim Cortez; Chris Jones; Cindi Shank; Clarissa Daugherty; Commissioners; Connie Jacobson; Dan Beall; Daniel Griswold; Darin Pepple; Ed Opella; Elkhorn Valley Rehab Hospital; Eric Chapman; Eric Evenson; Ernie Nichols; Gus Holbrook; Jamie Jones; jeff goetz; Jim Wetzel; John Becker; Kenny King; Leo Malsom; Leo Malsom; Lorrie Jackson; Mark Harshman (E-mail; Mark Sellers; Matthew Epp- Barnunn Zoning and Planning; Michael Steinberg; Michele Berens, WBI; Mike Hendershot (E-mail; Mike Magee; Northway, Daniel; Rae Smith, Americorps VISTA, Redcross; Rick Ratcliff; RoadBridge; Robert Hoover; Robert Hoover; Salt Creek Joint Powers; Scott Warren; Steve Schulz; Stew Anderson; Theresa Simpson; TOM LAUGHREY; Town of Edgerton; Town of Midwest; Trey Warne; Wayne Reynolds; WYDOT PIO; wyofire12@gmail.com; Brislawn, Jeff P; Ada Kari; Adam Wilson (E-mail; Andrea Nester; April Ramos; Bob Dundas (E-mail; Bob Fenton; Brian Connely; bpreciado@millspd.org; Bryan Anderson - State Forestry; calvin.goddard@wyo.gov; Cary Bone; Chris Dray; Shank, Cindi; Cordell Anthony; Craig Johnson - Chevron; Craig Short; Dan Hobbs; Daniel Northway; Danny Morse; Deb Harris; Ed Opella; Emily Lacroix; Forrest Chadwick; Gayle Schnorenberg; Gust Hatanelas; Heather Duncan-Malone; Jamie Jones; James Ogden; James Samet; Jeff Erdahl; Jim Fitz; Joe Nickerson-CPD; John Becker; John Farrell (E-mail; John Lawson; Justin Lindberg; Karla Case; Kelly Spitz (E-mail; Ken Dockweiler; Kenny Longfritz; Kevin Lynnot; Kevin MacMancus; Kimberly Catellier; Laura Briot; Lori Reed; Lucas Murphy; Marcia Jones; Marge Cole - CATC; Matt Gacke; Matt Keating; Mike Bradford, BOR Safety Manager; Mike Coleman; mthomas@uranerz.com; Miles Ellis, BLM AFMO; Nan Holbrook; Paul Kordonowy; Paul Phillips; Richard Bell (E-mail; Rick Lopez; Riley DeWitt, SCES Chief; Rob Hendry; roberthoover@townofbarnunn.com; Sam Roggow; Scott Radden WLC; Scott S Smith; Sean Peverley; Stan Mitchem; Steve Freel; Steve magness; Steve Schlager; Stew Anderson; Tate Belden; Tony Giles; Ty Jones; Tyler Keller; Van Frazier
Subject: FW: CHANGE OF DATE! Mitigation Kickoff meeting:

Good Morning,
It has come to my attention that a few folks did not receive the email regarding the date change for the mitigation plan update/LEPC meeting. Below is the original email from Lt. Anderson. The meeting/webinar has been moved to January 12, 2017 at 10 am. We will send instructions for connection to the webinar early next week, if you choose to attend from your office. Otherwise it will be held in the EOC.

Thanks,

Rissa Daugherty
Administrative Assistant
Natrona County Emergency Management
201 N David; 2nd Floor
Casper, Wy 82601
Phone: (307 235-9205
Fax: (307)235-9652

From: Stew Anderson
Sent: Friday, December 16, 2016 12:52 PM
Subject: CHANGE OF DATE! Mitigation Kickoff meeting:

Greetings;
Please see the date change for the Mitigation Planning/Special LEPC meeting webinar. It has been changed to Thursday January 12, 2017 1000-1200.
We will be sending out the webinar information in the near future.

We have finally began our update process for the Natrona County Multi-Jurisdictional All Hazards Mitigation Plan. This process will need to involve all entities in Natrona County and, when it is finished, adoption by all entities. This plan is a FEMA requirement in order to receive funding if we were to qualify for a federal disaster declaration and for Mitigation Grants. Agencies included in the planning process can, and in some cases should, include jurisdictional planning departments, public works, fire, law enforcement, jurisdictional engineering departments, elected officials, member of the public/private sector, non-governmental agencies, GIS departments and the emergency manager from each entity.

This process will include three or four meetings in the next several months with completion and adoption, if all goes well, this Spring.
This will involve going through the plan, deleting projects no longer needed or completed, adding new projects, updating our historical data and success projects that have been done in the past. If your entity has any mitigation type of projects planned for the future, or in progress, whether they are funded yet or not, please start gathering that information so that we may add the project into the plan update.

Our initial kick-off meeting is a planned webinar hosted by the contractor that we are working with to complete the update. The tentative date and time for this webinar will be Thursday January 12, 2017 from 10:00 AM to 12:00 PM. Please save the date and time for this initial meeting.
Since this planning process includes the private sector, we will also be calling this an LEPC meeting with the meeting dedicated solely to the Mitigation plan update. This is the reason this email is also being sent to the LEPC members.

More information will be forthcoming on this kickoff meeting/webinar. Please spread the word to those particular folks in your public works, planning, engineering, etc. departments so that they may join in if they wish.
Please contact me with any questions.
Thank you;

Lt. Stewart Anderson
Natrona County Emergency Manager
Office: 307-235-9205
Cell: 307-262-1899

From: Clarissa Daugherty <cdaugherty@natronacounty-wy.gov>
Sent: Wednesday, January 11, 2017 10:35 AM
To: Constance Lake; Aaron Buck; Air Methods Charles; Air Methods Jeremy; Audrey Gray; Bryon Preciado; Casper College Security; Casper Mountain Fire (E-mail; Timothy Cortez; Chris Jones; Cindi Shank; Clarissa Daugherty; Commissioners; Dan Beall; Daniel Griswold; Darin Pepple; Ed Opella; Elkhorn Valley Rehab Hospital; Eric Chapman; Eric Evenson; Ernie Nichols; Gus Holbrook; Jamie Jones; jeff goetz; Jim Wetzel; John Becker; Kenneth King; Leo Malsom; Leo Malsom; Lori Jackson; Mark Harshman; Mark Sellers; Matthew Epp- Barnunn Zoning and Planning; Michael Steinberg; Michele Berens, WBI; Mike Hendershot (E-mail; Mike Magee; Northway, Daniel; Rae Smith, Americorps VISTA, Redcross; Rick Ratcliff; RoadBridge; Robert Hoover; Robert Hoover; Salt Creek Joint Powers; Scott Warren; Steve Schulz; Stew Anderson; Theresa Simpson; TOM LAUGHREY; Town of Edgerton; Town of Midwest; Trey Warne; Wayne Reynolds; WYDOT PIO; wyofire12@gmail.com; Brislawn, Jeff P; Ada Kari; Adam Wilson (E-mail; Andrea Nester; April Ramos; Bob Dundas (E-mail; Bob Fenton; Brian Connely; bpreciado@millspd.org; Bryan Anderson - State Forestry; calvin.goddard@wyo.gov; Cary Bone; Chris Dray; Shank, Cindi; Cordell Anthony; Craig Johnson - Chevron; Craig Short; Dan Hobbs; Daniel Northway; Danny Morse; Deb Harris; Ed Opella; Emily Lacroix; Forrest Chadwick; Gayle Schnorenberg; Gust Hatanelas; Heather Duncan-Malone; Jamie Jones; James Ogden; James Samet; Jeff Erdahl; Jim Fitz; Joe Nickerson-CPD; John Becker; John Farrell (E-mail; John Lawson; Justin Lindberg; Karla Case; Kelly Spitz (E-mail; Ken Dockweiler; Kenny Longfritz; Kevin Lynnot; Kevin MacMancus; Kimberly Catellier; Laura Briot; Lori Reed; Lucas Murphy; Marcia Jones; Marge Cole - CATC; Matt Gacke; Matt Keating; Mike Bradford, BOR Safety Manager; Mike Coleman; mthomas@uranerz.com; Miles Ellis, BLM AFMO; Nan Holbrook; Paul Kordonowy; Paul Phillips; Richard Bell (E-mail; Rick Lopez; Riley DeWitt, SCES Chief; Rob Hendry; roberthoover@townofbarnunn.com; Sam Roggow; Scott Radden WLC; Scott S Smith; Sean Peverley; Stan Mitchem; Steve Freel; Steve magness; Steve Schlager; Stew Anderson; Tate Belden; Tony Giles; Ty Jones; Tyler Keller; Constance Lake
Subject: Mitigation Planning Webinar
Attachments: NatronaCountyKickoffMtgPresentation.pdf

Good Morning!
Below is the information for connecting to the Webinar tomorrow, January 12, 2017 at 10 am. If you will be attending in the EOC, located at 201 N. David 2nd Floor please RSVP. If you choose to attend from your location you will need the following information. Please let me know which one works best for you. For those of you that have already RSVP'd, please disregard this email.

Attached to this email is a draft copy of the presentation.

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have to download the app plug in. Once you join the meeting, please type your name and agency in the Guest Name Box.

You will need to mute your computer in two ways, one by actually muting your computer speakers and the other by muting your speaker in the Skype Conference. I have added a picture to show where mute is in the conference.

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Toll number: +1 (810) 893-7590
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Thanks,

Rissa Daugherty
Administrative Assistant
Natrona County Emergency Management
201 N David; 2nd Floor
Casper, Wy 82601
Phone: (307 235-9205
Fax: (307)235-9652

Title
G. Compliance
Admin
Area Supervisor
Area Supervisor
Director Security
GIS Specialist
Retired public safety
PROJECTS COORDINATOR
MPO Specialist
Regional GIS Administrator
PSD
Terminal Manager
Chief
Air Mgmt Specialist
Admin

Title
Assistant chief
Field Coordinator
Supervisor/Gas Operations
NCEMA Coord.
Dir. of Clinical Services
ES H.
Fire Chief
Fire chief
DIVISION CHIEF

Summary of Natrona County Hazard Mitigation Plan Update
Kick-Off Meeting Conference Call/Webex and LEPC Meeting
Natrona County EOC
January 12, 2017, 10:00 am- 11:30am

Opening Remarks and Introductions

Welcome remarks and a call to order of the LEPC meeting was done by Stew Anderson with Natrona County Emergency Management. A motion was made and to approve the LEPC minutes from the previous meeting, which was approved. Jeff Brislawn, the project manager from Amec Foster Wheeler began the webinar presentation and asked everyone in the room at the Natrona County EOC or on the call to introduce themselves. Present at the EOC were 24 participants, documented in a sign-in sheet. A mix of people representing the County, municipalities, and local business and industry were present including:

Natrona County
- Natrona GIS
- Natrona Fire Department
- Stew Anderson- Natrona County Emergency Management
- Sheriff's Office

City of Casper
- City of Casper
- City of Casper Community Development
- Casper Fire Department

Town of Edgerton
- Edgerton Police Department (Jamie Jones)

Town of Evansville
- Evansville Fire Department

Town of Midwest
- Midwest Police Department (Jamie Jones)

Town of Mills
- Mills Police Department
- Mills Fire Department

Other stakeholders
- Regional GIS
- Teresa Davis- Clinical Services of Central Wyoming
- BLM Fire
- Black Hills Energy
- National Weather Service-Riverton
- Sinclair Transportation
- Private Citizen
- Casper Crude to Rail
- Casper College

Additionally there were 15 persons that participated remotely via the Skype for Business webinar. These included:
- Melinda Gibson- Wyoming Office of Homeland Security
- Calvin Goddard
- Jamie Jones

- Jeff Goetz WYDOT
- Justin Lindberg
- Michele Berens(name truncated)Ty Jones
- 8 others (names or affiliation were not noted in Skype login)

Three staff members from Amec Foster Wheeler, the consulting firm hired to facilitate the planning process and develop the updated plan, were on the call including Jeff Brislawn, Kyle Karsjen and Mackenzie Bosher.

Mitigation, Mitigation Planning, and Disaster Mitigation Act (DMA) Requirements

A PowerPoint presentation was presented via Skype by Jeff Brislawn. The presentation described importance of mitigation planning and the process thereof, including the 9 step planning process that will be followed to ensure compliance with the DMA 2000. The plan is intended to identify hazards, assets at risk, and ways to reduce impacts through long-term, sustainable mitigation projects. The plan will also maintain eligibility for FEMA mitigation grant funding.

After Jeff's overview of the disaster declarations in Wyoming, Stew Anderson commented that Natrona County has had three Fire Management Assistance Grants (FMAG) also. The first two dealt with the Casper Mountain Fire and the third was the Station Fire in 2015. He mentioned this to bring up the pilot project that FEMA was working on to help communities receive mitigation funds for the fire impacted area. Melinda Gibson noted that there is not an official program yet for fire mitigation funding and FMAG, the county just happened to have good timing to be included into the pilot program. Jeff commented that he hoped the pilot project may turn into a regular standing grant associated with future FMAG declarations.

Objectives and Schedule for Plan Development

All municipalities within Natrona County that participate in the plan will maintain or create eligibility for FEMA mitigation funds. This meeting is the first meeting of a committee formed to provide input to the plan update process. A definition of participation in the planning process was provided that includes:

- Attend and participate in planning meetings/workshops
- Provide available data requested of the County Emergency Management coordinator and Amec Foster Wheeler
- Provide input on local mitigation strategy (actions/projects)
- Advertise and assist with public input process
- Review and comment on plan drafts
- Coordinate formal adoption

It was discussed how each jurisdiction needs to commit to the above elements to receive full credit for participation in the plan.

Hazard Mitigation Planning Committee Organization and Roles

The Hazard Mitigation Planning Committee (HMPC) will include members of appropriate county departments, e.g., Building, Planning, Public Works, Police/Fire/Public Safety, and Emergency Management and include municipalities and special districts (fire and school).

Goals of the process were discussed that included:

- Thoroughly update the plan per most current FEMA planning guidance
- Revisit and update risk assessment
- Update the mitigation strategies
- Note implementation progress of loss reduction activities

The plan will be developed over the next six months. There will be two planning workshops. The meetings will occur in February and March. An email group will be developed for the HMPC for sharing information on upcoming meetings. Amec Foster Wheeler will be drafting the updated risk assessment in the next couple of months. A complete draft for FEMA review is targeted to be complete by early June of 2017. The final approved plan is anticipated to be ready for adoption by September of 2017. Stew commented that the longest part of the process is FEMA approval. He confirmed that there are grants waiting for this plan to be approved.

During the discussion of scheduling and organization, Stew emphasized that the HMP becomes a living document. This means that if Project A has priority over Project B, but Project B gets funding, Project B may take priority over time. Melinda agreed with this statement and stressed that this plan is not intended to "tie anyone's hands," but to facilitate organization and keep everyone on the same page with regards to overall mitigation priorities.

Review of Identified Hazards

A list of natural hazards was discussed, based on the hazards in the 2010 HMP, to start a discussion about what hazards should formally profiled and analyzed in the plan update. Jeff compared the list in the existing plan with hazard profiled in the State Hazard Mitigation Plan. The hazards discussed to be profiled in the plan update included:

- Dam Failure
- Drought
- Earthquake
- Flood
- Severe Thunderstorm (Lightning and Hail)
- Hazardous Materials
- Landslide
- Tornado
- Wildfire
- Wind
- Winter Storm
- Terrorism (CBRNE, Sabotage)

Comments on hazards:

Flood: There were concerns of river erosion control along the river. Multiple community members spoke about specific locations where this occurs including sloughing on the Eastdale Drainage behind Dragon Wall, erosion near Mills and Chamberlin Road, and occurrences behind Wolf Creek. The main concern was whether this should be listed as a separate hazard

or should be included in the Flood Profile. Jeff recommended placing these occurrences in the flood profile.

Although Stew mentioned that highest significance hazards depend on time of year, Flooding was also one of the highest concerns in the planning area. One comment was that since the last plan, there have been Casper Stormwater Plan updates within the county. There have also been updates to the River Master Plan. Jeff asked if these were online, and the answer was that they were not but could be made available.

HazMat: Stew mentioned that 15-20 years ago, he put in a request for a Hazardous Materials Survey/Commodity Flow study. The hope is to receive the survey this year from the State in the spring. While he is unsure how soon it will be available, he says it may be a last minute addition.

Terrorism: Stew questioned why CBRNE and Sabotage were listed in the section "Other Hazards Considered but not profiled," rather than included in the Terrorism profile. Jeff concluded that those hazards will be included within the Terrorism profile.

Wildfire: Although Stew mentioned that highest significance hazards depend on time of year, wildfire was one of the highest concerns in the planning area. The County will check with State Forestry on any updates to Red Zone fire hazard designations.

Planning for Stakeholder and Public Involvement

The planning team was encouraged to involve the public and stakeholders in the planning process. Possible involvement techniques discussed included:

- Develop an online and hardcopy survey
- Social media or email blasts
- Mentioning the planning efforts and 'piggybacking' at other public forums such as to Comprehensive plan meetings, council or commissioner meetings or Firewise updates
- Advertising through public portal on GIS
- Advertising through recently distributing crowdsourcing app that could be connected into their web-mapping capabilities, which would allow areas of concern to be added by the public onto a map
- Engage Chamber of Commerce

Stew mentioned that the LEPC email distribution includes members of the public. The group thought that a public survey and 'piggybacking' would get the best results. Jeff will send Stew a draft survey that can be converted to a web version that can be easily distributed electronically.

Coordinating with Other Agencies / Related Planning Efforts / Recent Studies

A discussion was held on how to coordinate this planning process with other agencies and departments in order to meet one of the DMA planning requirements. WOHS recommended including rural electric associations and water districts as stakeholders. Stew recommended health care providers as stakeholders, and also County Planning and Zoning. Stew was unsure if the Town of Bar Nunn was represented online.

A discussion on coordination with other plans/policies and hazard information sources occurred, and the following was suggested by the HMPC:

- Casper and Mills are updating their Comprehensive and Land Use Plans
- Will check with County whether Bar Nunn, Evansville, or Casper have updates to their Comprehensive Plans.
- The County's Comprehensive Plan was recently updated

Information Needs

Jeff mentioned that if anyone has incident logs or damage assessments, those could be useful. GIS data collection was already underway.

Tim Troutman of NWS commented that they can provide information on weather hazards. Jeff noted that the National Climatic Data Center database is being used as a resource and noted that it often is not complete in regards to damage losses. Tim agreed.

Jeff recommended participating jurisdictions begin reviewing projects/actions in 2010 and prepare notes on progress (a status form will be developed and shared at a later date).

Next Steps/Next Meeting Timing

Amec Foster Wheeler HIRA update	Feb 10
HMPC meeting to discuss HIRA and Goals	Week of Feb 20th
HMPC meeting to update mitigation actions	Week of March 13th
First draft of HMP for HMPC review	Mid April
HMPC comments by	Late April
Public/State review draft	Mid May
Public comments due	End of May
Plan to FEMA	Early June
Conditional Approval	Late July
Local adoption	August
Target for approved, adopted plan	September 2017

Jeff will convene with County OEM to identify specific dates. An email will follow with more information on future meetings.

Questions and Answers/Adjourn

The presentation concluded at 11:30 am. Stew made a motion to adjourn the LEPC meeting.

Summary prepared by Mackenzie Bosher, Amec Foster Wheeler.

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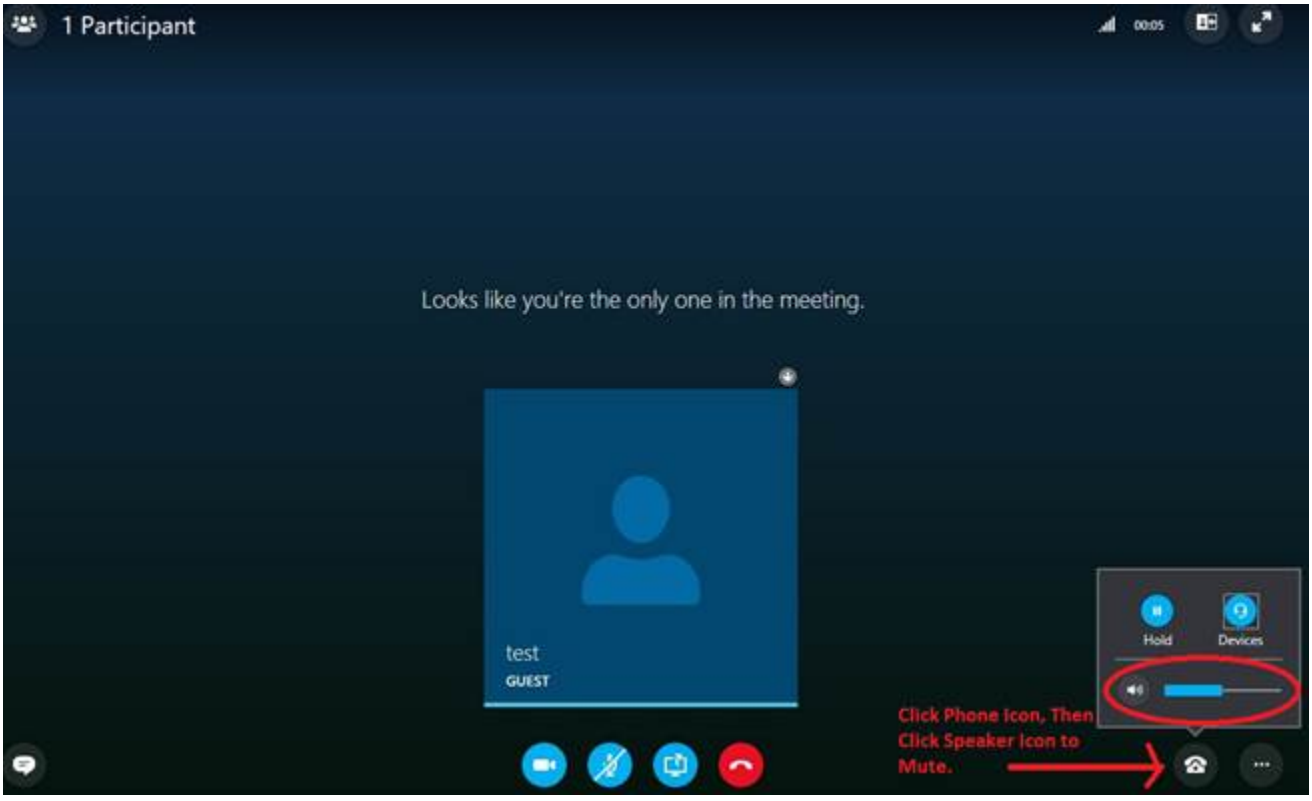

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Toll number: +1 (810) 893-7590
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Thanks,

Rissa Daugherty
Administrative Assistant
Natrona County Emergency Management
201 N David; 2nd Floor
Casper, Wy 82601
Phone: (307 235-9205
Fax: (307)235-9652

Stew,

The link to the online survey is now active and included below. Can you distribute this to the HMPC and encourage them to share broadly through whatever channels possible (email lists, social media, post link on web etc.). Please document how this is distributed (an email will do, or a link to a website).

Here is some text that can be used with the notice about the survey link:

Natrona County Hazard Mitigation Plan Update 2017 Public Survey

Provide feedback to the multi-jurisdictional Hazard Mitigation Planning committee to inform the update of the Natrona County Hazard Mitigation Plan. The survey is intened to gather public feedback on concerns about floods, wildfires, winter storms and other hazards and strategies to reduce their impacts. Take a quick, five question survey and let your concerns and ideas be heard. Please complete by March 15, 2017.
Click the link below to start the survey:
https://www.surveymonkey.com/r/NatronaHMP2017

NATRONA COUNTY HAZARD MITIGATION PLAN UPDATE 2017

RISK ASSESSMENT and GOALS Meeting

February 24, 9:00am – noon

Evansville Community Center

71 Curtis St., Evansville WY 82636

- **Introductions**
- **Review of the Planning Process**
- **Review of Identified Hazards**
- **Vulnerability Assessment Overview by Hazard**
- **Capability Assessment Overview**
- **Updating Goals for the Mitigation Plan**
- **Mitigation Action Strategy update needs**
- **Update on Public Involvement Activities/public meeting planning**
- **Next Steps**
- **Questions and Answers/Adjourn**

Summary of the Natrona County Risk Assessment and Goals Meeting
2017 Hazard Mitigation Plan Update
February 28, 2017
9:00am – 12:00 pm
Evansville Community Center
Evansville, WY

Introductions and Opening Remarks

Jeff Brislawn of Amec Foster Wheeler, the consulting firm hired by the County to facilitate the plan update process, began the meeting with welcoming remarks. Jeff asked everyone around the room to introduce themselves. Twelve persons representing a mix of County agencies and the municipalities of Casper, Mills, Midwest and Evansville and local stakeholders were present and documented on a sign in sheet. Representatives from the WYDOT, Casper-Natrona County Health Department, Central Wyoming Hospice and the Red Cross were also present.

Review of Mitigation, Disaster Mitigation Act (DMA) Requirements, and the Planning Process

A PowerPoint presentation was presented by Jeff Brislawn, the project manager from AMEC Foster Wheeler. Jeff outlined the nine step planning process being followed and discussed the project status. The update of the 2010 Hazard Mitigation Plan (HMP) will allow the County and participating municipalities to remain eligible for FEMA mitigation grants.

Risk Assessment Presentation and Discussion

Jeff outlined the general risk assessment requirements before beginning a detailed discussion of each hazard. He presented details on each hazard that will be included in the draft updated risk assessment chapter. Refer to the PowerPoint presentation and draft Hazard Identification and Risk Assessment (HIRA - forthcoming) chapter for specific details on each hazard. Several valuable details were learned during the risk assessment conversation among participants. The group discussed several hazard incidents that have occurred in the past five years. Highlights of the discussion are noted by hazard in the table below.

Hazard or Topic	Meeting Discussion
Wildfire	• There have been two major wildland fires in the past two years; BLM did a study on one of them. • Bar Nunn was evacuated in 2016 due to a nearby wildfire (Ridgecrest Fire) • Redzone mapping and analysis was discussed

	• Jeff noted that the redzone areas were determined in a statewide study done by the WY Division of Forestry that looked at housing density and fuels and topography. Much of the Casper metropolitan area is within the redzone "buffer" area, and that risk ratings from the more detailed County CWPP would be noted in the HMP.
Flood	• Jeff displayed some flood risk maps and analysis based on FEMA flood insurance rate maps. HAZUS flood modeling of approximate 1% annual chance areas is utilized for some areas of the county that is not mapped in the NFIP. • Periodic flooding has occurred in the past five years including 2012, 2015 and 2016. 2016 flooding was not bad along the North Platte due to mitigation and greenway efforts along the Platte River Parkway. • Flash flooding resulted in evacuations in the 33 Mile area June 5, 2015 (the day after the flooding in Lusk in 2015) • Jeff showed a slide summarizing critical facilities in the 1% and 0.2% annual chance flood zones. This includes hazardous materials and public safety facilities. The County EOC is located in the 0.2% zone but on the 2nd floor. • The Mills town Hall, Public Works department and Water Treatment Plant are all near the river • Fire station #9 in Mills is now a senior/community center • After the construction of Pathfinder Reservoir development has encroached closer to the N Platte River.
Dam Failure	• Pathfinder Reservoir is full and expected to use the spillway for excess flow this spring/summer, as occurred in 2016 • The 1906 Coal Creek Flood – noted as a dam failure- may have been more of an embankment failure.
Earthquake	• Jeff presented loss scenarios based on HAZUS modeling • Some HMPC members noted feeling earthquakes including: A M4 event in 1984 or 86 near Glenrock. An event on northern county line about 10 years ago that cracked stucco on buildings. A M3 event occurred in January 2017.
Landslide/Debris Flow/Rockfall	• Activity increases during wet cycles • Debris flow risk increases after wildfires; this happened on Sheepherder Hill burn scar in spring of 2013 • There have been debris flows on Alcova Lake Shore Drive; rockfall risk too • Rockfall hazard areas exist on Casper Mountain • Other problem areas include the narrows on Hwy 220 and the Wolf Creek drainage
Expansive Soils	• Jeff showed a map of potential problem areas, which covers a large portion of the County

	• Problem areas include the Indian Hills area, Hwy 220, Red Butte, Antelope Hills and areas close to the foot of Casper Mountain particularly on the west end. • CY Junior High had foundation issues which were mitigated when it was re-built. • Public Health requires special septic systems on tight soils in conformance with WY DEQ regulations.
Drought	• 2002-2004 worst, causes wildfires, effects on agriculture, cattle, pasture, and hay • Contributes to wildfires • Water source mostly the N Platte, of which the State of Nebraska has significant primacy/water rights • Mills has 8 wells and the N Platte River for supply • Has resulted in water restrictions, sometimes when pumps go down
Thunderstorm (Hail and Lightning)	• Hail can ruin crops and have economic impacts (roofs and vehicles) • Hail Has resulted in numerous roof and gutter damage • Not aware of significant issues with lightning, aside from sparking wildfires. It was thought an oil storage facility caught fire after a strike
Tornado	• A tornado in 1987 near Bar Nunn ripped roofs off two homes
Severe Winter Storm	• A severe winter storm in early October 2013 caused power outages • Crops, Calving and Lambing risks, and livestock operations impacts • Traffic accidents • Power impacts – trees on lines, particularly in fall and spring snow events • First responder impacts • Sheltering of stranded travelers on I-25 can be an issue, even from storms affecting Colorado. Midwest can quickly be overwhelmed with shelter needs when I-25 is closed to Casper. • A nursing home had to relocate persons during one storm event when their generator ran out of fuel. • Delivery of extra oxygen is done as a preventative measure if a large storm is forecasted • The dialysis center has a generator hookup and contract with a generator company now • All fire stations have backup generators now to ensure doors can be opened and use as shelter if needed
Extreme Cold	• Severe cold snap in November 2012 resulted in tree mortality • Livestock and agricultural impacts were noted • Temperatures of – 32 experienced in January • Results in heavy loads on power system

	• Frozen pipes sometimes result in house fires when blow torches are used for warm up • Frostbite risk increases
High Wind	• Often results in power outages and property damage • Results in blowing snow, ground blizzards, "sleeping semi's" • Roof damage • Trampolines vulnerable • Substation in Midwest/Edgerton could take up to 7 days to replace parts if damaged due to 1940's era construction • Losses likely under-reported
Avalanche	• There are some hazard areas on Casper Mtn that have resulted in 2-3 events but minor impacts
HAZMAT	• Fixed sites and Transportation hazards • Tier 11 facilities identified • A commodity flow study is expected to be completed this spring • Many petroleum and other flammable products transported by truck • Railroad goes through the Casper metro area, which includes cars carrying ore from uranium mines • Incident statistics were discussed, including a high number recorded in Midwest. It was speculated that this could be venting of Co2 which would need to be reported. • Gas lines have been hit during digs that did not call ahead.
Terroristic events	• This will be mentioned as a possible concern in the plan but without specifics or details • Two incidents of "white powder" letters that turned out to be benign were noted – one with a threatening letter to the GSA office and one that went to the Casper Star Tribune. • The post office has a biological detection system for anthrax
Pandemics / Public Health Hazards	• A discussion about why this hazard was not on the list of hazards profiled. Sometimes these are covered in other planning mechanisms. A jurisdictional public health risk assessment has been completed which will be provided to Amec. • H1N1 virus in 2009 was the most recent public health incident
Growth and Development trends	• Jeff noted that projections into 2040 indicate continued steady growth. • In relation to hazards there is growth occurring in WUI areas • Casper sees about 5-6 floodplain development permits a year for substantial improvements or new construction in the floodplain which must be mitigated for the 100 year event. • The downturn in oil and gas has resulted in lower growth in recent years.

Risk Summary Review

Jeff provided a handout with specific risk summaries for each hazard. This is a draft document for HMPC. The intent is to summarize the hazard significance as the basis and need for mitigation actions.

Capability Assessment Review

Jeff briefly reviewed highlights of existing capabilities in the county to mitigate hazards, including numbers of National Flood Insurance Policies, the emergency management program, and the county Community Wildfire Protection Plan. Casper participates in the NFIP Community Rating System which helps lower the cost of flood insurance in return for floodplain management activities above standard FEMA regulations. Other capabilities noted included warning and notification systems (R911, Code Red, NAWAS, sirens). All fire stations have generators. Casper developed a local energy assurance paln in 2011 that focused on backup power needs. The county used a pilot mitigation grant program associated with federal Fire Management Assistance declarations to do re-seeding and erosion control on a burn area.

Coordination and Integration with Other Plans

Jeff asked the group if other plans reference or integrate aspects of the HMP within the past 5 years. The group noted that the EOP mentions the HMP. The THIRA is also sourcing the HMP. Jeff encouraged cross-referencing of the plan in other mechanisms in the future as opportunities permit. Opportunities might include Firewise planning and the update of the Mills Land Use Plan. The MPO/Casper is in the process of updating its master land use plan.

Plan Goals Update

Jeff presented a slide with the goals and objectives from the 2010 HMP. The update presents an opportunity to revisit the twelve goals and adjust if necessary. Jeff will provide the goals and objectives in a worksheet as a followup to the meeting. Changes, if any, will be finalized at the next planning workshop.

Planning for Public Involvement

Jeff noted that public involvement will include a public survey and advertisement of the draft updated plan for review and comment. The survey is available and can be easily shared via email or social media. The group noted that the survey is on the County website and has been shared through Facebook. So far 90 responses have been received. Jeff will share results of the survey before the next meeting after it closes in mid-March.

Mitigation Action Strategy Update

Jeff noted the next step in the process is updating the hazard mitigation strategy. As a starting point the group will need to provide a status on the existing actions from the 2010 plan. A handout was provided which will be discussed further in the next meeting. Jeff encouraged the participating entities to review prior to the next meeting. The City of

Casper noted that they had already begun reviewing their projects and could provide status updates.

Plan Timeline/Next steps

Jeff summarized the next steps in the process.

- HMPC homework:
  - Review the handout on the mitigation strategy and note status of actions
  - Provide any more information to inform the HIRA and review the draft HIRA prior to the next meeting
  - Start formulating ideas for new mitigation projects

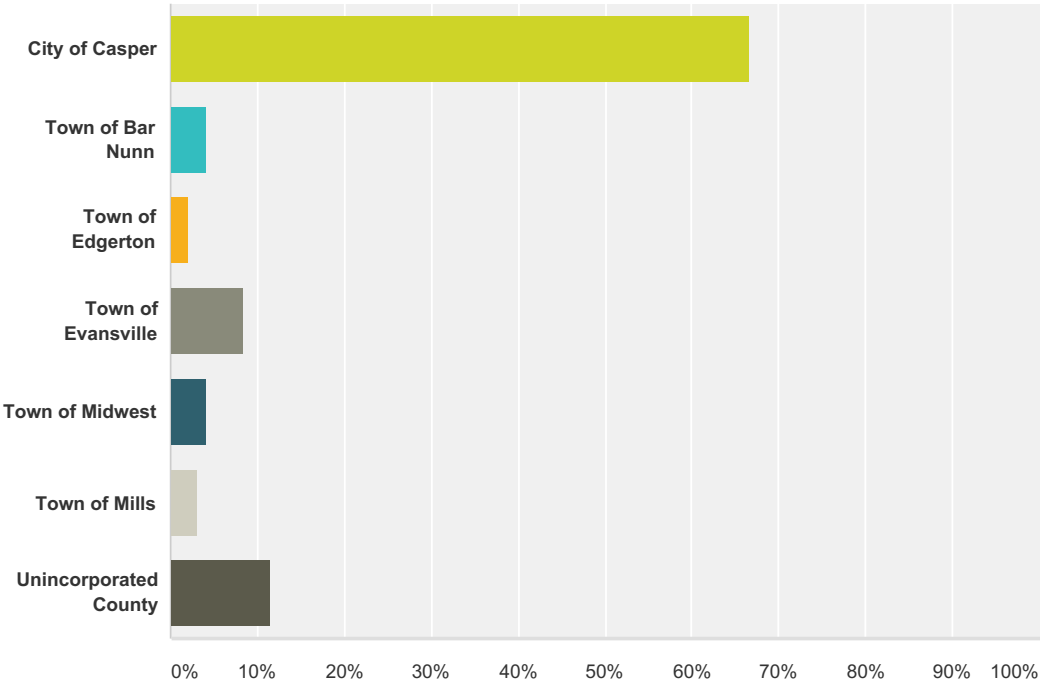
The next and final HMPC planning meeting will be held the week of March 20th or April 3rd (date/time TBD) to update mitigation actions for the plan. Jeff emphasized that this is an important meeting and will form the basis for the mitigation action plan. A calendar update will be sent out to save the date. The meeting materials will also be shared electronically, including the presentation and worksheets. There was a question about the overall schedule. The goal is to have a draft plan in late April, public review draft in May and a plan sent for FEMA approval in June and a final for adoption in August/September.

Meeting

Name	
Rissa Daugherty	co
Paula Reece	pr
JAIME JONES	m
Jeff Erdahl	Je
RAE SMITH	Ra
Dan Beall	D
Teresa Davis	Te
Audrey Gray	a
Constance Lake	C
Matt Cooke	m
Steve Anderson	a
Jeff Barsalou	J

Q1 Indicate the community you reside in:

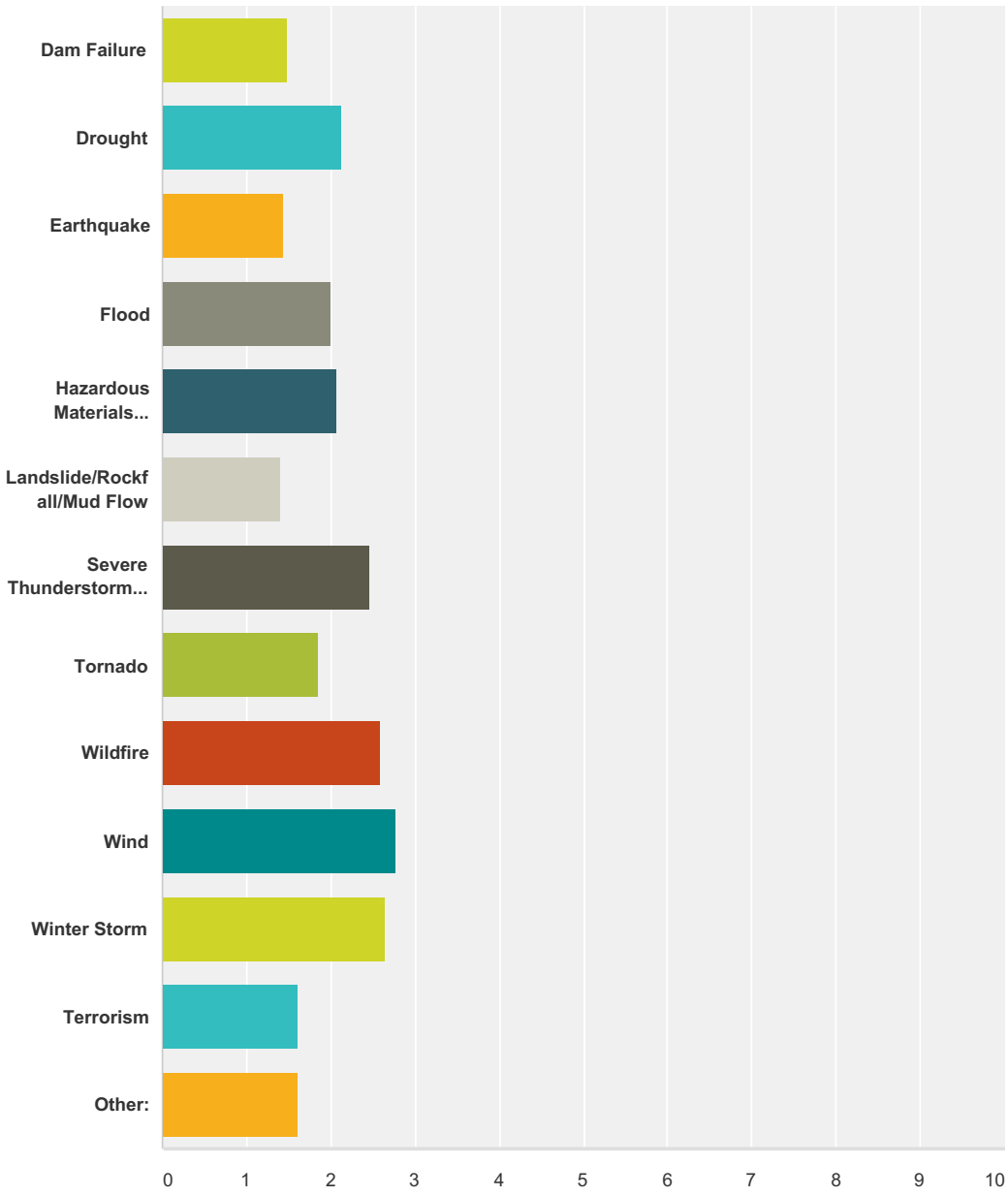
Answered: 96 Skipped: 0



Answer Choices	Responses	
City of Casper	**66.67%**	64
Town of Bar Nunn	**4.17%**	4
Town of Edgerton	**2.08%**	2
Town of Evansville	**8.33%**	8
Town of Midwest	**4.17%**	4
Town of Mills	**3.13%**	3
Unincorporated County	**11.46%**	11
Total		**96**

Q2 The hazards addressed in the Hazard Mitigation Plan are listed below. Please indicate the level of significance in your community that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

Answered: 96 Skipped: 0



	1=Low	2=Moderate	3=High	Total	Weighted Average
Dam Failure	59.38% 57	33.33% 32	7.29% 7	96	1.48

Drought	**17.89%** 17	**52.63%** 50	**29.47%** 28	95	2.12
Earthquake	**62.50%** 60	**31.25%** 30	**6.25%** 6	96	1.44
Flood	**25.00%** 24	**50.00%** 48	**25.00%** 24	96	2.00
Hazardous Materials Incident	**23.96%** 23	**45.83%** 44	**30.21%** 29	96	2.06
Landslide/Rockfall/Mud Flow	**66.67%** 64	**28.13%** 27	**5.21%** 5	96	1.39
Severe Thunderstorm (including Lightning and Hail)	**7.37%** 7	**38.95%** 37	**53.68%** 51	95	2.46
Tornado	**27.08%** 26	**59.38%** 57	**13.54%** 13	96	1.86
Wildfire	**6.25%** 6	**29.17%** 28	**64.58%** 62	96	2.58
Wind	**4.17%** 4	**14.58%** 14	**81.25%** 78	96	2.77
Winter Storm	**2.08%** 2	**31.25%** 30	**66.67%** 64	96	2.65
Terrorism	**55.21%** 53	**29.17%** 28	**15.63%** 15	96	1.60
Other:	**56.00%** 14	**28.00%** 7	**16.00%** 4	25	1.60

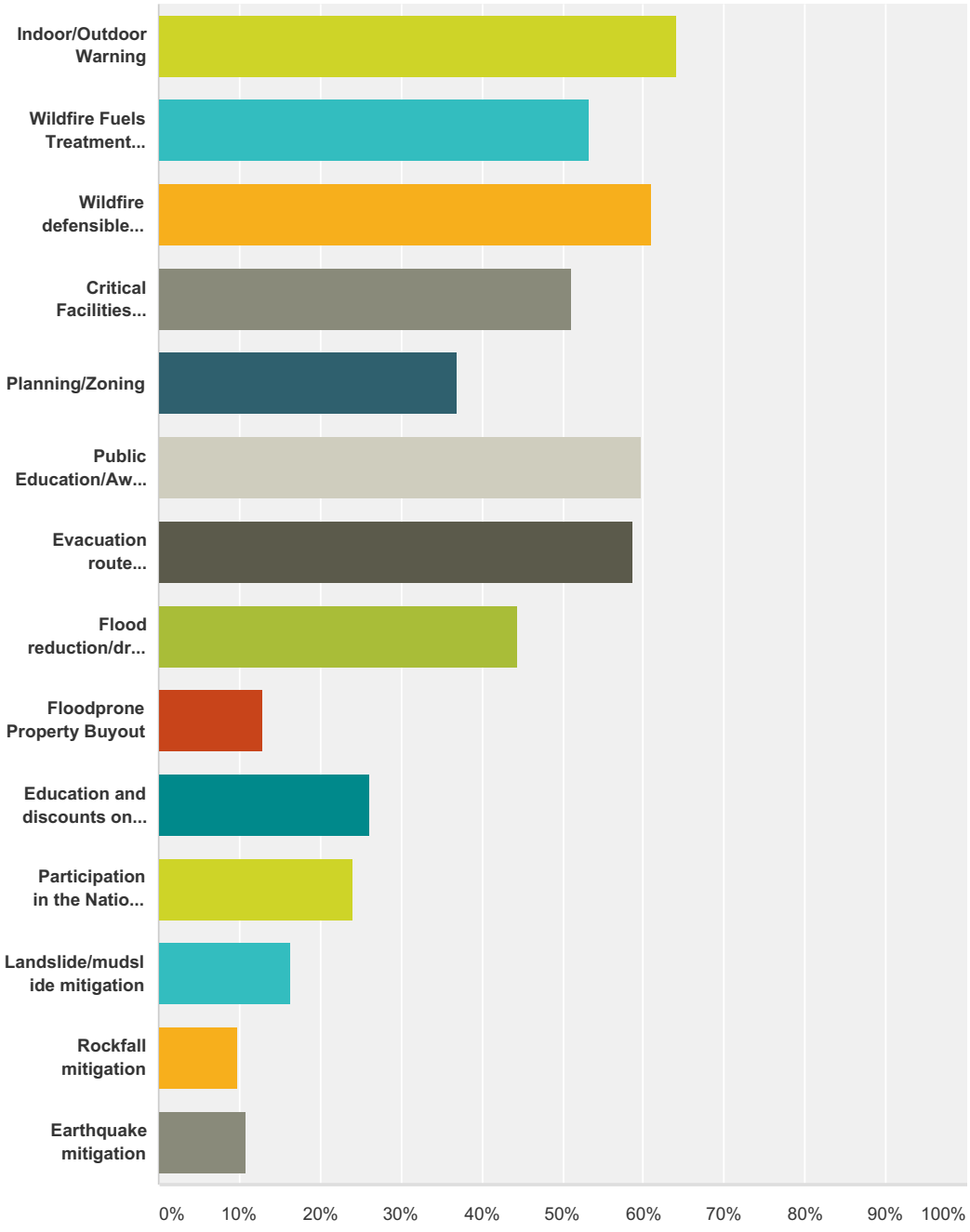
Q3 Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction.

Answered: 20 Skipped: 76

#	Responses	Date
1	Deep flooding creating deep pot holes near Whyoming and Blackmore rd. Area is hazardous in any foul weather.	2/17/2017 10:30 AM
2	During the Eclipse I am worried about the sewer, water and trash. How is Casper going to plan for that? Are we going to have enough water and what is going to happen with all the sewage and trash.	2/15/2017 3:09 PM
3	Wildfire planning for local residents living on the mountain.	2/15/2017 11:07 AM
4	reduce the vehicular traffic on Outer Drive during high winds as bad accidents happen with high wind/trucks!	2/14/2017 4:06 PM
5	None	2/14/2017 3:39 PM
6	Not really statistics however when people become fearful, economy falls, and ignorance surfaces.. people become hateful and destroy the property/lives of others.	2/14/2017 2:12 PM
7	Limited access to the town of Bar Nunn for emergency evacuations and responders.	2/13/2017 8:35 AM
8	NONE	2/13/2017 7:32 AM
9	None at this time.	2/10/2017 3:58 PM
10	Refinery Fire-Moderate	2/10/2017 9:15 AM
11	na	2/10/2017 9:07 AM
12	Wildland fuel mitigation along creek drainages in Casper	2/9/2017 2:15 PM
13	Lack of evacuation routes in and out of the town of Bar Nunn	2/9/2017 10:23 AM
14	No.	1/27/2017 10:12 PM
15	No	1/27/2017 8:29 PM
16	Not at this time	1/27/2017 4:12 PM
17	We need another way out of Bar Nunn. We are land locked if the one way out to Casper is blocked.	1/27/2017 3:57 PM
18	Natural Gas or hazardous substances released in the air or area.	1/27/2017 3:37 PM
19	I've always been concerned about the communities ability to evacuate being center and McKinley are the only means to enter the highway. With the choice of the state to close Beverly has made my fear of our ability to leave quickly to be of great concern.	1/27/2017 3:32 PM
20	City of Casper - when the sirens go off, it's nearly impossible to hear or understand what they are saying	1/27/2017 3:21 PM

Q4 The following types of mitigation actions may be considered in the plan. Please place a check next to the types of mitigation actions that you think should have the highest priority in the plan.

Answered: 92 Skipped: 4



Answer Choices	Responses	
Indoor/Outdoor Warning	**64.13%**	59

Wildfire Fuels Treatment projects	**53.26%**	49
Wildfire defensible space projects	**60.87%**	56
Critical Facilities Protection	**51.09%**	47
Planning/Zoning	**36.96%**	34
Public Education/Awareness	**59.78%**	55
Evacuation route development	**58.70%**	54
Flood reduction/drainage improvement	**44.57%**	41
Floodprone Property Buyout	**13.04%**	12
Education and discounts on flood insurance	**26.09%**	24
Participation in the National Flood Insurance Program	**23.91%**	22
Landslide/mudslide mitigation	**16.30%**	15
Rockfall mitigation	**9.78%**	9
Earthquake mitigation	**10.87%**	10
Total Respondents: 92		

Q5 Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by hazards.

Answered: 11 Skipped: 85

#	Responses	Date
1	We live on HWY 20/26 W and would love to be able to hear the warning sirens that are available in town. The closest one on 10 Mile Rd, we can't hear. Perhaps some further out for rural residents? It is growing greatly. Thank you for your consideration!	2/23/2017 7:13 AM
2	Research other states efforts to reduce hazards for any condition and implement those ideas to advance in all areas! New Mexico tilts roads with groves for fast water run off during monsoon seasons... "wake up" lines are used to help keep snow from building up in tire groves allowing better traction... left hand turns from incline need more time in poor weather - too many People run too many lights due to this issue!	2/17/2017 10:30 AM
3	Water quality for residents residing on mountain in regard to well water.	2/15/2017 11:07 AM
4	Currently live in the County, south and west of Casper. It is beyond time that Natrona County and the Natrona County Commissioners enact updated Planning & Zoning guidelines and ENFORCE siad Planning and Zoning guidelines. I have neighbors that have TOO much clutter and in the case of any emergency, would potentially cause unlimited hazards.	2/14/2017 3:39 PM
5	Emergency preparedness	2/14/2017 2:12 PM
6	na	2/10/2017 9:07 AM
7	Public shelters for emergency from tornados to whatever.	1/28/2017 4:25 AM
8	N/A	1/27/2017 10:12 PM
9	I admin Casper"s largest pet recovery group, Casper Pets Lost N Found on facebook. Currently we have 7000 members. We always strive to support Metro and uphold all Ordinances and by-laws. I have been thinking of sitting down with Tory Metro (we have a good relationship) to see what plans are in place for pets in cases of disaster. We gained some experience with the Cole Creek fire and livestock; but would like to see about cats and dogs for the people of Casper and develop a plan in which our membership and board for information dissemination to the community.	1/27/2017 4:08 PM
10	Again the ability for the community to evacuate entering the highway is limited with Beverly being closed. If a high profile vehicle was to become wedged or a car in one of the underpasses it could severely impede the ability to leave Casper quickly.	1/27/2017 3:32 PM
11	Wind tearing down property	1/27/2017 3:25 PM

Q6 Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

Answered: 21 Skipped: 75

#	Responses	Date
1	Kathy Chong katz333@msn.com	2/23/2017 11:05 AM
2	Leah Smith lsmith@cnchd.org	2/21/2017 8:00 AM
3	kdlitl20@msn.com	2/15/2017 11:07 AM
4	Jon Kinder jkinder@bresnan.net	2/14/2017 3:39 PM
5	Rita Goehring rmgoehring@gmail.com	2/14/2017 2:12 PM
6	Wayne L. Reynolds reynoldw@natronacounty-wy.gov	2/13/2017 7:32 AM
7	Dan Adcock Publisworks2@evansvillewy.com	2/10/2017 3:58 PM
8	Michelle SCJPB@yahoo.com	2/10/2017 8:44 AM
9	Christa Wiggs cmkarau@hotmail.com	1/31/2017 12:45 PM
10	KnopAtWork@gmail.com	1/28/2017 3:49 PM
11	Elmer parson elmerp@tribcsp.com	1/28/2017 11:34 AM
12	dniegisch@usa.net	1/28/2017 4:25 AM
13	Jody VonSeggern wyomingjody@gmail.com	1/27/2017 7:43 PM
14	Issac Zent. Ibzent@gmail.com	1/27/2017 5:34 PM
15	Mike Coley KE7AZF@gmail.com	1/27/2017 4:46 PM
16	Stefanie woinarowicz 664 wagon trail evansville wyoming 82636	1/27/2017 4:39 PM
17	Carla Edwards Carla370@yahoo.com P O Box 4096 Casper 82604.	1/27/2017 4:08 PM
18	Danielle Steinberg Kodi2004pup@yahoo.com	1/27/2017 4:01 PM
19	Traci.c462@live.com	1/27/2017 4:00 PM
20	keely.cvic@yahoo.com	1/27/2017 3:37 PM
21	Preston Pilant Prestonpilant@gmail.com	1/27/2017 3:32 PM

NATRONA COUNTY HAZARD MITIGATION PLAN UPDATE 2017

Mitigation Strategy Meeting

March 22, 2017, 1:00- 4:00 pm
County EOC, 201 N. David, Casper, WY

- **Introductions**
- **Review of the Planning Process**
- **Goals Update**
- **Review of possible mitigation activities and alternatives**
- **Discuss criteria for mitigation action selection and prioritization**
- **Review of progress on existing actions in the plan**
- **Brainstorming Session: Development of new mitigation actions (group process)**
- **Prioritize mitigation actions (group process)**
- **Discuss plan implementation and maintenance**
- **Discuss next steps**
- **Questions and Answers/Adjourn**

Mitigation Action Selection and Prioritization Criteria

Does the proposed action protect lives?

Does the proposed action address hazards or areas with the highest risk?

Does the proposed action protect critical facilities, infrastructure, or community assets?

Does the proposed action meet multiple objectives (multi-objective management)?

STAPLE/E

Developed by FEMA, this method of applying evaluation criteria enables the planning team to consider in a systematic way the social, technical, administrative, political, legal, economic, and environmental opportunities and constraints of implementing a particular mitigation action. For each action, the HMPC should ask, and consider the answers to, the following questions:

Social

Does the measure treat people fairly (different groups, different generations)?

Technical

Will it work? (Does it solve the problem? Is it feasible?)

Administrative

Is there capacity to implement and manage project?

Political

Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?

Legal

Does your organization have the authority to implement? Is it legal? Are there liability implications?

Economic

Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?

Environmental

Does it comply with environmental regulations or have adverse environmental impacts?

Example Mitigation Actions by FEMA categories with Hazards Identified in the Natrona Hazard Mitigation Plan 2017

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Landslides/ Debris Flows/ Rockfalls; soil hazards; subsidence	Weather Extremes (Tornado, hail, lightning, wind, temps, drought)	Earth quakes	Wildfires	Severe Winter Storm
PLANS and REGULATIONS								
Building codes and enforcement		■	■	■	■	■	■	■
Comprehensive Watershed Tax		■						
Density controls	■	■	■	■			■	
Design review standards		■	■	■		■	■	
Easements		■	■	■			■	
Environmental review standards		■	■	■		■	■	
Floodplain development regulations	■	■	■					
Hazard mapping	■	■	■	■			■	
Floodplain zoning	■	■	■					
Forest fire fuel reduction							■	
Housing/landlord codes			■		■			
Slide-prone area/grading/hillside development regulations				■			■	
Manufactured home guidelines/regulations		■			■	■		
Minimize hazardous materials waste generation			■					
Multi-Jurisdiction Cooperation within watershed	■	■						
Open space preservation	■	■		■			■	
Performance standards	■	■		■	■	■	■	■
Periodically contain/remove wastes for disposal			■					
Pesticide/herbicide management regulations			■					
Special use permits	■	■	■	■			■	
Stormwater management regulations		■	■					
Subdivision and development regulations	■	■	■	■		■	■	
Surge protectors and lightning protection					■			

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Landslides/ Debris Flows/ Rockfalls; soil hazards; subsidence	Weather Extremes (Tornado, hail, lightning, wind, temps, drought)	Earth quakes	Wildfires	Severe Winter Storm
Tree Management					■		■	■
Transfer of development rights		■		■			■	
Utility location			■	■	■			■
STRUCTURE AND INFRASTRUCTRE PROJECTS								
Acquisition of hazard prone structures	■	■		■			■	
Facility inspections/reporting	■	■	■			■		
Construction of barriers around structures	■	■	■					
Elevation of structures	■	■						
Relocation out of hazard areas	■	■	■	■			■	
Structural retrofits (e.g., reinforcement, floodproofing, bracing, etc.)		■	■	■	■	■	■	■
Channel maintenance		■		■				
Dams/reservoirs (including maintenance)	■	■						
Isolate hazardous materials waste storage sties			■					
Levees and floodwalls (including maintenance)		■						
Safe room/shelter					■	■		■
Secondary containment system			■					
Site reclamation/restoration/revegetation		■		■				
Snow fences								■
Water supply augmentation					■			
Debris Control		■		■				
Defensible Space							■	
Stream stabilization		■		■				
EDUCATION AND AWARENESS								
Flood Insurance	■	■						
Hazard information centers	■	■	■	■	■	■	■	■

Alternative Mitigation Actions	Dam Failure	Floods	Hazardous Materials	Landslides/ Debris Flows/ Rockfalls; soil hazards; subsidence	Weather Extremes (Tornado, hail, lightning, wind, temps, drought)	Earth quakes	Wildfires	Severe Winter Storm
Public education and outreach programs	■	■	■	■	■	■	■	■
Real estate disclosure	■	■	■	■	■	■	■	■
Crop Insurance					■	■		
Lightning detectors in public areas					■			
NATURAL SYSTEMS PROTECTION								
Best Management Practices (BMPs)		■	■	■	■		■	
Forest and vegetation management	■	■		■	■		■	■
Hydrological Monitoring	■	■	■	■	■			
Sediment and erosion control regulations	■	■	■	■				
Stream corridor restoration		■		■				
Stream dumping regulations		■	■					
Urban forestry and landscape management		■		■	■		■	■
Wetlands development regulations		■	■	■			■	
EMERGENCY SERVICES								
Critical facilities protection	■	■	■	■	■	■	■	■
Emergency response services	■	■	■	■	■	■	■	■
Facility employee safety training programs	■	■	■	■	■	■	■	■
Hazard threat recognition	■	■	■	■	■	■	■	■
Hazard warning systems (community sirens, NOAA weather radio)	■	■	■	■	■	■	■	■
Health and safety maintenance	■	■	■	■	■	■	■	■
Post-disaster mitigation	■	■	■	■	■	■	■	■
Evacuation planning	■	■	■	■			■	

Summary of the Natrona County Mitigation Strategy Meeting 2017 Hazard Mitigation Plan Update

March 22, 2017
1:00 – 3:30 PM
Natrona County EOC, Casper, WY

Introduction and Opening Remarks

Jeff Brislawn, project manager with Amec Foster Wheeler, initiated the meeting with a discussion of the agenda for the afternoon. Jeff asked everyone around the room to introduce themselves; 8 persons from various County departments and the City of Casper and Town of Evansville were in attendance and documented on a sign in sheet. Stakeholders included Sinclair Transportation. Handout materials were provided.

Jeff presented the PowerPoint slide deck that outlined the meeting agenda and topics.

Review of the Planning Process

Jeff reviewed the planning process that has taken place so far. The process is currently in Phase III – Develop a Mitigation Plan. Jeff also reviewed the findings of the process up to the point of the meeting, including the draft hazard identification and risk assessment. Jeff presented a slide that summarized the hazard significance ratings. Some discussion about the overall significance ratings occurred; Jeff suggested the group review the draft HIRA and recommend any changes that might be warranted. Jeff also presented the results of the public survey. The survey was distributed via emergency management Facebook and received about 96 responses. Wind and winter storm ranked as high significance hazards; the group noted this could be due to the time of year the survey was taken (February- March) and recent wind and winter storm events.

Plan Goals

Jeff reviewed the broad mitigation goals developed for the plan at the previous meeting. The group validated the goals with some minor revisions and some adjustments/additions to the objectives. Jeff will draft the revised goals and objectives that will be included in the updated plan.

Review of Possible Mitigation Activities and Alternatives

Jeff presented information on typical mitigation activities and alternatives and referred to handouts with further details and guidance. Jeff reviewed ideas for possible mitigation activities and alternatives based on the risk assessment. Jeff outlined potential project criteria and action requirements, including the requirements of the Disaster Mitigation Act of 2000. Each hazard and each participating jurisdiction must have at least one true mitigation action (not preparedness) pertaining to them. The group was provided a handout with a matrix of typical mitigation alternatives organized by FEMA categories for the hazards identified in the plan. Another reference document titled “Mitigation Ideas” developed by FEMA was made available

for reference at the meeting. This reference discusses the common alternatives for mitigation by hazard.

Coordination with Other Plans

The group also discussed the importance of coordinating the mitigation plan with other planning processes, and vice versa. The group discussed opportunities to cross reference the hazard mitigation plan in other planning efforts. Jeff noted that projects in other plans can be linked with the HMP through an action item that notes implementation of the mitigation – related actions present in plans such as CWPPs or capital improvement plans. The 2012 River Master Plan was noted has having projects and a geomorphic assessment that identifies erosion hazard areas.

Review of progress on 2010 Plan actions and identification of new actions

Each action from the 2010 plan was discussed with the group. The group provided input on whether the action had been completed and if not reasons why. Some actions were determined to still be relevant and should continue in the updated plan. Others were recommended to be deleted. Jeff took notes on the revisions to the action table. Action priorities were revisited and modified in some cases. Completed and deleted actions will be moved to separate tables in the updated plan. The continuing, deferred and new actions will be grouped together in an updated action strategy table.

During the discussion some new actions to include in the plan were brainstormed. To stimulate ideas Jeff noted some possible ideas in his presentation, and also referred the group to the public survey results which included some mitigation recommendations, and the FEMA Mitigation Ideas publication. New action ideas were noted on large sticky notes by the participants. These were then posted on flip chart paper, organized by hazards. Jeff posted project descriptions of several drainage projects previously provided by the City of Casper. These actions and their dot prioritization include:

1. Develop a Ready, Set, Go Program for All Hazards (1 dot)
2. Address evacuation of Evansville due to Train Derailment or other hazards, including developing an alternate route (6 dots)
3. Improve clarity of warning messages on sirens (1 dot and public survey recommendation)
4. Develop additional emergency access/egress for Bar Nunn (5 dots and public survey recommendation)
5. Sun Drive Detention Pond on Sage Creek (1 dot)
6. Eastdale Creek Diversion to Sage Creek
7. Lower Eastdale Creek Channel Improvements (2 dots)
8. Emigrant Gap Draw Channel Improvements
9. Industrial Avenue Storm Sewer Improvements
10. North Platte River Restoration (includes flood, erosion, and wildfire mitigation)
11. Flood hazard education and awareness (2 dots)

12. Continue to offer immunizations to residents (biological disease – may be noted as an ongoing capability)
13. Continue to educate the public about novel diseases (biological disease – may be noted as an ongoing capability)

Jeff will enter the proposed mitigation projects into the action table. He will be in touch to identify points of contact to flesh out the specifics of the different projects. In addition he will send out a sample action for 'Continued Participation in the National Flood Insurance Program,' which is a requirement for all NFIP communities.

Action Prioritization

The group was provided with a decision-making tools to consider when prioritizing the actions. This including FEMA's recommended criteria, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits). Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than another included:

- Does action protect lives?
- Does action address hazards or areas with the highest risk?
- Does action protect critical facilities, infrastructure or community assets?
- Does action meet multiple objectives (Multiple Objective Management)?

The actions noted previously were given an initial prioritization based on consideration of the above and input from the group. The group was provided sets of sticky dots, 4 per person, which they used to "vote" on the projects using the above criteria. Jeff will compile the results into a relative high, medium, low prioritization based on this initial dot method.

Next Steps

Jeff provided a new action worksheet for participants to flush out the details of proposed actions. These are due April 7th from the constituents. Comments on the draft HIRA are also due then. A target for the first complete draft is the end of April.

The meeting adjourned at 3:30 PM.

Natrona County Hazard Mitigation Plan
New Mitigation Action Worksheet

Use this to record new potential mitigation projects (1 form per project) identified during the planning process. Provide as much detail as possible and use additional pages as necessary. Complete and return to Jeff Brislawn by **April 7th. Note Jurisdiction:**

Mitigation Project Title	
Hazard(s) Mitigated	
Project Description, Issue/Background	
Related planning mechanisms	
Jurisdictions that will benefit	
Responsible Office/ Agency	
Partners	
Priority (High, Medium, Low)	
Cost Estimate	
Benefits (Avoided Losses)	
Potential Funding source	
Timeline for Completion	

Prepared by: _____

Title/Dept: _____

Phone: _____

Email: _____

Please return worksheets by mail, email, or fax to: Jeff Brislawn
jeff.brislawn@amecfw.com
Phone: 303-704-5506
Fax: 303-935-6575
1942 Broadway, Suite 314, Boulder, CO 80302

SIGN-IN SHEET
Natrona County Hazard Mitigation Plan Update Project
Meeting #3 Mitigation Strategy Meeting, March 22, 2017, 1:00-4:00 pm
County EOC, 201 N. David Casper, WY

Name	Email Address	Phone	Jurisdiction/ Department/ Organization/Affiliation	Title
JEROME FLORES	jflores@SINCLAIROIL.com	(307)324-3190	SINCLAIR TRANS. CO.	SAFETY & REG. COMP.
Matt Gacke	mattgacke@msn.com	307-266-5732	mattgacke@msn.com	Evansville Fire Dept.
Audrey Gray	agray@cnchd.org	307-577-9737	agray@cnchd.org	PHP Manager
Denise Wyskup	dwyskup@casperwy.gov	235-8455	City of Casper/Regional GIS	Regional GIS Administrator
Constance Lake	clake@casperwy.gov	235-8346	Casper Cmty Dev	MPO Specialist
JOLENE MARTINEZ	jmartinez@casperwy.gov	235-8332	Casper/Engineering Office	special projects coordinator
Amanda Huckabay	ahuckabay@cnchd.org	577.9751	CNCHD	PHP Specialist
Jeff Brislawn	Jeff.brislawn@AmecFW.com	303-704-5506	AmecFoster Wheeler	Project Manager

November 2, 2017 at 1:30 pm
Bar Nunn Fire Station
Mitigation Planning Meeting – Town of Bar Nunn

In attendance:

John Harlin- Natrona County Emergency Management Coordinator
Stacia Hill- Natrona County Emergency Management Deputy Coordinator
Robert Hoover – Fire Chief, Town Council Member
Chuck Johnson – Town of Bar Nunn Maintenance Supervisor

Identified Areas of Concern or Threats:
Wildfire
Airplane crash
Threats to Elementary School
Flooding from Severe Rain Storms
Natural Disasters

Meeting notes:

Wildfire – The town of Bar Nunn will start construction of a new interchange on Interstate 25 in the spring of 2018. Currently there are only two routes of ingress/ egress for emergency responders and citizens during disaster response and evacuation. This interchange will eventually connect US HWY 20-26 near the Casper Natrona County International Airport, Town of Bar Nunn, Interstate 25 and the Town of Evansville. The Town annually maintains fire breaks on the north and west sides of the town to mitigate the potential of wild fires impacting the Town. In 2014 there was a large grass fire north west of the Town. This fire left a large burn scar that now contains cheat grass. The Town of Bar Nunn would like to mitigate the cheat grass flash fuels by spraying work with the Ag Extension this coming spring and summer to eliminate the cheat grass

As of the summer of 2017 the Town of Bar Nunn finished a project that looped all fire hydrants so water volume and pressure is no longer an issue in the event of a large fire.

In the summer of 2017 an addition was added to the Elementary School. Along with that project a complete sprinkler system was added to the entire school. All future plans for building public buildings will now have sprinkler systems installed. The town has adopted fire resistant construction standards. The town of Bar Nunn plans on building a new town Hall. Construction is to begin in 2 to 5 years. This building will also have a sprinkler system installed.

Flooding- All new areas of development have retention areas built in anticipation of heavy rain storms that cause major flooding of street and homes. Bar Nunn is relatively flat so water run-off has been an issue. In the new development on the north end of Bar Nunn retention areas have been built to contain the run off and remove it from the residential areas reducing the potential of flooding. They have also constructed retention areas around the school. All new development areas in the Town of Bar Nunn are being planned to the 100 year flood plan.

The threat of an airplane crash at or just east of the Interstate is a large concern for the Town of Bar Nunn. Most commercial and private aircraft either approach or depart directly over the southern half of

the town. The crash of an airplane has the potential to cause significant damage to the Town of Bar Nunn. The Town of Bar Nunn is now notified of any potential aircraft situation that is approaching the airport. It is realized they cannot control or build barriers from this happening but they have taken measures to ensure they are notified by the Public Safety Communication Center and have made plans for removing key equipment to outlying areas. There have been situations when aircraft have landed on the streets of Bar Nunn when they could not make it to the airport to due fuel and or mechanical problems with the aircraft.

Robert Hoover has also asked for and will provide a secure location for a CERT trailer to be stored in the town. This would aid in the response if there was a significant event that occurred in the area.

End of meeting

November 6, 2017 at 5:30PM
Edgerton Town Hall
Mitigation Planning Meeting – Town of Edgerton

In attendance:

John Harlin- Natrona County Emergency Management Coordinator
Stacia Hill- Natrona County Emergency Management Deputy Coordinator
H.H. "Buck" King – Mayor
Cindy Aars – Council Member
Paul Brow – Council Member
Cathy Andreen – Council Member
Frank Tucker – Council Member
Chad Leatherwood – Water Distribution Manager

Identified areas of concern:
Lighting and Thunder storms
Hail
Wind Storms
Wild Fires
Earthquake
Tornados

Meeting notes:

Hail, Lighting and Thunder Storms – Edgerton gets severe storms every year. In 2016 a severe thunderstorm producing hail and high wind impacted the town. This storm caused significant damage throughout the town. The town council believes not much planning can be done to circumvent damage from these storms. The Town Hall, where critical communications is located, does not have a backup power source. The Town Hall is the designated tornado shelter and warming/ cooling shelter. There was discussion as to the possibility of installing a generator backup in the future. Council members will respond to the town hall if there is a serious power outage or disaster.

Flooding – is not too much of a concern. The town is built above the flood plain. A number of years ago there was a major storm and they received 2" of rain in 20 minutes. Salt Creek, which runs along the outside of town, was able to handle the rainfall. There was very minor flooding on one roadway but within a very short time the water ran off and or seeped into the ground. Currently there are no flood mitigation plans.

Wild fires – are a concern due to the fact that Edgerton is surrounded by private property ranch land and Bureau of Land Management lands. There are areas that could pose a serious problem in the event of a fire. The Town identified the potential threat of wild land fire would have to the water storage tank and treatment facility. To mitigate the wild land fire threat, the Town discussed creating a firebreak and

weed control around the perimeter of the water storage tank and treatment facility. There were no additional properties within the Town boundary identified as in need of wild fire mitigation efforts.

Earthquake – could cause major problems with the potable water supply for the town. Currently a 40 mile long pipeline carries water from Casper to Edgerton. If an earthquake damaged the waterline the town could possibly deplete it stores and be out of drinking water in 5 to 7 days. The town has planned, and contracted in the past, commercial water tankers to bring water into the town. The Town's water tower can hold approximately 1.5 million gallons of water; however the maintained level is 500,000 gallons. They currently utilize electronically actuated back flow valves and butterfly isolation valves with manual backup valves. Accessing and operating the manual valves takes a considerable amount of time and may not be sufficient in an emergency situation. The recommendation would be to evaluate the water control system. The Town would like to install a generator and/or battery back up to the valve and water operating system. In the event of water system compromise, the Town would institute a boiling order and conduct community education.

The town of Edgerton and the town of Midwest share this water supply pipeline and water storage tank.

Tornados - The Town uses the basement of the town hall as a shelter for tornados. They could also affect the power for the town and, as previously noted, having a backup generator would be beneficial. There is an outdoor warning siren system in place that works well in the area. The siren system is powered by solar charged batteries.

The Town has adopted all the National Building codes and has memorandums of understanding for new construction. They also require all new construction, once passed by the Town Council, to also have permits and inspections from the Natrona County Building Inspector.

The Town has above ground power transmission. There has been discussion about changing to underground power systems. At this point the cost is prohibitive but if there was a large storm or tornado that went through the area and cause significant damage to the current power lines they would look at changing to underground at that time.

End of meeting.

November 8, 2017
Midwest Town Hall
Mitigation Planning Meeting – Midwest

In attendance:

John Harlin- Natrona County Emergency Management Coordinator
Stacia Hill- Natrona County Emergency Management Deputy Coordinator
Guy Chapman – Mayor
Amanda DeWitt – Council Member
Darla Lindsay – Council Member
Katie Bachmeier – Council Member
Jaime Jones – Chief of Police
James Durand- Public Works Department

Community Members
Eugene Dickerson
Katie Piatt
Jan Bunderson
Michelle Gibbs
Chad Leatherwood
Ron Moore
Paula Chapman
Frank Tucker
Daryl Shepard

Identified areas of Concern:
Wild Fire Danger
Earthquakes
Tornados
Chemical Release

Wildfire - The Town of Midwest's greatest concern currently is Wildland fire. They have identified strategies to mitigate the impact of a wild land fire on the town. In the spring of 2018 the town will mow and/or grade a large fire break on the north edge of town. It could be mowed out 50' to 100' or a grader could remove the vegetation every 1 to 2 years. On the east side of town they have cleared all greasewood and vegetation in a 4 acre area. This will continue to be maintained. On the south end of town there seems to be a lot of brush that is growing up but they will address that area again this spring. The west side of the town poses no real issue at this time.

Critical Infrastructure – at this time there are no structures that have sprinkler systems in them in the event of fire. The systems could be added to the Town Hall, Fire Station, Police Station and the school. The buildings do have fire alarms.

Water system – the town also shares the same water system that Edgerton has. There is vulnerably to the system in the event of a large fire, earthquake, and tornados. Midwest also stated they could strengthen the water system by having a generator and creating a better fire break around the tower.

Severe winter storms, severe thunderstorms and tornados- shelter facilities; the fire station, church and school all have basements that have been designated as shelter locations.

The town of Midwest is serviced by outdoor warning sirens. The sirens feature solar charged battery power.

Flooding does not pose a large problem. The town of Midwest is higher in elevation than the flood plain. They also have storm sewers and catch basins in the event of heavy rain.

APPENDIX B - CRITICAL FACILITIES BY JURISDICTION IN NATRONA COUNTY

Jurisdiction	Critical Facility Type	Facility Count
Bar Nunn	Day Cares	4
	EPA FRS Location	1
	Fire Department	1
	National Shelter System Facility	2
	School	1
	Total	**9**

Jurisdiction	Critical Facility Type	Facility Count
Casper	Air Facility	1
	Assisted Living	10
	Bridge	18
	College/University	1
	Community Support	43
	Day Cares	88
	EPA FRS Location	303
	EPA Regulated Facility	2
	Fire Department	5
	Hospital	2
	Law Enforcement	7
	Local EOC	1
	Medical Facility	2
	National Shelter System Facility	30
	Nursing Home	9
	Private School	4
	Public Health Department	1
	School	25
	Special Medical Facility	45
	Substation	4
	Tier II	17
	Urgent Care Facility	2
	Total	**620**

Jurisdiction	Critical Facility Type	Facility Count
Edgerton	Community Support	1
	Total	**1**

Jurisdiction	Critical Facility Type	Facility Count
Evansville	Bridge	7
	Day Cares	2
	EPA FRS Location	4
	EPA Regulated Facility	1
	Fire Department	1
	Law Enforcement	1
	National Shelter System Facility	1
	School	1
	Tier II	6
	Total	**24**

Jurisdiction	Critical Facility Type	Facility Count
Midwest	Fire Department	1
	Law Enforcement	1
	National Shelter System Facility	1
	School	1
	Total	**4**

Jurisdiction	Critical Facility Type	Facility Count
Mills	Bridge	3
	Day Cares	7
	EPA FRS Location	16
	EPA Regulated Facility	4
	Fire Department	1
	Law Enforcement	1
	National Shelter System Facility	1
	School	1
	Tier II	11
	Total	**45**

Jurisdiction	Critical Facility Type	Facility Count
Unincorporated	Air Facility	6
	Bridge	110
	Day Cares	6
	Electrical Facility	8
	EPA FRS Location	196
	EPA Regulated Facility	19
	Fire Department	2
	Law Enforcement	2
	National Shelter System Facility	5
	Non-Union Communications	83
	Power Plant	1
	School	6
	Substation	10
	Tier II	120
	Union Communications	17
	Total	**591**

APPENDIX C - FLOOD EXPOSURE DETAILS

1% Annual Chance

Table A.1. Casper

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Commercial	11	84	$5,051,721	$5,051,721	$10,103,442	$2,525,861	
Exempt	13	18	$0	$0	$0	$0	
Res Vacant Land	2	2	$0	$0	$0	$0	
Residential	462	565	$50,281,259	$25,140,630	$75,421,889	$18,855,472	1,379
Total	**488**	**669**	**$55,332,980**	**$30,192,351**	**$85,525,331**	**$21,381,333**	**1,379**

Table A.2. Evansville

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Commercial	3	3	$1,758,803	$1,758,803	$3,517,606	$879,402	
Exempt	1	1	$0	$0	$0	$0	
Residential	1	1	$214,208	$107,104	$321,312	$80,328	2
Total	**5**	**5**	**$1,973,011**	**$1,865,907**	**$3,838,918**	**$959,730**	**2**

Table A.3. Mills

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Commercial	7	8	$763,194	$763,194	$1,526,388	$381,597	
Exempt	2	3	$0	$0	$0	$0	
Residential	1	5	$76,673	$38,337	$115,010	$28,752	12
Total	**10**	**16**	**$839,867**	**$801,531**	**$1,641,398**	**$410,349**	**12**

Table A.4. Unincorporated

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Com Vacant Land	5	5	$0	$0	$0	$0	
Commercial	28	73	$5,117,428	$5,117,428	$10,234,856	$2,558,714	
Exempt	3	3	$0	$0	$0	$0	
Industrial	7	9	$9,198,301	$13,797,452	$22,995,753	$5,748,938	
Multi-Use	3	10	$886,915	$886,915	$1,773,830	$443,458	
Res Vacant Land	21	26	$0	$0	$0	$0	
Residential	278	315	$34,882,224	$17,441,112	$52,323,336	$13,080,834	769

Total	**345**	**441**	**$50,084,868**	**$37,242,907**	**$87,327,775**	**$21,831,944**	**781**

Table A.5. 1% Annual Chance Summary by Jurisdiction

Jurisdiction	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss
Casper	488	669	$55,332,980	$30,192,351	$85,525,331	$21,381,333
Evansville	5	5	$1,973,011	$1,865,907	$3,838,918	$959,730
Mills	10	16	$839,867	$801,531	$1,641,398	$410,349
Unincorporated	345	441	$50,084,868	$37,242,907	$87,327,775	$21,831,944
Total	**848**	**1,131**	**$108,230,726**	**$70,102,695**	**$178,333,421**	**$44,583,355**

0.2% Annual Chance

Table A.6. Casper

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Com Vacant Land	5	8	$0	$0	$0	$0	
Commercial	190	256	$69,544,805	$69,544,805	$139,089,610	$34,772,403	
Exempt	67	108	$1,095,930	$1,095,930	$2,191,860	$547,965	
Industrial	5	5	$2,107,754	$3,161,631	$5,269,385	$1,317,346	
Multi-Use	8	13	$2,978,567	$2,978,567	$5,957,134	$1,489,284	
Res Vacant Land	49	89	$0	$0	$0	$0	
Residential	1,477	1,593	$164,544,092	$82,272,046	$246,816,138	$61,704,035	3,887
Total	**1,801**	**2,072**	**$240,271,148**	**$159,052,979**	**$399,324,127**	**$99,831,032**	**3,887**

Table A.7. Evansville

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Commercial	3	3	$355,402	$355,402	$710,804	$177,701	
Exempt	2	4	$0	$0	$0	$0	
Res Vacant Land	27	29	$0	$0	$0	$0	
Residential	224	239	$23,417,500	$11,708,750	$35,126,250	$8,781,563	583
Vacant Land	2	2	$1,245	$1,245	$2,490	$623	
Total	**258**	**$277**	**$23,774,147**	**$12,065,397**	**$35,839,544**	**$8,959,886**	**583**

Table A.8. Mills

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population

Com Vacant Land	2	21	$0	$0	$0	$0	
Commercial	15	21	$1,388,874	$1,388,874	$2,777,748	$694,437	
Exempt	6	7	$0	$0	$0	$0	
Industrial	1	1	$3,912,380	$5,868,570	$9,780,950	$2,445,238	
Res Vacant Land	52	62	$0	$0	$0	$0	
Residential	218	267	$9,870,584	$4,935,292	$14,805,876	$3,701,469	651
Total	**294**	**$379**	**$15,171,838**	**$12,192,736**	**$27,364,574**	**$6,841,144**	**651**

Table A.9. Unincorporated

Property Type	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss	Population
Com Vacant Land	1	2	$0	$0	$0	$0	
Commercial	40	155	$11,089,932	$11,089,932	$22,179,864	$5,544,966	
Exempt	1	1	$0	$0	$0	$0	
Industrial	3	3	$2,694,324	$4,041,486	$6,735,810	$1,683,953	
Multi-Use	3	4	$400,133	$400,133	$800,266	$200,067	
Res Vacant Land	5	5	$0	$0	$0	$0	
Residential	212	229	$33,716,684	$16,858,342	$50,575,026	$12,643,757	559
Total	**265**	**$399**	**$47,901,073**	**$32,389,893**	**$80,290,966**	**$20,072,742**	**559**

Table A.10. 0.2% Annual Chance Summary by Jurisdiction

Jurisdiction	Parcel Count	Building Count	Improved Value	Est. Content Value	Total Exposure	Potential Loss
Casper	1,801	2,072	$240,271,148	$159,052,979	$399,324,127	$99,831,032
Evansville	258	277	$23,774,147	$12,065,397	$35,839,544	$8,959,886
Mills	294	379	$15,171,838	$12,192,736	$27,364,574	$6,841,144
Unincorporated	265	399	$47,901,073	$32,389,893	$80,290,966	$20,072,742
Total	**2,618**	**3,127**	**$327,118,206**	**$215,701,005**	**$542,819,211**	**$135,704,803**

Figure 1 : Casper Structures within Floodplain

Figure 2 : Evansville Structures within Floodplain

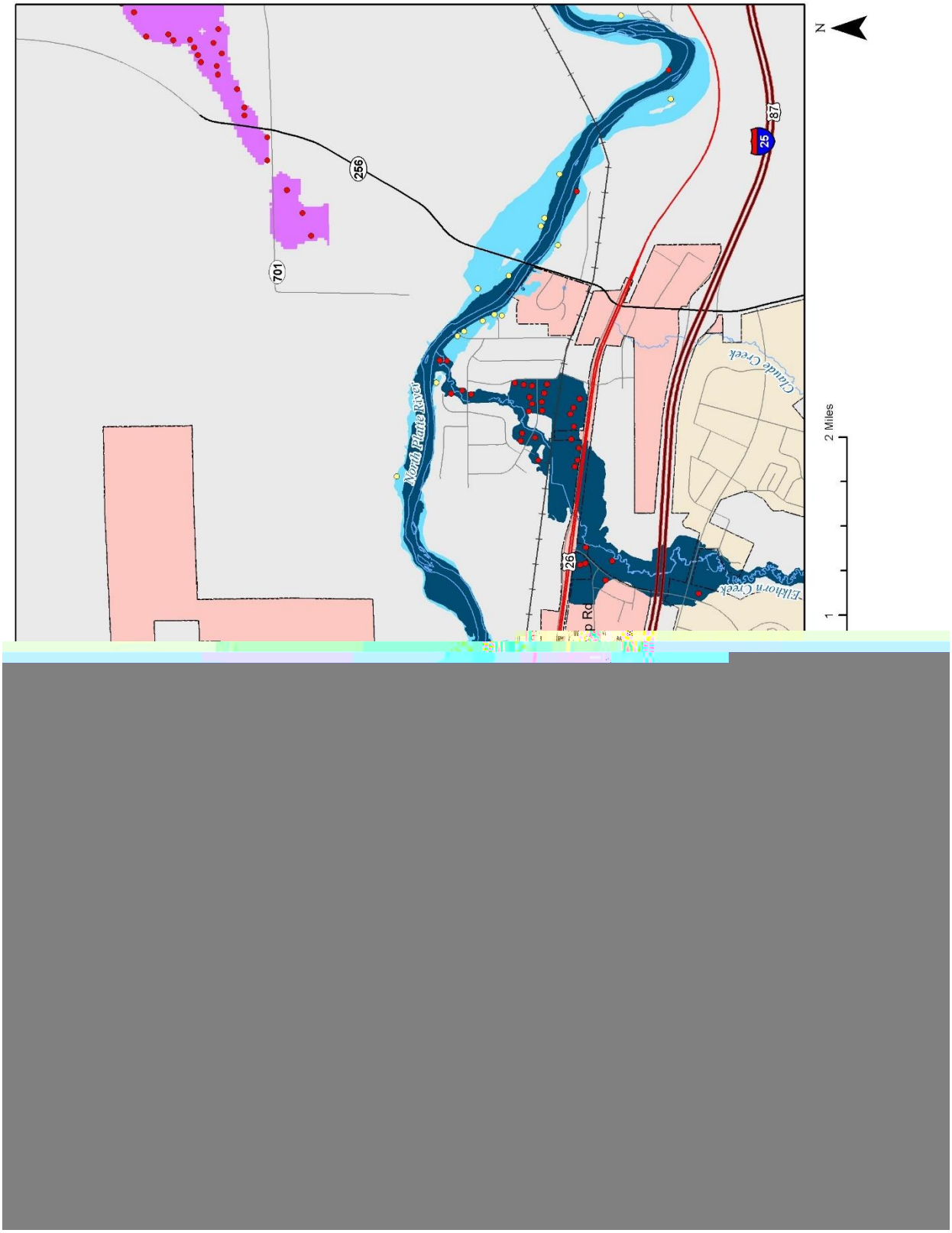
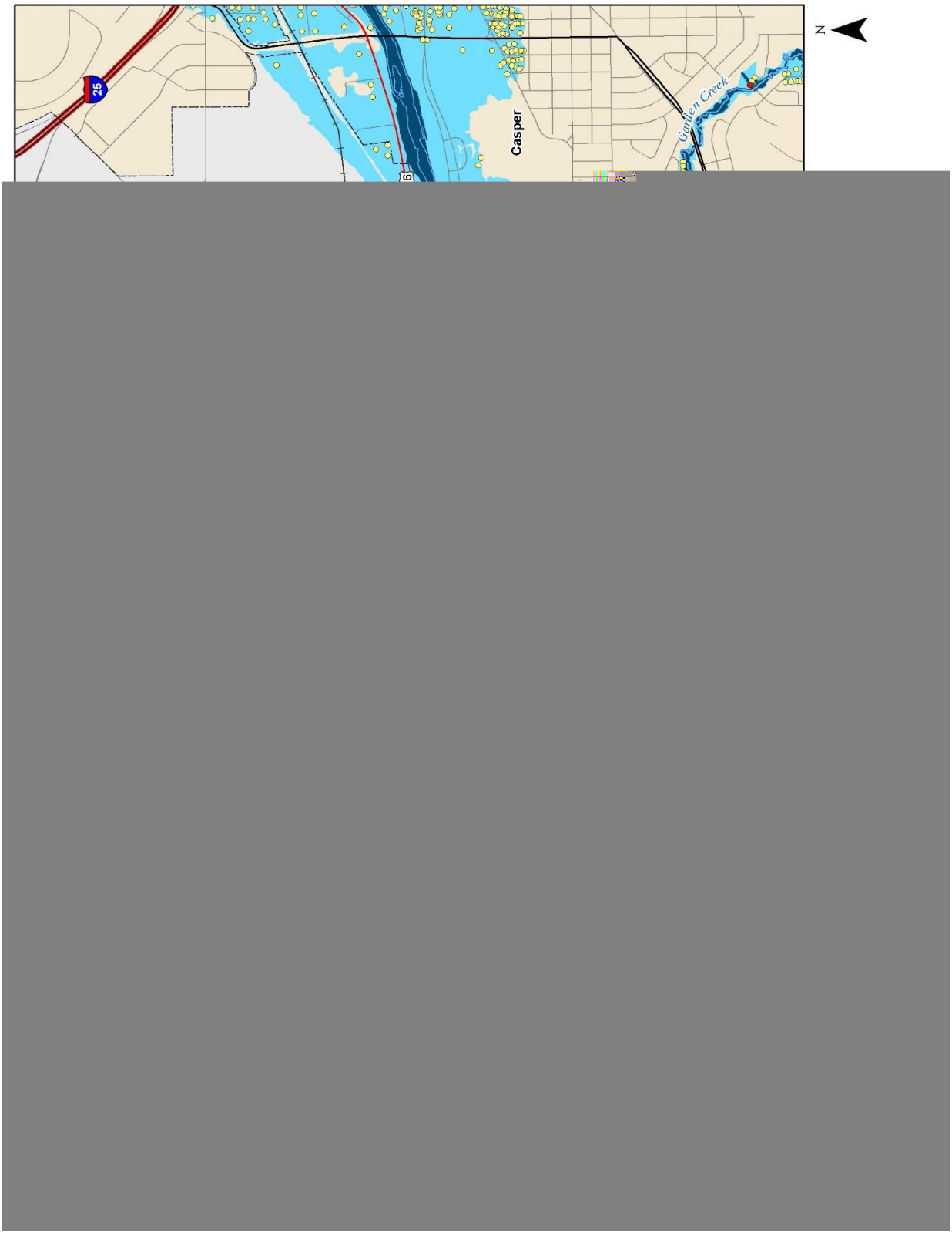


Figure 3 : Mills Structures within Floodplain



APPENDIX D - RECORD OF ADOPTION