Emery County, Utah
Pre-Disaster Mitigation Plan

Approval Date: 12/30/2025

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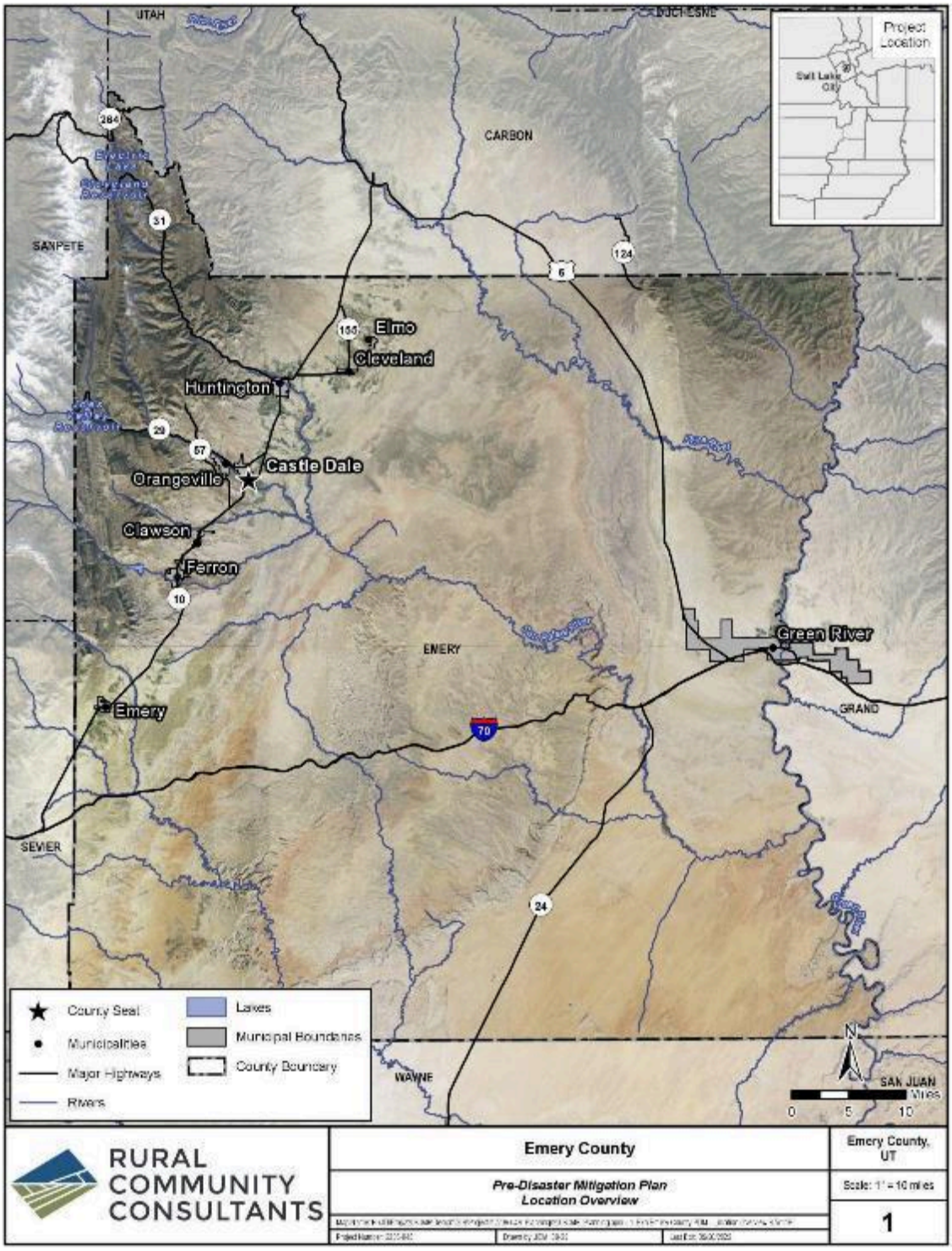


Map illustrating the general location of Emery County (click here for original).

1.0 Executive Summary

1.1 Welcome to the 2024 Emery County Pre-Disaster Mitigation Plan

This Plan represents an update of the PDM Plan that was approved by the cities, the County, the State, and by FEMA in 2018. After an extensive review to incorporate the most current demographic data, maps, vulnerability assessments, and mitigation projects, this 2022 Update of the Emery County Pre-Disaster Natural Hazards Mitigation Plan (PDM) has been created to update the original PDM plan, created in 2003 and updated in 2018, which was approved by the County, the State, and FEMA. The review incorporates the revision of names, critical facilities, hazard history, and economic development throughout the region over the previous five years. Other changes include a reorganization of the mitigation goals, objectives, and actions for ease in reading and for more clearly identifying projects. Development pressures in hazard areas will continue to increase the risk to residents. The entire plan was reviewed and analyzed by the planning team throughout the planning process and again at the final draft stage before submission to the State and FEMA.

1.2 How to Use This Plan

As with the original Pre-Disaster Mitigation Plan (PDM), this update was developed and organized within the rules and regulations established under 44 Code of Federal Regulations (CFR), Section 201.6. The Plan contains a discussion on the purpose and methodology used to develop the Plan, a profile on communities within Emery County, as well as a hazard identification study and a vulnerability analysis of nine potential natural hazards. To assist in the explanation of the contents there are several appendices included to provide more detail on specific subjects. This is intended to improve the ability of communities within Emery to respond to emergencies and disasters. It will also document valuable local knowledge on the most efficient and effective ways to reduce loss and enable the County to develop projects that provide for both the safety of their populations and the protection of the environment.

1.3 Plan Mission

The Emery County Pre-Disaster Natural Hazard Mitigation Plan was created with the goal of substantially and permanently reducing the County's vulnerability to natural hazards through sound public policy. By increasing public awareness of potential harm, documenting resources for risk reduction and loss-prevention, and identifying activities to guide the development of less vulnerable and more sustainable communities, the Pre-Disaster Natural Hazard Mitigation Plan aims to protect citizens, critical facilities, infrastructure, private property, and the natural environment.

1.4 Changes in Priorities Since 2018

1.4.1 General Changes

The priorities for hazard mitigation in Emery County have evolved since the 2018 plan based on changing conditions, recent events, and new information:

- **Increased Focus on Drought Resilience:** Extended drought conditions have elevated water conservation and supply redundancy as top priorities across all jurisdictions.
- **Enhanced Wildfire Mitigation:** Recent wildfires (including the 2018 Trail Mountain Fire) have prompted more aggressive fuel reduction and defensible space programs.
- **Climate Change Adaptation:** Increased recognition of changing climate patterns has influenced hazard planning, particularly for flooding and severe weather events.
- **Infrastructure Resilience:** Greater emphasis on hardening critical infrastructure against multiple hazards, particularly water systems, communications, and emergency power.
- **Vulnerable Population Protection:** More specific targeting of mitigation measures to address needs of aging populations, residents with disabilities, and economically disadvantaged communities.
- **Improved Emergency Communication:** Prioritization of warning systems and communication technologies to alert residents during hazard events.
- **Regional Coordination:** Enhanced emphasis on multi-jurisdictional approaches to hazard mitigation through shared resources and collaborative planning.
- **Stormwater Management:** Updated subdivision ordinances and infrastructure to address flash flooding risks have become higher priorities.

1.4.2 Jurisdiction-Specific Priority Changes

Emery County

- Increased emphasis on drought contingency planning
- Enhanced radio communications system development
- Greater focus on wildfire mitigation in Wildland-Urban Interface zones

Castle Dale City

- Shifted priority to water storage infrastructure improvements
- Enhanced focus on stormwater management systems
- Greater emphasis on updating subdivision standards for hazard resilience

Clawson Town

- New priority for coordination of shared services with the County
- Increased focus on water conservation and delivery systems

Cleveland Town

- Enhanced priority for transportation infrastructure improvements for winter storms
- New emphasis on flash flood mitigation measures

Elmo Town

- Increased priority for utility infrastructure protection
- Enhanced focus on emergency notification systems

Emery Town

- New emphasis on source water protection
- Prioritization of wildfire mitigation in foothill areas

Ferron City

- Enhanced focus on irrigation canal improvements
- Greater priority for flood control structures
- New emphasis on water storage enhancements

Green River City

- Increased priority for flood protection along the Green River
- Enhanced focus on tourist/traveler emergency notification
- New emphasis on water treatment plant upgrades

Huntington City

- Higher priority for secondary water metering
- Enhanced emphasis on watershed protection
- New priority for wildfire mitigation coordination with federal agencies

Orangeville City

- Increased focus on Adobe Wash maintenance
- Enhanced priority for strategic water resource annexation
- New emphasis on flash flood warning systems

Special Service Districts

- **Castle Valley SSD:** Enhanced focus on water system redundancy and emergency power
- **Emery County EMS SSD:** New priority for equipment modernization and advanced training
- **Emery School District:** Increased focus on seismic safety for URM buildings
- **Emery County Recreation SSD:** Enhanced emphasis on facility emergency protocols
- **North Emery Water Users SSD:** New priority for drought resilience and infrastructure protection
- **San Rafael SSD:** Increased focus on energy resilience and diversification

2.0 Plan Purpose and Use

2.1 Introduction

Utah is vulnerable to natural and technological (human-caused) hazards that threaten the health, welfare, and security of our citizens. The cost of response to and recovery from potential disasters can be substantially reduced when attention is turned to mitigating their impacts and effects before they occur.

Hazard mitigation is defined as any cost-effective action that has the effect of reducing, limiting, or preventing vulnerability of people, property, and/or the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation actions, which can be used to eliminate or minimize the risk to life and property, fall into three categories: first, those that keep the hazard away from people, property and structures; second, those that keep people, property and structures away from the hazard; and third, those that do not address the hazard at all but rather reduce the impact of the hazard on the victims, such as insurance. This mitigation Plan has strategies that fall into all three categories.

Hazard mitigation actions must be practical, cost effective, and environmentally and politically acceptable. Actions taken to limit the vulnerability of society to hazards must not in themselves be more costly than the anticipated damages.

Capital investment decisions must be considered in conjunction with natural hazard vulnerability. Capital investments can include homes, roads, public utilities, pipelines, power plants, chemical plants, warehouses and public works facilities. These decisions can influence the degree of hazard vulnerability of a community. Once a capital facility is in place, few opportunities will present themselves over the useful life of the facility to correct any errors in location or construction with respect to hazard vulnerability. It is for these reasons that zoning ordinances, which could restrict development in high vulnerability areas, and building codes, which could ensure that new buildings are built to withstand the damaging forces of hazards, are the most useful mitigation approaches that Emery County can implement.

Often, hazard mitigation may be a neglected aspect within emergency management. When local governments place a low priority on mitigation implementation activities relative to the perceived threat, some important mitigation measures may be neglected in favor of higher-priority activities. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is the key to greatly reducing long-term risk to people and property from natural hazards and their effects. Preparedness for all hazards includes response and recovery plans, training, development, management of resources and the need to mitigate each jurisdictional hazard.

2.2 Purpose

The purpose of this Plan is to (1) identify natural hazard threats to the community, (2) create mitigation strategies to address those threats, (3) develop short- and long-term mitigation planning goals and objectives, and (4) to fulfill federal, state and local hazard mitigation planning obligations.

Mitigation actions would serve to minimize threats that have an undesirable impact on the citizens, economy, and environment of Emery County. This Plan is intended to enhance awareness and to provide mitigation strategies for elected officials, agencies, and the public, and develop actions that will minimize

negative outcomes to Emery County's citizens, the economy, and the environment due to potential natural hazard threats. The Plan also details what actions can be taken to help prevent or reduce hazard vulnerability to each jurisdiction. The well-being of the county and local communities rests on reducing risks to life and property in the event of a natural hazard event.

2.3 Project Scope

The Emery County Natural Hazards Pre-Disaster Mitigation (PDM) Plan was developed in accordance with the requirements of the FEMA Section 322 regulations, the Utah Division of Emergency Management (DEM) and local planning agencies. The goal of this Plan is to assist Emery County in reducing the costs of natural disasters by providing comprehensive hazards identification, risk assessment, vulnerability analysis, mitigation strategy and implementation schedule. Regulations set forth by FEMA were followed during the development of this Plan.

Future monitoring, evaluating, updating and implementation will occur annually or following any natural disaster. A major revision will occur every five years. Annual or any interim Plan review, updates and revisions will be the responsibility of each adopting jurisdiction. The plan provides comprehensive natural hazard identification, risk assessment, vulnerability analysis, mitigation actions, and an implementation schedule.

2.4 Entity Overview

Emery County is a county in east-central Utah, United States. As of the 2022 United States Census, the population was 10,099. Its county seat is Castle Dale, and the largest city is Huntington.

Table 2.4.1 Annual Estimates of the Resident Population for Emery County, Utah

Emery County Population (US Census)				
Year	2010	2015	2020	2021 (Est.)
Emery County Unincorporated	1,591	1,565	1,820	1,663
Castle Dale	1,643	1,542	1,499	1,518
Clawson	199	189	164	165
Cleveland	466	447	500	508
Elmo	441	425	397	401
Emery Town	290	275	310	313
Ferron	1,671	1,559	1,461	1,480
Green River	1,071	972	852	865
Huntington	2,149	2,005	1,920	1,946
Orangeville	1,483	1,381	1,224	1,240
Emery County	11,004	10,360	10,147	10,099

2.5 Participating Jurisdictions

The Plan will be adopted by the County following FEMA Region VIII approval. The list below identifies the communities and authorities that participated in the planning process and will adopt the Plan. All of these jurisdictions are seeking plan approval. Each of these jurisdictions also participated in and adopted the previous PDM Plan in 2018.

Table 2.5.1 Participating Jurisdictions

Jurisdiction	Contact Name And Information
Castle Dale City	Danny VanWagoner, Mayor dancvcc57@hotmail.com
Clawson Town	Gary Price, Mayor pfamfarm@gmail.com
Cleveland Town	Preston Wilson, Mayor prestonwilson3075@gmail.com
Elmo Town	James Winn, Mayor jwinn39@yahoo.com
Emery Town	Jack Funk, Mayor emerymayor@etv.net
Ferron City	Trent Jackson mayor@ferroncity.org
Green River City	Ren Hatt, Mayor rhatt@greenriverutah.com
Huntington City	Leonard Norton, Mayor mayor@huntingtonut.com
Orangeville City	Shawn Bell sbell1228@yahoo.com
Castle Valley SSD	Jacob Sharp, Director jsharp@etv.net
Emery Emergency Medical Services	Macade Jensen macadejensen@gmail.com
Emery SSD #1 (Roads)	Bevan Wilson, Chairman ecssd1@emery.utah.gov
North Emery Water Users SSD	Carl Fillmore, Manager northemery@etv.net
San Rafael SSD	Jordan Leanord jordanL@emery.utah.gov

A sample of the adoption resolution, as well as links to the individual support and adoption resolutions are given in Appendix D. Also, public notifications and social media posts used to inform and engage the community throughout the planning process are documented in Appendix D.8.

3.0 The Planning Process

3.1 Overview

This updated Plan was prepared by the County Emergency Services staff and consultant Rural Community Consultants, with support from the planning committee and other local and state personnel. Additional County and municipal agencies that have aided in the planning process include city and county geographic information systems (GIS) departments, elected officials, local officials, emergency managers, fire departments, planning departments, public works departments, and other local governmental agencies. The planning process was based on Section 322 requirements of the Disaster Mitigation Act of 2000 (DMA 2000) and supporting guidance documents developed by FEMA and the Utah DEM.

Emery County received a FEMA Pre-Disaster Mitigation grant to update the Emery County 2016 Mitigation Plan and to develop a 2020 Emery County Pre-Disaster Mitigation Plan under the planning guidelines included in the FEMA guidance materials (published in 2011).

3.2 Goals & Objectives

The goals of the Pre-Disaster Natural Hazard Mitigation Plan include coordinating with local governments to develop Emery County plans and processes that meet the planning components identified in the FEMA Region VIII Crosswalk document, as well as Utah DEM planning expectation and public input from the local community. The overall objective is risk reduction from natural hazards in the State of Utah through implementing and updating County, regional, and the State of Utah mitigation plans.

Short-Term Local Goals

These goals form the basis for the development of the Pre-Disaster Natural Hazard Mitigation Plan and are shown from highest to lowest priority.

1. Protection of life before, during, and after the occurrence of a natural disaster.
2. Preventing loss of life and reducing the impact of damage where problems cannot be eliminated.
3. Protection of emergency response capabilities (critical infrastructure).
4. Protect and/or create communication and warning systems.
5. Protect emergency medical services and medical facilities.
6. Ensure mobile resource availability and survivability.
7. Ensure the continuity of government.
8. Protect developed property, homes and businesses, industry, educational institutions, and the cultural fabric of the community. While utilizing hazard loss reduction within the community's environmental, social, and economic needs.
9. Protect natural resources and the environment when considering mitigation measures.
10. Promote public awareness through education of community hazards and mitigation measures.

11. Preserve and/or restore natural features.

Long-Term Local Goals

1. Eliminate or reduce the long-term risk to human life and property from identified natural hazards.
2. Aid both the private and public sectors in understanding the risks they may be exposed to and find mitigation strategies to reduce those risks.
3. Avoid risk of exposure to identified natural hazards.
4. Minimize the impacts of those risks when they cannot be avoided.
5. Mitigate the impacts of damage because of identified natural hazards.
6. Accomplish mitigation strategies in such a way that negative environmental impacts are minimized.
7. Provide a basis for funding; prioritizing of natural hazard mitigation projects.
8. Establish a County platform to enable all the communities to take advantage of shared goals and resources.

Objectives

The following objectives are meant to serve as a measure to evaluate natural hazard mitigation projects. These objectives become especially important when two or more projects are competing for limited resources.

1. Identify persons, agencies or organizations responsible for implementation.
2. Project a time frame for implementation.
3. Explain how the project will be financed and the conditions for financing and implementing (as information is available).
4. Identify alternative measures, should financing not be available.
5. Be consistent with, support, and help implement the goals and objectives of natural hazard mitigation plans already in place.
6. Projects should significantly reduce potential damages to public and/or private property and/or reduce the cost of state and federal recovery for future disasters.
7. Projects should have practical, cost-effective, and environmentally sound alternatives after options are considered.
8. Projects should address repetitive problem(s), or one that has the potential to have a major impact on a critical facility.
9. Projects should meet applicable permit requirements where development in hazardous areas is avoided.
10. Projects should contribute to both the short and long-term solutions to the hazard vulnerability risk problem assuring the benefits of a mitigation measure is equal to or exceeds the cost of implementation.
11. Projects should have manageable maintenance and modification costs when possible.

Projects should accomplish multiple objectives, including improvement of life-safety risk, damage reduction, restoration of essential services, protection of critical facilities, and security of economic development, recovery, and environmental enhancement whenever possible.

3.2.1 Hazard-Specific Goals

Earthquakes

- Reduce vulnerability of existing buildings through retrofitting.
- Ensure new construction meets seismic standards.

Flooding

- Protect life and property in flood-prone areas.
- Improve stormwater management systems.

Wildfire

- Create defensible space in the wildland-urban interface.
- Enhance firefighting capabilities.

Landslides

- Reduce development in high-risk areas.
- Stabilize existing vulnerable slopes.

Drought

- Improve water conservation.
- Develop redundant water sources.

Dam Failure

- Enhance early warning systems.
- Strengthen emergency response protocols.

Problem Soils

- Identify risk areas.
- Implement appropriate building standards.

Severe Weather

- Improve warning systems.
- Enhance critical facility protection.

Each goal supports the plan's overall mission of reducing vulnerability to natural hazards through sound public policy.

3.3 Planning Process

The development of the Emery County Pre-Disaster Mitigation Plan followed a structured 18-month process from June 2022 through December 2024. The process began with a kickoff meeting between Emery County Emergency Management and the consulting team in June 2022, followed by a public stakeholder kickoff meeting in September 2022.

The core planning team, consisting of County Emergency Management staff and consultants, met monthly throughout the process to coordinate activities and review progress. These regular meetings ensured consistent advancement of the plan while maintaining alignment with FEMA requirements and local needs.

Between January and June 2023, the team conducted individual meetings with each participating jurisdiction to gather specific hazard and mitigation information. This approach allowed for focused attention on each community's unique circumstances and needs. Concurrent with these meetings, the team developed the hazard profiles and risk assessments using the latest available data and modeling.

From July through September 2023, a draft plan was made available for initial public review and comment. The planning team incorporated feedback received during this period into a revised draft. A second public review period was conducted from April 15 to May 17, 2024, after which final revisions were made based on public input. The final draft was submitted to Utah DEM for their initial feedback in June 2024, and again in April 2025 after revisions were made.

Table 3.3.1 Core Planning Team

Contact Name and Information	Organization
Jeremy Lake Sheriff Deputy - Emergency Mgt jeremy.lake@ecso.utah.gov 435-381-3404	Emery County Emergency Management
Mike Hansen, AICP Planning Director mhansen@rural-community.com (801) 550-5075	Rural Community Consultants
Brian Carver Community and Economic Development Director brianc@brag.utah.gov 435.713.1420	Bear River Association of Governments

Table 3.3.2 Planning Committee

Contact Name and Information	Organization
Maranda Miller, MCMP Post-Disaster Mitigation Coordinator and Mitigation Planning Lead marandamiller@utah.gov (385)-227-9469	Utah Division of Emergency Management
Jeremy Lake Sheriff Deputy - Emergency Mgt jeremy.lake@ecso.utah.gov 435-381-3404	Emery County Emergency Manager

Mike Hansen, AICP Planning Director mhansen@rural-community.com (801) 550-5075	Rural Community Consultants
Noah Maddox, MSEM Emergency Planning Specialist noah.m@rural-community.com (801) 692-0219	Rural Community Consultants

3.4 Public Involvement

Public involvement opportunities were available and incorporated throughout the development of this Plan. Such opportunities included a public website (EmeryHazardPlan.org), social media campaigns, and public meetings for comment review. The development of this plan was conducted utilizing an online interaction to ensure that stakeholders had equal access to the developing information throughout the process.

The public engagement strategy was designed to reach all segments of the community through multiple channels:

- Online Engagement: The project website served as a central information hub, providing:
    - Regular plan updates and draft documents.
    - Interactive hazard maps.
    - Online surveys in both English and Spanish.
    - Virtual public meeting access.
    - Comment submission forms.
- In-Person Engagement: The planning team conducted outreach through:
    - Public meetings at various locations throughout the county.
    - Presentations at community events and local gatherings.
    - Focus groups with vulnerable populations.
    - Mobile outreach stations at high-traffic community locations like libraries and community centers.

Emergency managers, fire and sheriff departments, state and local agencies, business leaders, educators, non-profit organizations, private organizations, and other interested members that could be affected by a hazard within the region or other interested members, were all a part of the planning process.

Special attention was given to ensuring participation from traditionally underserved populations through:

- Partnerships with local social service agencies and community organizations.
- Multilingual outreach materials and translation services.
- Flexible meeting schedules to accommodate various work schedules.
- Selection of accessible meeting venues.
- Transportation assistance when needed.

Public feedback was systematically incorporated into the plan through:

- Documentation of all public comments received.
- Regular review of input by the planning team.
- Incorporation of public suggestions into hazard profiles and mitigation strategies.
- Written responses to public concerns in plan revisions.

Emergency managers, fire and sheriff departments, state and local agencies, business leaders, educators, non-profit organizations, private organizations, and other interested members that could be affected by a hazard within the region or other interested members, were all a part of the planning process.

Exhibit 3.4.1 Images of Public Communication Tools

Screenshot of the website that served as the information portal for the public and stakeholders throughout the initiative (EmeryHazardPlan.org). Screenshot of the integrated GIS storymap that was compiled with hazard-related information for the area.

The draft of this Pre-Disaster Mitigation Plan was developed publicly on the initiative website and Emery County websites. Once the draft was compiled, a focused advertisement for a public comment and review period was conducted in September, 2023. A second public comment and review period was conducted from July 10 to August 10 after revisions were made (noticed on the Utah Public Meeting Notice website as well as the County's website). The initiative website was visited a number of times by residents, and there were eleven public surveys received on that draft of the Plan. Members of the public and elected officials from each jurisdiction were notified of the public comments at County Council of Government meetings.

3.5 Plan Participation

Plan participation was completed as a result of a collaborative effort between Utah Department of Public Safety Division of Emergency Management, County Emergency Manager, Fire Departments, Emery County Sheriff's Office, Public Works Department, Planning Commission, Assessor's Offices, geographic information systems (GIS) departments, special service districts, school districts, City, County, and State GIS Departments, Elected Officials, Public Employees, Utah Division of Forestry, Fire and State Lands, and

Citizens of the cities and towns within Emery County. Special attention was given to ensure inclusion of underserved communities.

Interviews were conducted with stakeholders from the communities and workshops were conducted during the Plan development phase. Feedback was solicited through the Emery County Pre-Disaster Natural Hazard Mitigation Plan Working Group during the plan development. Additionally, through public hearings, workshops and draft Plan displays, ample opportunity was provided for public participation (including vulnerable populations, and review of the 2018 PDM Plan on the Emery County website (See Appendix D for meeting agendas and attendance lists). All comments, questions, and discussions resulting from these activities were given thoughtful consideration as the plan was developed.

Sample reminder card that was shared with stakeholders at LEPC meetings and in-person visits.

Feedback from the Public was greatly considered throughout the process. A public comment period was held from July 15, 2023 through September 1, 2023, and again from April 15 to May 17, 2024. The website hosting software does not provide traffic data for the site. However, no comments were made on the draft during the 2023 public comment period. If comments were made, they would be discussed among the Core Planning Team and then a course of action would have been implemented to resolve the comments within the working draft. Upon completion of the public comment period, any suggestions that were deemed unnecessary were compiled for further review.

Beyond the regular sessions convened by the county's task force, numerous discussions took place involving state officials and representatives from various municipalities. Leadership figures such as mayors, members of councils, and municipal employees generously contributed their time. Their focus was on devising feasible strategies for mitigation that would align with their unique requirements. The following outlines the diverse entities that engaged with Emery County in the course of updating this plan, utilizing various communication methods including face-to-face meetings, emails, and calls or video conferencing:

- Utah Division of Emergency Management
- Federal Emergency Management Agency
- National Weather Service
- National Climate Data Center
- Emery County Emergency Manager, Jeremy Lake
- Emery County Sheriff's Office
- Rural Community Consultants and Jones & DeMille Engineering (Consultant)
- Emery County agencies including:
    - Public Works

- Local Emergency Planning Committee (LEPC)
- Fire Departments
- School Districts
- Special Service Districts
- Water Conservancy District

3.6 Community Capabilities

Emery County and the municipalities of Castle Dale City, Clawson Town, Cleveland Town, Elmo Town, Emery Town, Ferron City, Green River City, Huntington City, Orangeville City, the Castle Valley Special Service District, and other special service districts face many challenges to improve the natural hazard mitigation efforts and sustain the current plan. The following capabilities have been identified for consideration for discussion and strengthening to implement and sustain the plan.

While Table 3.6.1 shows varying capabilities across jurisdictions, each entity maintains core authorities essential to hazard mitigation. Smaller jurisdictions often rely on county resources or regional partnerships to enhance their capabilities. The special service districts maintain specialized capabilities focused on their specific service areas and infrastructure systems.

3.6.1 Stakeholder Capabilities Inventory

The following table is an inventory of mitigation capabilities that were outlined in the FEMA Hazard Mitigation Plan Guidance (Community Capability Assessment Worksheet).

REGULATORY TOOLS											
	Co	CD	CL	CT	ET	EM	FC	GR	HC	OC	CV
Building Codes	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
BCEGS Rating	dev	dev	dev	dev	dev	dev	dev	dev	dev	dev	N/A
Capital Improvements	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Climate Change Adapt Plan	N	N	N	N	N	N	N	N	N	N	N
Community Wildfire Plan	Y	N	N	N	N	N	N	N	N	N	N
General Plan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
Economic Development Plan	Y	N	N	N	N	N	Y	Y	Y	N	N/A
Emergency Ops Plan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Floodplain Management Plan	Y	N	N	N	N	N	Y	Y	N	N	N/A
NFIP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
Site Plan Review Requirements	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A

Stormwater Plan	Y	N	N	N	N	N	N	Y	N	N	N
Subdivision Ordinance	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
Transportation Plan	Y	N	N	N	N	N	Y	Y	Y	N	N/A
Zoning Ordinance	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
ADMIN/TECHNICAL RESOURCES											
	Co	**CD**	**CL**	**CT**	**ET**	**EM**	**FC**	**GR**	**HC**	**OC**	**CV**
Code Enforcement Dept	N	N	N	N	N	N	N	N	N	N	N/A
Community Planner	Y	N	N	N	N	N	N	Y	N	N	n/a
Emergency Manager	Y	N	N	N	N	N	N	N	N	N	N
Engineering Dept	Y	N	N	N	N	N	N	Y	N	N	Y
Floodplain Administrator	Y	N	N	N	N	N	N	N	N	N	n/a
GIS Coordinator	Y	N	N	N	N	N	N	Y	N	N	N
Grant Administrator/Writer	Y	N	N	N	N	N	N	N	N	N	N
Resiliency Planner	Y	N	N	N	N	N	N	N	N	N	N
Transportation Planner	N	N	N	N	N	N	N	N	N	N	N
FINANCIAL RESOURCES											
	Co	**CD**	**CL**	**CT**	**ET**	**EM**	**FC**	**GR**	**HC**	**OC**	**CV**
Capital Improvement Program	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
General Obligation Bonds	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Impact Fees	N	Y	N	N	N	N	Y	Y	Y	N	N/A
Utility Fees	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EDUCATION AND OUTREACH RESOURCES											
	Co	**CD**	**CL**	**CT**	**ET**	**EM**	**FC**	**GR**	**HC**	**OC**	**CV**
Public Outreach (Emergency Mgt)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Stormready Certification	N	N	N	N	N	N	N	N	N	N	N

Note(1) that for the stakeholders, "CO" refers to Emery County, "CD" is Castle Dale, "CL" is Clawson, "CT" is Cleveland, "ET" is Elmo Town, "EM" is Emery Town, "FC" is Ferron City, "GR" is Green River, "HC" is Huntington City, "OC" is Orangeville City, and "CV" refers to the Castle Valley Special Service District.

Note(2) that "dev" means that this resource is being developed or requested because the stakeholder didn't have that information readily available.

Note(3) that for special service districts, capabilities are assessed based on their specific service areas.

N/A indicates the capability is outside the district's statutory authority.

Each jurisdiction's ability to expand and improve their capabilities varies based on resources and constraints:

- Emery County maintains strong potential to expand capabilities through:
    - Grant writing and administration.
    - Regional partnerships.
    - Staff training programs.
    - Technology upgrades.
- Municipalities face varying constraints:
    - Castle Dale and Huntington: Moderate expansion potential through existing staff and budgets.
    - Ferron, Green River, and Orangeville: Limited expansion potential constrained by staff capacity and budget limitations, but can expand capabilities through:
        - Pursuing competitive grant funding for infrastructure improvements
        - Partnering with county agencies for technical assistance and specialized services
        - Coordinating with neighboring jurisdictions on shared mitigation initiatives
        - Accessing state and federal technical resources for hazard mitigation planning
    - Smaller towns (Clawson, Cleveland, Elmo, Emery): Limited by small staff/budget but can expand through partnerships.
- Special Districts:
    - Castle Valley Special Service District: Can expand through capital planning and specific funding mechanisms.
    - Other service districts: Can expand through focused grants and infrastructure funding.

3.7 Community Asset Data

Background information and data for this Plan was obtained from the sources listed below. From these sources, the Planning Consultant extracted relevant information and data. That information and data was subsequently submitted to the Emery County Working Groups for their consideration and approval for inclusion into the Plan. See appendix (H) for a complete list of GIS data sources.

4.0 Stakeholder Participation

4.1 Outreach Overview

The Emery County PDM Plan update process involved extensive outreach to ensure comprehensive participation from various entities. We categorized participants into three distinct groups: Participating Jurisdictions, Stakeholders, and the General Public. Each group was presented with specific opportunities for involvement in the planning process.

Participating jurisdictions include local governments and special districts within Emery County. These entities were integral to the planning process and were invited to participate actively (see Appendix D for a sample invitation letter and their involvement).

Stakeholders were identified and invited based on their roles in hazard mitigation and community resilience. The following categories of stakeholders were identified with the intent of engaging them:

1. Local and Regional Agencies involved in Hazard Mitigation Activities:
    - Public works departments
    - Emergency management offices
    - Local floodplain administration
    - GIS departments
2. Agencies with Authority to Regulate Development:
    - Zoning and planning departments
    - Community and economic development departments
    - Building officials
    - Planning commissions
    - Relevant elected officials
3. Neighboring Communities:
    - Adjacent local governments
    - Special districts
    - Tribal governments (Ute Indian Tribe of the Uintah and Ouray Reservation)
4. Representatives of Businesses, Academia, and Other Private Organizations:
    - Private utilities
    - Major employers that sustain community lifelines
    - Higher education institutions operating within the county

4.2 Stakeholder Engagement Tools

4.2.1 Online Engagement

The development of this Plan primarily utilized online interactions:

1. **Initiative website**: A dedicated website was modified to ensure all jurisdictions and stakeholders had access to requested and generated information. Each jurisdiction was given a specified place to obtain and submit information.
2. **Social media campaign**: To spread awareness of the website, ads were run on social media, targeting stakeholders and the public and advertising the Plan update initiative.
3. **Public comment period**: The general public was given access to the plan during the designated public comment period.
4. **Interactive draft**: Each part of the plan was digitized into a google-doc format, and links were shared with stakeholders who were able to make tracked comments and suggestions within the text. These comments were reviewed and incorporated by the core planning team throughout the initiative. The public was also given access to do the same during the public comment period.

4.2.2 In-Person Engagement

Stakeholder meetings were the primary form of in-person interaction. These included:

1. **Core Planning Team Meetings**: Regular meetings between Emery County Emergency Management and Rural Community Consultants.
2. **One-on-One Stakeholder Meetings**: In-person and online (phone and/or video conference) meetings were held with various stakeholders to maintain project momentum and keep communities engaged.

4.2.3 Direct Outreach

Participating jurisdictions and identified individuals representing key stakeholders were contacted directly and made aware of the Plan update initiative to ensure maximum participation (see Appendix D).

4.2.4 Inclusion of Vulnerable Populations

The County's population includes certain vulnerable populations (see Appendix G). The Planning Team attempted to reach these vulnerable populations through the avenues described in this Section 4.2. Additionally, these populations' interests were represented by the various stakeholders who participated in the Plan update.

4.3 Typical Meeting Agenda for Core Planning Team

The Core Planning Team consists of Emery County Emergency Management and Rural Community Consultants to discuss updates and plans for future assignments (e.g. goals, timelines/deadlines, etc). Because the plan was ongoing with many stakeholders working to move forward, the agenda for these items remained relatively unchanged throughout the process. Appendix D contains the dates of the Core Planning Team meetings. The following is an example of the running agenda:

- Progress reports
  - Assignment from last meeting
  - Engagement from stakeholders
  - New mapping and current hazard identification
  - Research, how to complete assignments to FEMA standards
- Goals (County and city - both current plan related and updates from 2018 plan and progress)
- Public involvement + website development
  - Upcoming timelines and deadlines
  - Upcoming action items for stakeholders

4.4 Stakeholder and Participating Jurisdiction Engagement

Detailed information on stakeholders and participating jurisdiction engagement, including invited entities, public announcements, meeting agendas, and attendance sheets, can be found in Appendix D. This includes:

- One-on-One Stakeholder Meetings (Appendix D).
- Local Emergency Planning Committee (LEPC) meetings, which included various stakeholders from categories mentioned in section 4.1.

4.5 Invited Partners/Entities

One of the critical elements of the County PDM Plan update was to invite participation from a number of stakeholders including jurisdictions, businesses, agencies, nongovernmental organizations, the general public including underserved communities and vulnerable populations, etc. (a sample invitation letter is shown in Appendix D). The tables in that Appendix show each invited stakeholder with contact information and how/if they responded.

The planning team identified neighboring counties and invited their emergency management offices to participate. During FEMA's review process, it was identified that the Ute Indian Tribe of the Uintah and Ouray Reservation should have been included as a neighboring community. The Tribe was provided the final draft plan on December 4, 2025 for review and comment prior to final adoption, and any feedback we receive will be amended into the final plan.

5.0 Plan Development & Adoption

5.1 Monitoring, Evaluating, & Updating the Plan

Periodic monitoring and evaluation of this Plan are required to ensure that the goals and objectives for the region are kept current and that local mitigation strategies are being carried out. This Plan has been designed to be user-friendly in terms of maintenance and implementation.

5.2 Annual Review Procedures

Local jurisdictions will review this Plan annually, or more frequently as situations dictate, such as following a disaster declaration. If the participating jurisdictions or DEM determines that a modification of the Plan is warranted, an amendment to the Plan may be initiated.

5.2.1 Implementation Monitoring Framework

1. **Quarterly Progress Reviews**. Each jurisdiction's designated mitigation coordinator will:
    - Track status of all mitigation actions.
    - Document completed milestones.
    - Identify implementation challenges.
    - Update project timelines.
    - Coordinate with responsible departments.
    - Prepare quarterly summary reports.
2. **Annual Implementation Review.** County Emergency Management will coordinate annual meetings to:
    - Review action status across all jurisdictions.
    - Document completed projects.
    - Assess effectiveness of completed actions.
    - Identify new implementation opportunities.
    - Update project priorities.
    - Adjust timelines as needed.
3. **Documentation Requirements.** Standard tracking forms for all mitigation actions including:
    - Project description.
    - Lead responsibility.
    - Timeline.
    - Funding sources.
    - Current status.
    - Implementation challenges.

- Outcomes and effectiveness.
- Photos and supporting materials.

4. **Progress Indicators.** Quantitative metrics:
    - Number of completed actions.
    - Funds invested.
    - Properties protected.
    - Structures mitigated.
    - Qualitative assessments:
        - Implementation challenges.
        - Coordination effectiveness.
        - Public engagement success.
        - Lessons learned.
5. **Data Management**. Centralized tracking system maintained by County Emergency Management.
    - Regular updates from all participating jurisdictions.
    - Annual compilation of monitoring data.
    - Secure storage of all documentation.
    - Public accessibility of non-sensitive information.
6. **Lead Agency Accountability Framework**. Each mitigation action's designated lead agency will provide quarterly status updates to the County Emergency Manager, including progress milestones achieved, implementation challenges encountered, funding secured, and timeline adjustments needed. Lead agencies are responsible for coordinating with supporting agencies and ensuring action completion within established timeframes.
7. **Regulatory Compliance Tracking.** Annual reviews will verify that all implemented mitigation actions continue to meet federal requirements under 44 CFR § 201.6, with particular attention to ensuring each participating jurisdiction maintains at least one active mitigation action for each identified hazard of concern.

5.3 Revisions & Updates

Each emergency manager in the County will regularly monitor and annually review the Plan and is responsible to make revisions and updates. The annual review is required to ensure that the goals and objectives for the Region are kept current. More importantly, revisions may be necessary to ensure the Plan is in full compliance with Federal regulations and State statutes. This portion of the Plan outlines the procedures for completing such revisions and updates. The Plan will also be revised to reflect lessons learned or to address specific hazard incidents arising out of a disaster.

> *Note that the previous hazard plan was developed with the County as the primary stakeholder. Most of the goals in that plan were focused at the county-level. The approach to this Plan has diverged from the previous one in the sense that the goals (and analysis) are based on smaller-scale stakeholders, primarily municipalities.*

5.4 Five-Year Plan Review

The entire Plan including any background studies and analysis shall be revised and updated every five years to determine if there have been any significant changes in the region that would affect the Plan. Increased development, increased exposure to certain hazards, the development of new mitigation capabilities or techniques and changes to Federal or State legislation are examples of changes that may affect the condition of the Plan.

The Natural Hazard Pre-Disaster Mitigation Planning Committee and Local Working Group, with a potential membership representing every jurisdiction in Emery County, will be reconstituted for the five-year review/update process. Typically, the same process that was used to create the original Plan will be used to prepare the update.

If the participating jurisdictions or DEM determine that the recommendations warrant modification to the Plan, an amendment may be initiated as described below.

5.4.1 Five-Year Update Process

1. Update Coordination:
    - County Emergency Management will initiate the update process 18 months before plan expiration.
    - A planning team will be reconvened representing all participating jurisdictions.
    - A detailed update schedule will be established and distributed.
2. Risk Assessment Updates:
    - Review and update hazard profiles with new data and occurrences.
    - Incorporate new mapping and modeling results.
    - Update vulnerability assessments with current asset information.
    - Evaluate changes in development patterns and their impact on risk.
    - Document changes in priority hazards.
3. Capability Assessment Updates:
    - Review and update capability assessments for each jurisdiction.
    - Document changes in staffing, resources, and technical capabilities.
    - Evaluate effectiveness of existing authorities and policies.
    - Identify new opportunities for capability enhancement.
    - Update assessment of training and resource needs.
4. Progress Review:
    - Evaluate implementation status of all mitigation actions.
    - Document completed projects and their outcomes.
    - Assess effectiveness of completed actions.
    - Identify implementation challenges and lessons learned.
    - Update cost-benefit considerations based on actual project costs.
5. Strategy Updates:

- Review and revise mitigation goals and objectives.
- Update mitigation actions based on current conditions.
- Develop new actions to address identified gaps.
- Ensure actions reflect current priorities and capabilities.
- Update implementation schedules and responsibilities.

6. Stakeholder and Public Engagement:
    - Conduct comprehensive outreach to all stakeholders.
    - Hold public meetings in each jurisdiction.
    - Provide online engagement opportunities.
    - Document all participation and feedback.
    - Incorporate stakeholder and public input into updates.
7. Plan Review and Adoption:
    - Complete internal review of draft updates.
    - Submit to the State and FEMA for review.
    - Address review comments.
    - Obtain adoption from all participating jurisdictions.
    - Document adoption and maintain records.

5.5 Plan Amendments

The Utah DEM State Hazard Mitigation Officer, Local Mitigation Committee, or Mayor/City Manager of an affected community, will initiate amendments and updates to the Plan.

Upon initiation of an amendment to the Plan, DEM will forward information on the proposed amendment to all interested parties including, but not limited to, all affected City or County departments, residents and businesses. Depending on the magnitude of the amendment, the full planning committee may be reconstituted.

At a minimum, the information will be made available through public notice in a newspaper of general circulation or on the DEM website at dem.utah.gov. The review and comment period for the proposed Plan amendment will last for not less than 45 days.

At the end of the comment period, the proposed amendment and all review comments will be forwarded to participating jurisdictions for consideration. If no comments are received from the reviewing parties within the specified review period, such will be noted accordingly. DEM will review the proposed amendment along with comments received from other parties and submit a recommendation to FEMA within 60 days.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered:

1. There are errors or omissions made in the identification of issues or needs during the preparation of the Plan;
2. New issues or needs have been identified which were not adequately addressed in the Plan;

3. There has been a change in information, data or assumptions from those on which the Plan was based;
4. The nature or magnitude of risks has changed; and/or
5. There are implementation problems, such as technical, political, legal or coordination issues with other agencies.

Upon receiving the recommendation of DEM, a public hearing will be held. DEM will review the recommendation (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, DEM will take one of the following actions:

1. Adopt the proposed amendment as presented.
2. Adopt the proposed amendment with modifications.
3. Defer the amendment request for further consideration and/or hearing.
4. Reject the amendment request.

5.6 Implementation Through Existing Programs

Once the Plan is promulgated, participating cities and counties will be able to include this Plan's information in existing programs and plans. These could include the General or Master Plan, Capital Improvements Plan, Emergency Operations Plan, State Mitigation Plan, or City Mitigation Plans. Many of the mitigation actions developed by the cities and counties have elements of mitigation implementation, including the National Flood Insurance Program (NFIP), the Utah Wildland-Urban Interface Code, the Building Code Effectiveness Grading System (BCEGS), and Community Rating System (CRS), all of which have been implemented.

5.6.1 Integration Framework Recommendation

1. Planning Integration:
    - Incorporate hazard data into comprehensive plan updates.
    - Include mitigation actions in capital improvement programs.
    - Reference mitigation priorities in departmental strategic plans.
    - Align zoning and development codes with hazard areas.
    - Coordinate mitigation goals with sustainability initiatives.
2. Operational Integration:
    - Include mitigation considerations in permit review processes.
    - Incorporate hazard assessments in site plan reviews.
    - Reference mitigation requirements in building inspections.
    - Align public works projects with mitigation priorities.
    - Coordinate emergency planning with mitigation goals.
3. Budgetary Integration:
    - Include mitigation projects in annual budget processes.
    - Identify funding sources for mitigation activities.

- Coordinate grant applications with mitigation priorities.
- Track mitigation investments across departments.
- Leverage existing programs for mitigation funding.

4. Administrative Integration:
    - Assign integration responsibilities to specific positions.
    - Include mitigation duties in job descriptions.
    - Provide training on integration requirements.
    - Establish coordination procedures between departments.
    - Document integration activities and outcomes.

5.6.2 Jurisdictional Integration Processes

Recognizing that jurisdictions have different staffing levels, technical capabilities, and planning resources, the following matrix outlines how each will integrate hazard mitigation into their local planning mechanisms based on their unique organizational capacity:

Here is the reformatted table with four columns for each row, based on the provided highlighted text:

Jurisdiction	Primary Planning Tools	Responsible Parties	Integration Methods + Timeline
Emery County	• General Plan • Building Code Updates • Capital Projects List	• County Commission • Planning Commission • Emergency Manager	• Monthly Coordination Meetings • Quarterly Reports • Timeline: 2024-2026
Castle Dale	• General Plan • Emergency Operations Plan • Infrastructure Master Plans • Capital Improvements List	• Mayor • City Council • Public Works Staff	• Council Workshops • Budget Process • Timeline: 2024-2026
Clawson	• General Plan • Emergency Operations Plan	• Mayor • Town Council	• Council meetings • Staff coordination • Timeline: 2025-2026
Cleveland	• Emergency Operations Plan • Capital Projects	• Mayor • Town Council	• Council meetings • Staff coordination • Timeline: 2025-2026
Elmo	• Emergency Operations Plan • Capital Projects	• Mayor • Town Council	• Council meetings • Staff coordination • Timeline: 2025-2026
Emery Town	• Emergency Operations Plan	• Mayor • Town Council	• Council meetings • Staff coordination

	• Capital Projects		• Timeline: 2025-2026
Ferron	• General Plan • Emergency Operations Plan • Infrastructure Master Plans • Capital Improvement List	• Mayor • City Council • Public Works staff	• Budget process • Staff coordination • Timeline: 2024-2026
Green River	• General Plan • Infrastructure Master Plans • Capital Improvement List	• Mayor • City Council • Public Works staff	• Project review checklist • Annual work program • Timeline: 2024-2025
Huntington	• General Plan • Emergency Operations Plan Stormwater Plan • Infrastructure Master Plans • Capital Improvement List	• Mayor • City Council • Planning Commission • Public Works staff	• Budget process • Staff coordination • Timeline: 2024-2026
Orangeville	• General Plan • Emergency Operations Plan • Stormwater Plan • Infrastructure Master Plans • Capital Improvement List	• Mayor • City Council • Planning Commission • Public Works staff	• Budget process • Staff coordination • Timeline: 2024-2026
Emery School District	• Facility Plan • Emergency Operations Plan	• Facilities Director • Superintendent	• Safety Committee • Board updates • Timeline: 2024-2025
Emery County SSD #1	• System Master Plan • Capital Program	• General Manager • Board of Trustees	• Board meetings • Staff training • Timeline: 2024-2025
Castle Valley SSD	• Water Master Plan • Capital Program	• General Manager • Board of Trustees	• Board meetings • Staff training • Timeline: 2024-2025
Emery County EMS SSD	• System Master Plan • Emergency Response Plan	• Director • Board of Trustees	• Board meetings • Staff training • Timeline: 2024-2025

North Emery Water SSD	• Water Master Plan • Capital Program	• General Manager • Board of Trustees	• Board meetings • Staff training • Timeline: 2024-2025

Note: Each jurisdiction will customize their integration methods based on their unique organizational structure, capacity, and needs. This matrix represents primary mechanisms but is not exhaustive.

5.7 Process

It will be the responsibility of the Mayor/Council/Commissioner(s) of each jurisdiction, as they see fit, to ensure these actions are carried out no later than the target dates unless reasonable circumstances prevent their implementation (i.e. lack of funding availability).

5.8 Capability Assessments

This assessment analyzes the current capacity to mitigate the effects of natural hazards and emphasizes the positive capabilities that should be continued. Emery County has elected to conduct a hazard and capabilities analysis.

The following areas were assessed to determine mitigation capabilities:

1. Staff and Organization
2. Technical
3. Fiscal
4. Policies and Programs
5. Land Use Management
6. Legal Authority
7. Political Willpower

5.9 Mitigation Action Prioritization

Emery County and participating jurisdictions used a practical approach to prioritize mitigation actions based on several key factors that emphasize maximizing benefits relative to costs. The Planning Committee evaluated each proposed mitigation action using the following prioritization criteria:

- **Life Safety** -- Does the action protect lives and prevent injury?
- **Property Protection** -- Does the action reduce damage to structures and infrastructure?
- **Technical Feasibility** -- Can the action be implemented with existing resources and capabilities?
- **Cost-Effectiveness** -- Do the benefits of the action outweigh its costs?
- **Environmental Impact** -- Does the action have positive or neutral environmental effects?

Actions were classified as High, Medium, or Low priority based on a qualitative assessment that considered:

- **High Priority**: Actions that address severe or widespread hazards, provide immediate protection to life and property, can be implemented in the short-term (1-2 years), and have funding sources identified or readily available.
- **Medium Priority**: Actions that address significant but less severe hazards, provide important but less urgent protection, can be implemented in the mid-term (3-4 years), and have potential funding sources identified.
- **Low Priority**: Actions that address less significant hazards, provide long-term protection, require extended implementation timeframes (5+ years), or have limited funding opportunities currently identified.

This prioritization approach ensures that each jurisdiction directs available resources toward the most critical and effective mitigation actions while maintaining flexibility to address unique local circumstances.

5.9 Staff & Organizations

5.9.1 City and County Elected Officials

The Emery County Commission consists of three members. Each of the five cities has a mayor and a city council, consisting of five members, which governs the municipality. The elected officials have the responsibility of adopting mitigation policies. Cities and counties receive their legal authority to govern from the State of Utah.

5.9.2 Emery County General Capabilities

Listed below is a general organizational list of County/City governmental administrative areas involved in Pre-Disaster mitigation (see full capabilities list in Appendix I):

- Elected officials
- City Managers
- County and City Attorneys
- County Assessors
- County Clerks
- Human Services/Personnel Directors
- County and City Treasurers/ Finance
- Public Works Departments
- County and City Planning/GIS Departments
- County Health Department
- Police and Fire Departments
- County Emergency Management
- Special Improvement District

5.9.3 Emergency Management

Emery County has an emergency management director. The emergency management director is responsible for natural and man-made hazard mitigation, preparedness, response, and recovery operations.

5.9.4 Local Emergency Planning Committee (LEPC)

The mission of the Emery County LEPC is to commit to increasing community safety through planning, public education, and collaboration. The Emery County LEPC will bring together local governments, first responders, and private industry to work together to prepare for and mitigate, respond to, and recover from all hazards. We will interact with the public to ensure it is well informed and prepared. We will contribute to the safety and resilience of the community.

The Emery County LEPC is composed of elected officials; law enforcement, emergency management, firefighting, emergency medical services, health, local environmental, hospital and transportation personnel; broadcast and print media; community groups; and owners and operators of hazardous chemical facilities that are required by federal law to have hazardous chemical emergency planning. Emery County has an active LEPC.

5.9.5 Fire/Emergency Medical Services

Most of the cities in Emery County have fire departments. Following a national trend, Emery County has an agreement with each of the City fire departments to provide service to the unincorporated parts of Emery County. There are two multi-jurisdiction fire districts in Emery County that were formed with the goal to better provide fire and emergency medical services.

5.9.6 Public Works

Divisions within public works and partnerships with special service districts often include streets, engineering, water, power, wastewater and sanitation. The Emery County public works department has undertaken a number of mitigation projects in the county. Several municipal public works departments have also participated in hazard mitigation, primarily in the form of stormwater and watershed management projects.

5.9.7 Health Care

The hospitals, medical facilities and the Southeastern Utah District Health Department (located in Carbon County) provide medical emergency preparedness and response to residents of Emery County. The health department assesses health hazards caused by damage to sewer, water, food supplies or other environmental systems. It also provides safety information, assesses disaster related mental health needs and services, and provides crisis counseling for emergency workers. Short of a pandemic disease outbreak, the health department will likely continue to adequately staff, train, and fund its mission.

5.9.8 School District

The Emery School District has more than 2,230 students in 10 schools. District administrators work closely with local public safety officials including law enforcement, fire emergency medical services, and public health to help ensure that schools are well prepared for any kind of emergency.

5.9.9 Special Service Districts

For the purposes of this Plan, Special Service Districts (SSD) are defined as quasi-governmental agencies having taxing authority, providing a specific public service that may include; public transportation, fire, water, wastewater and sewer. These SSD's work closely with local public safety officials to ensure that these

Districts are well prepared for any kind of emergency. In many cases, the districts participate in the County or City emergency preparedness committee for emergency coordination, planning and response.

In Emery County, services that are provided by municipalities to their residents are provided to residents in the unincorporated areas through the Emery County SSD #1. Other SSDs in Emery provide services such as EMS, recreation, water, etc.

5.10 Technical Capability

Throughout the plan update process, Emery County staff consulted with and utilized the technical expertise from a wide variety of resources listed below:

5.10.1 Jurisdiction Technical Expertise

Emery County and all of the municipalities either employ or contract with planners, emergency managers, building inspectors, housing specialists, and engineers as needed.

5.10.2 Geographic Information Systems (GIS)

For GIS capabilities, Emery County is supported by an in-house GIS staff (with one dedicated employee), and the State and local partners who are capable of providing important data to this planning process. (GIS capabilities are often found in other departments such as public works or information technology). GIS is most beneficial when data from all departments and planning jurisdictions is inputted for analysis.

5.10.3 GIS Information Sources

Background information and data for this Plan was obtained from the sources listed below. From these sources, the Planning Consultant extracted relevant information and data. That information and data was subsequently submitted to the Emery County Working Groups for their consideration and approval for inclusion into the Plan. (See Appendix H for complete list).

5.10.4 Public Safety Communications (PSC)

Public safety communications networks assure emergency communications through radio, microwave, telephone, satellite, internet, e-mail, fax, and amateur radio. One of the most beneficial capabilities of PSC is providing cross-communication between equipment and frequencies. PSC coordinates dissemination of emergency information to the media, the public, and emergency personnel; activates internal information systems; acts as a liaison to elected officials; assists in the provision of emergency information and documents the impact.

5.10.5 Public Works

Public works departments generally provide engineering, transportation, GIS, water, wastewater, sanitation (and in some cases electric power) expertise and capability. As a team, public works personnel identify critical infrastructure and plan and prepare for emergency mitigation.

5.10.6 Utah Division of Emergency Management (Utah DEM)

Utah DEM assists Emery County in providing information on preparing for, responding to, and recovering from emergencies. DEM serves as the liaison between local, state and federal emergency assistance. DEM also educates the public about earthquakes, hazardous materials, floods, communications, leadership, information technology, funding, coordination and supplies.

5.10.7 Utah State University (USU) Cooperative Extension

The USU Extension Service assisted with family and community data in putting research-based knowledge to work. Many of the programs and informational courses improve pre-disaster mitigation.

5.10.8 University of Utah

The University of Utah was utilized as a technical resource for academic mitigation research and demographic data (particularly through the Kem C. Gardner Institute).

5.11 Fiscal Capability

Emery County has limited fiscal capabilities to implement mitigation strategies. Emery County and most of its jurisdictions have provided some level of matching funds for federal grants in the past. Utah State Code Section 17-50-501 classifies counties into six categories based on population. The State of Utah grants graduated autonomy to counties according to class size.

5.12 Policies & Programs

Connecting local land use management with natural hazard planning is an effective way to mitigate a community's risk. Many communities have plans, ordinances, agreements, maps, training, warning systems, etc. in place that help them to become more disaster resistant. One of the goals of this Plan is for communities to coordinate existing activities so that individual objectives become part of an overall plan of action.

5.13 Land Use Management Tools

5.13.1 Ordinances

- Zoning ordinances designate the use of land and structures for the purpose of protecting the health, safety and welfare of residents and businesses. A zoning ordinance divides all land within a jurisdiction into zones or related uses. The zoning ordinance consists of two parts: the text and the maps. Specific zones are usually created for residential, commercial, industrial, and government uses. The map defines the boundaries of these zones, and the text provides the regulations for uses that are permitted to exist in each of the zones.
- Subdivision ordinances regulate all divisions and improvements of property including the division of land involving the dedications of new or changes to existing streets/roads.
- Design controls regulate building and landscaping. Such controls can be tailored to require that new developments meet the specific needs of the area. Two examples are requiring flame-resistant roofs in

wildland fire interface zones and requiring that trees and vegetation are planted on steep slopes to help mitigate landslide hazards.

- Floodplain ordinances prevent building in special flood hazard areas and provide flood loss reduction measures to new and existing development. Floodplain management ordinances help to provide insurance to homes and businesses through the National Flood Insurance Program (NFIP). The NFIP's Community Rating System was implemented to encourage cities to manage floodplain activities that exceed the minimum NFIP standards. A community participating in the system will receive reductions in insurance premiums.
- National Flood Insurance Program Participation: The National Flood Insurance Program was created in 1968 by the Federal Emergency Management Agency (FEMA) to provide homeowners living in the 100- year floodplain an opportunity to purchase flood insurance for their home. In order for individuals to be eligible to purchase flood insurance, their community needs to participate in the National Flood Insurance Program (NFIP). Assistance for community participation in the NFIP is provided by the State Floodplain Manager at DEM. There is also limited funding for flood mitigation projects for communities participating in the NFIP. Emery County and all the cities participate in the NFIP and comply with the minimum standards required by FEMA to be considered participating jurisdictions.
- Building codes require certain standards of construction to ensure that buildings remain safe for inhabitants through natural events.

5.13.2 Easements

Easements can be a cost effective way to control development in hazard-prone areas. Various land trusts can help secure easements that can then be conserved or preserved.

5.13.3 Planning

- General plans serve as a guide for decision-making on rezoning and other planning proposals and as the goals and policies of municipalities attempting to guide land use in local jurisdictions. Each plan is recommended to include land use, transportation, environment, public service and facilities, rehabilitation, redevelopment, conservation, and economics. Also recommended are implementing recommendations including the use of zoning ordinances, subdivision ordinances, capital improvement plans, and other suitable actions that the city deems appropriate. General plans articulate the jurisdiction's vision while land use management codes implement that vision. General plans and land use management codes are being consulted, reviewed, and changed as necessary.
- Emergency Operations Plans (EOPs) identify specific emergency actions undertaken by a jurisdiction to mitigate the loss of lives and property immediately before, during, and after an emergency. The Emery County Emergency Operations Plan EOP was reviewed as part of this planning process.
- Floodplain Management Plans identify steps and implementation strategies to effectively deal with floodplains. FEMA uses a scoring system that is used to rate communities. Those with higher scores will receive higher discounts (in 5% increments) on flood insurance.
- Stormwater Management Plans identify water policies for an entire watershed. Such policies can include: preservation of habitats, water quality and supply, open space development, land preservation, pollution prevention, and construction regulations.

- Environmental Reviews explain how development affects the land and its resources.
- Capital Improvement Plans: Cities plan for costs related to infrastructure, public facilities, and public safety. These plans identify projects, prioritize them, and identify ways of funding them. Such plans can include disaster reduction costs or mitigation measures in flood-prone areas or retro-fitting buildings for seismic strengthening.

The jurisdictions that make-up this region have incorporated various mitigation measures. The following tables identify, by municipality, existing land use ordinances, management practices and plans currently in place.

Table 5.13.3.1 - Natural Hazard and Environmental Planning, Emery County

	Castle Dale	Clawson	Cleveland	Elmo	Emery Town	Ferron	Green River	Huntington	Orangeville	Emery County	Castle Valley SSD	Emery Co EMS SSD	Emery Recreation SSD	Emery School Dist	Emery SSD #1	North Emery Water SSD	San Rafael SSD
Emergency Ops Plan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a	N	Y	Y	n/a
Stormwater Plan	N	N	N	N	N	N	N	Y	Y	n/a	n/a	n/a	n/a	n/a	N	N	n/a
Annexation Policy Plan	Y	Y	N	N	N	N	Y	Y	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
General Plan: Land Use	Y	Y	N	N	N	Y	Y	Y	Y	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a
General Plan: Transportation	Y	Y	N	N	N	Y	Y	Y	Y	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a
General Plan: Housing	Y	Y	N	N	N	N	Y	Y	Y	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Regional Transportation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a	n/a	n/a	n/a	N	n/a
Wildfire Plan (CWPP)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a	n/a	n/a	n/a	n/a	N	n/a

Table 5.13.3.2 - Natural Hazard & Environmental Quality Ordinances, Emery County

	Castle Dale	Clawson	Cleveland	Elmo	Emery Town	Ferron	Green River	Huntington	Orangeville	Emery County
Avalanches	N	N	N	N	N	N	N	N	N	N
Earthquakes, Faults, Geologic Hazards	N	N	N	N	N	N	N	N	N	N
Floodplains	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Foothills & Canyons	N	N	N	N	N	N	N	N	N	Y
Groundwater	N	N	N	N	N	N	N	N	N	N
Habitat	N	N	N	N	N	N	N	N	N	N
Lakes, Streams, Riparian	N	N	N	N	N	N	N	N	N	N
Landslides	N	N	N	N	N	N	N	N	N	Y
Mountains & Forest	N	N	N	N	N	N	N	N	N	Y

Zones										
Pollution & Air Quality (General Plan)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Prime Agricultural Lands	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ridgelines	N	N	N	N	N	N	N	N	N	N
Sensitive Lands	N	N	N	N	N	N	N	N	N	N
Steep Slopes	N	N	N	N	N	N	N	N	N	Y
Watersheds	N	N	N	N	N	N	N	N	N	N
Wetlands (Army Corps)	N	N	N	N	N	N	N	N	N	N
Wildland Fire (WUI)	N	N	N	N	N	N	N	N	N	Y

5.13.4 Building Codes

International and national building codes have been adopted by all jurisdictions in the County. These codes are constantly in review for reasonable mitigation for disasters. Locally, building officials lobby for additions or exceptions to international and/or national building codes according to local conditions. Most insurance policies rely on the international and national building code standards for assurance.

The Insurance Services Office, Inc. manages the Building Code Effectiveness Grading Schedule (BCEGS). This program was implemented in 1995 and assesses the building codes in effect in a particular community as well as how well the community enforces its building codes. The BCEGS program assigns each municipality a BCEGS grade of 1 to 10 with 1 showing exemplary commitment to building code enforcement. Insurance Services Inc (ISO) developed advisory rating credits that apply to ranges of BCEGS classifications 1-3, 4-7, 8-9, 10. ISO gives insurers BCEGS classifications, BCEGS advisory credits, and related underwriting information.

Communities with effective, well-enforced building codes should sustain less damage in the event of a natural disaster, and insurance rates can reflect that. The prospect of lessening natural-hazard-related damage and ultimately lowering insurance costs provides an incentive for communities to enforce their building codes rigorously. FEMA also uses these scores in their competitive grant programs, giving a higher ranking to those projects with lower scores. The following table highlights the BCEGS scores for Emery County jurisdictions.

As required by Utah statute (UCA 15A-2) Emery County and its municipalities have adopted the 2021 International Building Code (IBC) and International Residential Code (IRC). The Emery County School District adheres to both these codes and additional state requirements for educational facilities. All special service districts follow these codes for their respective facilities.

5.13.5 Special District Authorities and Resources

1. The Emery School District maintains authority over:
    - Educational facility construction and maintenance
    - Emergency operations planning for schools
    - Coordination with local emergency services

- Capital improvement programming
- School safety and security protocols

2. The Emery County Special Service District #1 maintains authority over:
    - Service provision in unincorporated areas
    - Infrastructure maintenance and development
    - Rate setting and fee collection
    - Capital improvement planning
    - Coordination with county emergency services
3. The Castle Valley Special Service District provides:
    - Water distribution infrastructure management
    - Wastewater collection and treatment oversight
    - Road maintenance in specific service areas
    - Storm drainage system management
    - Capital improvement programming for infrastructure
4. The Emery County Recreation Special Service District maintains:
    - Recreation facility management and safety
    - Parks and recreation area development
    - Recreational program coordination
    - Facility emergency planning
    - Capital improvement planning for recreational facilities
5. The Emery County Emergency Medical Services Special Service District handles:
    - Emergency medical response infrastructure
    - EMS personnel training and certification
    - Medical equipment maintenance and acquisition
    - Coordination with county emergency management
    - Integration with hospital and healthcare systems
6. The North Emery Water Users Special Service District oversees:
    - Drinking water infrastructure and treatment
    - Water quality monitoring and compliance
    - System maintenance and expansion planning
    - Emergency response for water system failures
    - Coordination with health departments
7. The San Rafael Special Service District manages:
    - Specialized infrastructure within its boundaries
    - Service coordination with county departments
    - Budget planning for service provision

- Emergency coordination with county emergency management
- Related public safety initiatives

5.14 Legal Authority

Local governments play an essential role in implementing effective mitigation. Each local government will review all present or potential damages, losses, and related impacts associated with natural hazards to determine the need or requirement for mitigation action and planning. In Emery County, the local executives responsible for carrying out plans and policies are the County commissioners, and for local jurisdictions, it is the city mayors/city managers. Local governments must be prepared to participate in the post-disaster Hazard Mitigation Team process and the pre-mitigation planning as outlined in this document. The cities and counties of Utah have the authority, through policing, to protect the health, welfare, and safety of their residents.

5.15 Political Willpower

Emery County region public officials have shown support for pre-disaster planning in the following ways.

5.15.1 Community Development Documents

Elected officials have adopted updated community development documents to reduce the risk of emergencies and disasters. Each County and most cities have updated Emergency Operation Plans, Land Use Management Codes, International Building Codes, and General Plans that include pre-disaster planning. In addition, there is support from residents.

5.15.2 Emergency Planning Training Courses

Emery County's residents have supported emergency planning training sponsored by Utah DEM and local governments such as: CERT (Community Emergency Response Team), Local Emergency Planning Committees (LEPC), Hazardous Materials (HAZMAT), Site Plans and Ordinances, Real Estate Requirements, and Hazard Mitigation.

5.15.3 Continued Public Involvement

The participating jurisdictions recognize that continued public involvement is essential for successful hazard mitigation. Following plan approval, jurisdictions will implement a comprehensive public engagement strategy that includes:

1. **Annual Engagement Activities:**
    - Host public open houses to review mitigation progress and gather community input
    - Maintain dedicated hazard mitigation sections on jurisdiction websites with:
        - Current plan documents.
        - Project updates.
        - Upcoming meetings.
        - Comment opportunities.
        - Educational resources.

- Provide regular updates through jurisdiction newsletters, social media, and local media outlets.
- Include hazard mitigation information at community events and festivals.

2. Targeted Outreach:

- Partner with community organizations serving vulnerable populations to ensure inclusive engagement.
- Conduct outreach in multiple languages based on community demographics.
- Utilize diverse communication channels including:
  - Print materials.
  - Digital platforms.
  - In-person events.
  - Local media.
  - Community networks.
- Maintain contact lists of interested parties for direct notification of mitigation activities.

3. Integration with Other Public Processes:

- Include hazard mitigation discussions in:
  - General plan updates.
  - Capital improvement planning.
  - Development review processes.
  - Emergency preparedness activities.
- Coordinate public engagement across departments to maximize efficiency and reach.

4. Documentation and Evaluation:

- Track public participation metrics.
- Gather feedback on engagement effectiveness.
- Adjust strategies based on community response.
- Maintain records of public comments and responses.
- Document how public input influences mitigation decisions.

5.15.4 Local Adoption Template

The following language was provided to local stakeholders. They were asked to convert it into the format of their municipal resolutions. Copies of enacted resolutions were requested by the PDM planning team.

> *WHEREAS, the health, safety and welfare of the citizens of _____ are matters of paramount importance to the _____; and*
>
> *WHEREAS the _____ recognizes the threat that natural hazards pose to people and property within their jurisdiction; and*
>
> *WHEREAS, the Federal Emergency Management Agency ("FEMA") has required that municipalities review and revise their local multi-hazard mitigation plan every five years to reflect changes in*

development, progress in local hazard mitigation efforts, and changes in mitigation priorities and submit their revised multi-hazard mitigation plan for review and approval by FEMA to remain eligible for pre-disaster mitigation grant funding; and

WHEREAS the Emergency Services Division of Emery County has received a grant from FEMA to prepare a multi-jurisdictional hazard mitigation plan in accordance with the requirements of 44.C.F.R. 201.6 and the FEMA "Local Mitigation Planning Handbook"; and

WHEREAS, these requirements include obtaining formal resolutions of participation, support, and adoption from stakeholder jurisdictions.

NOW THEREFORE, BE IT RESOLVED that _____ hereby intends to support the Plan update initiative by participating with the committee intended to develop revisions and updates to the Emery County Pre-Disaster Mitigation Plan.

This Resolution shall take effect upon passage.

6.0 Hazard Risks & Profiles

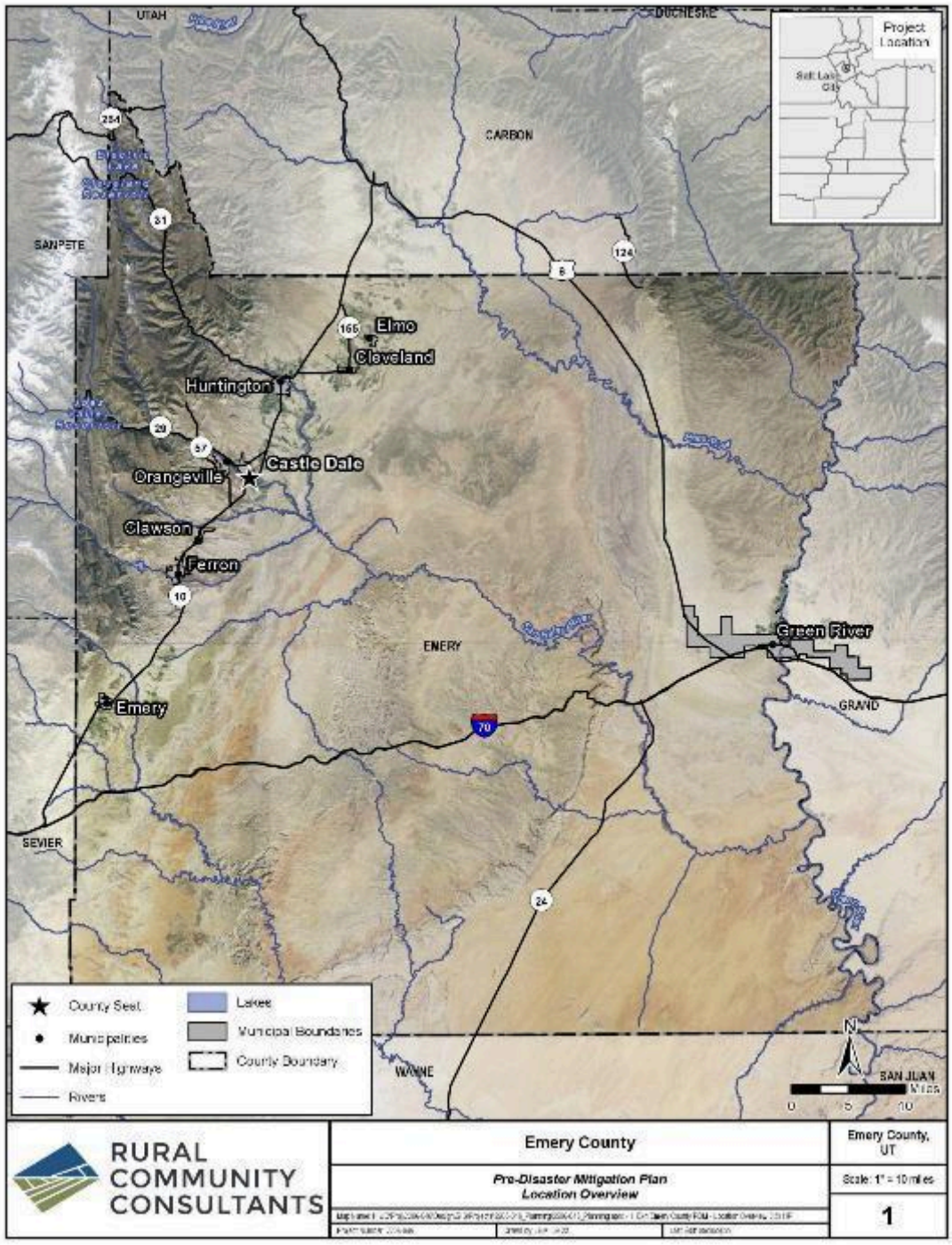
Note regarding HAZUS Data: *This analysis was conducted using Hazards United States -- Multi Hazards (HAZUS-MH) modeling program in 2018. While these results represent the most current HAZUS analysis available for Emery County, updated modeling is planned in partnership with the Utah Division of Emergency Management. This plan will be updated with new vulnerability data when it becomes available.*

With the exception of the emergency declaration for the COVID-19 pandemic (DR-4525), no other federal disaster declarations have been issued for Emery County from 2018-2024.

6.1 Geology

Carbon County exhibits a fascinating geological profile shaped by millions of years of geological processes. The County sits at the intersection of the Colorado Plateau and the Basin and Range Province, resulting in diverse geological features. The region is characterized by sedimentary rock formations, including sandstones, shales, and limestone.

- One risk associated with the County's geology is the potential for landslides and rockfalls, particularly in mountainous areas, which can pose hazards to residents, businesses, and visitors.
- Additionally, the presence of abandoned mines and underground coal seams increases the risk of subsidence, which can affect structures and infrastructure.
- Lastly, the county's geological composition makes it prone to seismic activity, and while earthquakes are relatively infrequent, they can present risks to those in the region.



Map illustrating the general location of Emery County (click here for original).

Figure 6.1.1 Map of Emery County Location

6.2 Risk Assessment

6.2.1 Risk Overview

The FEMA National Risk Index identifies Emery County, Utah, as an area with an overall risk index of 13.39. This is considered "very low". Emery has a very low score for "Expected Annual Loss" (14.02) and a social vulnerability score of 15.6, which is also considered very low. The County has a relatively moderate potential for resilience (47.33), but through careful management efforts, this score can be raised.

Table 6.2.1.1- Risk Assessment Summary for Emery County, Utah (FEMA Risk Index, 2022)

For more information about the National Risk Index, its data, and how to interpret the information it provides, please visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

6.2.2 Climate Change Impacts

Emery County faces increasing risks from climate change impacts. According to the Climate Risk and Resilience Portal (ClimRR), the following changes are projected:

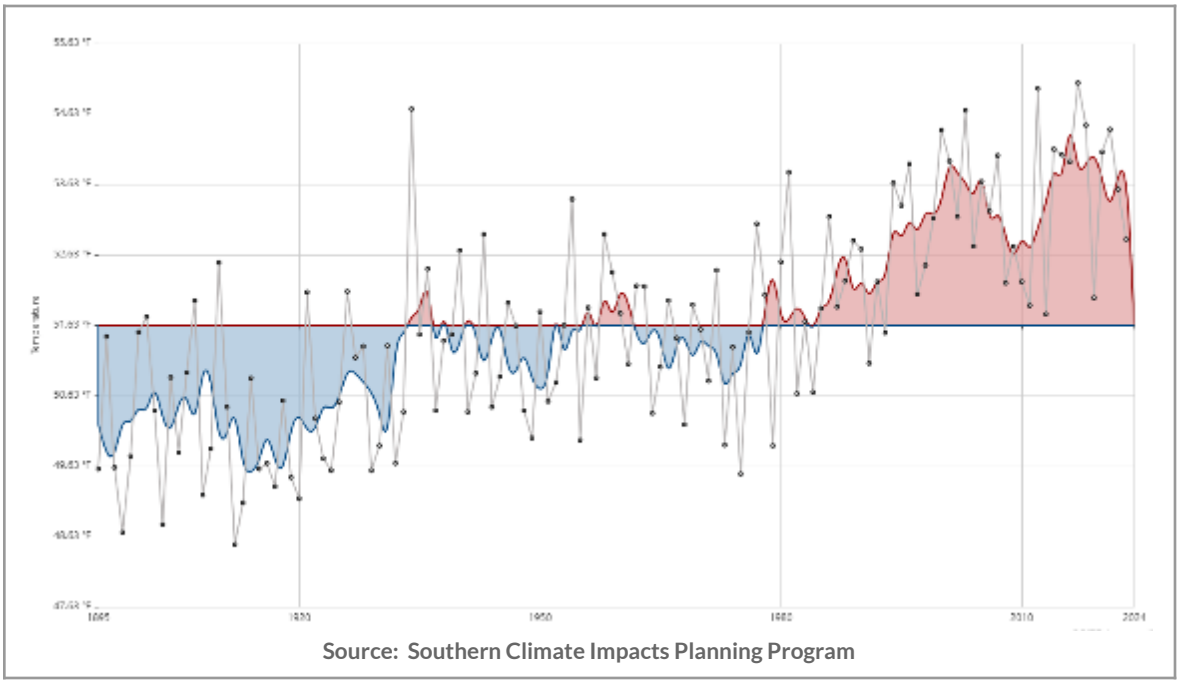
Heat Projections:

- By 2049, Emery County is expected to experience 14 more days that reach above 95°F (from 23 days to 37 days per year).
- By 2049, Emery County is expected to have a 2°F increase (from 50°F to 53°F) in average annual temperatures.

Precipitation Projections:

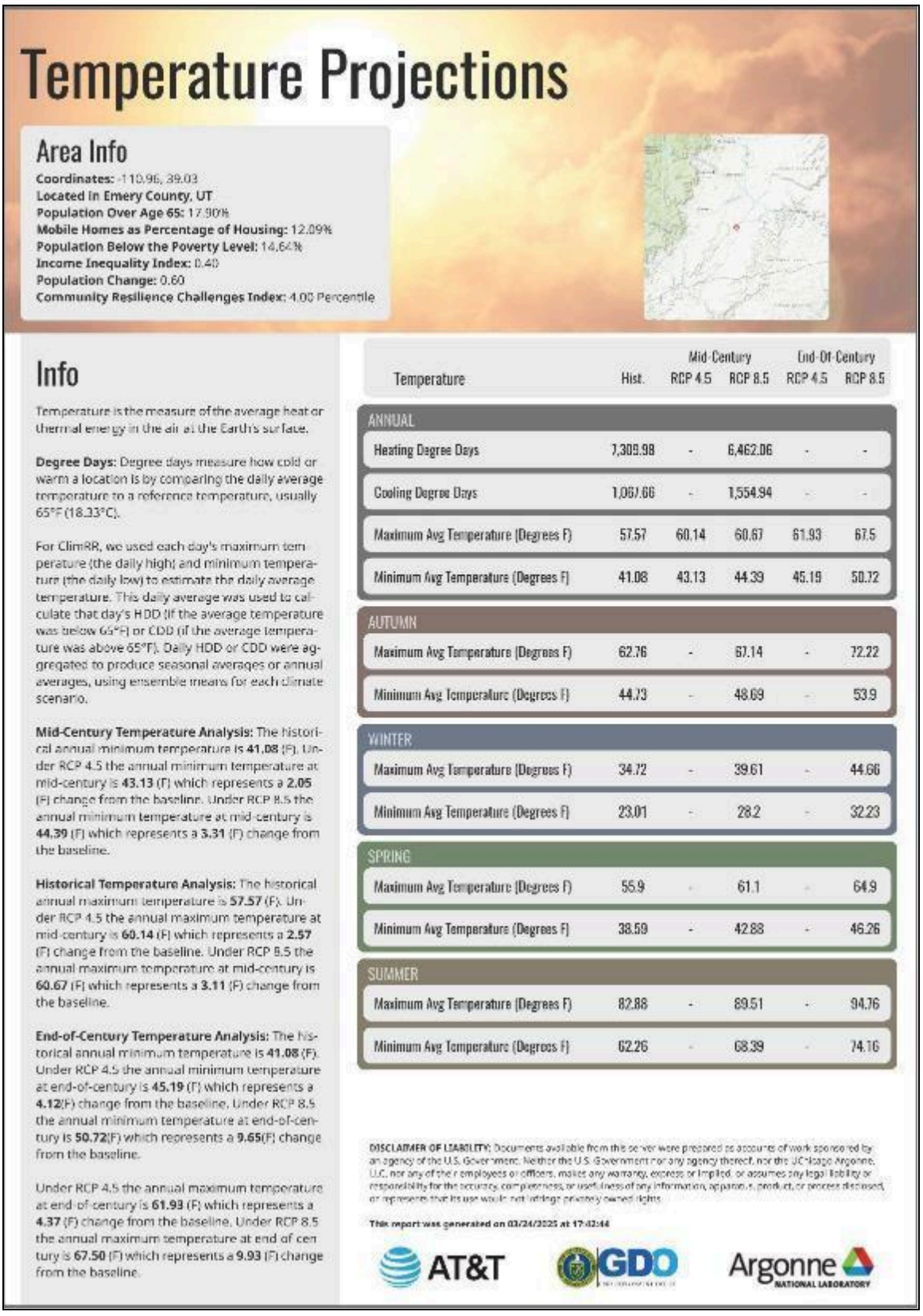
- By 2049, Emery County is expected to experience 0.07 more days of heavy precipitation per year (from 0.33 days to 0.4 days per year).
- By 2049, Emery County is expected to have a 0.4″ increase (from 10.6″ to 11″) in average annual precipitation.

Figure 6.2.2.1 - Historic Temperatures (Southeast Region)



Source: Southern Climate Impacts Planning Program

Figure 6.2.2.2 - Temperature Projections



Temperature Projections

Area Info

Coordinates: -110.96, 39.03
Located in Emery County, UT
Population Over Age 65: 17.90%
Mobile Homes as Percentage of Housing: 12.09%
Population Below the Poverty Level: 14.64%
Income Inequality Index: 0.40
Population Change: 0.60
Community Resilience Challenges Index: 4.00 Percentile

Info

Temperature is the measure of the average heat or thermal energy in the air at the Earth's surface.

Degree Days: Degree days measure how cold or warm a location is by comparing the daily average temperature to a reference temperature, usually 65°F (18.33°C).

For ClimRR, we used each day's maximum temperature (the daily high) and minimum temperature (the daily low) to estimate the daily average temperature. This daily average was used to calculate that day's HDD (if the average temperature was below 65°F) or CDD (if the average temperature was above 65°F). Daily HDD or CDD were aggregated to produce seasonal averages or annual averages, using ensemble means for each climate scenario.

Mid-Century Temperature Analysis: The historical annual minimum temperature is **41.08** (F). Under RCP 4.5 the annual minimum temperature at mid-century is **43.13** (F) which represents a **2.05** (F) change from the baseline. Under RCP 8.5 the annual minimum temperature at mid-century is **44.39** (F) which represents a **3.31** (F) change from the baseline.

Historical Temperature Analysis: The historical annual maximum temperature is **57.57** (F). Under RCP 4.5 the annual maximum temperature at mid-century is **60.14** (F) which represents a **2.57** (F) change from the baseline. Under RCP 8.5 the annual maximum temperature at mid-century is **60.67** (F) which represents a **3.11** (F) change from the baseline.

End-of-Century Temperature Analysis: The historical annual minimum temperature is **41.08** (F). Under RCP 4.5 the annual minimum temperature at end-of-century is **45.19** (F) which represents a **4.12**(F) change from the baseline. Under RCP 8.5 the annual minimum temperature at end-of-century is **50.72**(F) which represents a **9.65**(F) change from the baseline.

Under RCP 4.5 the annual maximum temperature at end-of-century is **61.93** (F) which represents a **4.37** (F) change from the baseline. Under RCP 8.5 the annual maximum temperature at end of century is **67.50** (F) which represents a **9.93** (F) change from the baseline.

Temperature	Hist.	Mid-Century RCP 4.5	Mid-Century RCP 8.5	End-Of-Century RCP 4.5	End-Of-Century RCP 8.5
ANNUAL					
Heating Degree Days	7,309.98	-	6,462.06	-	-
Cooling Degree Days	1,067.66	-	1,554.94	-	-
Maximum Avg Temperature (Degrees F)	57.57	60.14	60.67	61.93	67.5
Minimum Avg Temperature (Degrees F)	41.08	43.13	44.39	45.19	50.72
AUTUMN					
Maximum Avg Temperature (Degrees F)	62.76	-	67.14	-	72.22
Minimum Avg Temperature (Degrees F)	44.73	-	48.69	-	53.9
WINTER					
Maximum Avg Temperature (Degrees F)	34.72	-	39.61	-	44.66
Minimum Avg Temperature (Degrees F)	23.01	-	28.2	-	32.23
SPRING					
Maximum Avg Temperature (Degrees F)	55.9	-	61.1	-	64.9
Minimum Avg Temperature (Degrees F)	38.59	-	42.88	-	46.26
SUMMER					
Maximum Avg Temperature (Degrees F)	82.88	-	89.51	-	94.76
Minimum Avg Temperature (Degrees F)	62.26	-	68.39	-	74.16

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For more information about the Climate Risk and Resilience Portal (ClimRR), its data, and how to interpret the information it provides, please visit the ClimRR website at https://climrr.anl.gov/.

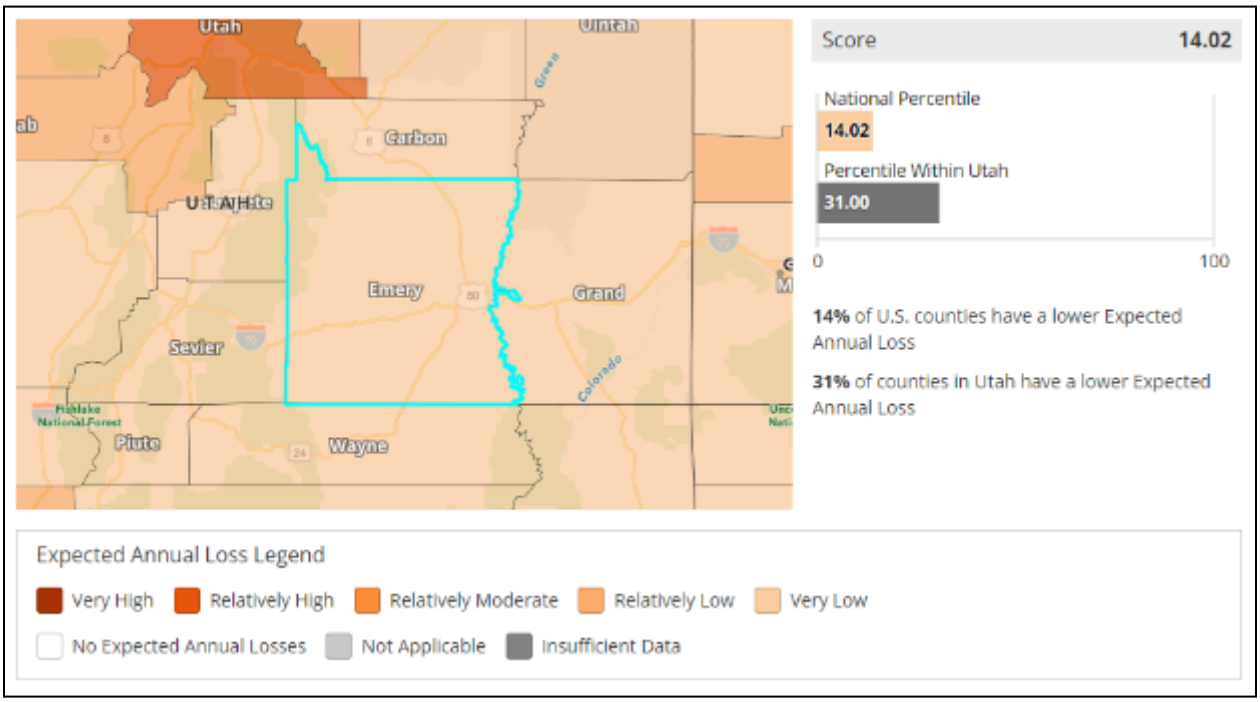
Figure 6.2.2.3 - Climate Change Projections

Heat Projections	Precipitation Projections
By 2049, Emery County is expected to experience 14 more days that reach above 95°F (from 23 days to 37 days per year).	By 2049, Emery County is expected to experience 0.07 more days of heavy precipitation per year (from 0.33 days to 0.4 days per year).
By 2049, Emery County is expected to have a 2°F increase (from 50°F to 53°F) in average annual temperatures.	By 2049, Emery County is expected to have a 0.4″ increase (from 10.6″ to 11″) in average annual precipitation.
Source: Headwaters Economics - Neighborhoods at Risk, 2024	

6.3 Expected Annual Loss

The FEMA Natural Disaster Expected Annual Loss (EAL) is a metric used to estimate the expected economic losses associated with natural disasters over a one-year period. It takes into account various factors, including the probability of occurrence of different types of natural disasters, the vulnerability of the affected area, and the value of exposed assets. Emery County's expected loss each year due to natural hazards is very low (14.02) when compared to the rest of the U.S.

Figure 6.3.1. Expected Annual Loss for Emery County, Utah (FEMA National Risk Index for Emery County, Utah, March 4, 2024)



6.4 Vulnerability Analysis

6.4.1 Overview

The vulnerability analysis is based on asset identification and potential loss estimates for those jurisdictions located within identified hazard areas.

6.4.2 Asset Identification

The vulnerability analysis combines the data from each of the hazard profiles and merges it with community asset information to analyze and quantify potential damages from future hazard events. The asset inventory identifies buildings, roads, and critical facilities that can be damaged or affected by the hazard events. Critical facilities are of particular concern because of the essential products and services to the general public they provide. These critical facilities can also fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in this plan include hospitals, police and fire stations, schools, communication facilities, utility companies, and water and wastewater treatment plants. In order to assess where and to what extent the identified hazards will affect the assets of each County, the locations of assets were identified and overlaid with the mapped hazards using GIS software.

6.4.3 Potential Loss Estimates

Potential dollar loss estimates were identified using this same method; therefore estimates were completed for existing infrastructure only. When data permitted, structure, content, and function of the identified vulnerable infrastructure was incorporated into the vulnerability assessments. Describing the vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. Future planned development was not analyzed due to the lack of data available in GIS format.

6.4.4 Data Limitations

Some vulnerability assessments in this plan rely on HAZUS-MH modeling conducted in 2018. While these analyses provide valuable insights into potential damages and losses, they are based on data and methodologies available at that time.

The County recognizes the importance of updated modeling and is planning to partner with the Utah Division of Emergency Management to conduct new HAZUS-MH analyses. When completed, these updated assessments will be incorporated into future plan revisions.

In the interim, the County is utilizing these existing analyses supplemented with more recent qualitative assessments to inform mitigation strategies and priorities.

6.5 Hazard Identification

The first step in risk assessment is identifying the hazards that could affect Emery County. Hazard identification addresses the geographic extent, the intensity/magnitude of a hazard, and the probability of its occurrence.

The FEMA National Risk Index identifies Emery County, Utah as an area with an overall very low risk index score of 13.39. The Community Resilience score is relatively moderate at 47.33.

Hazard identification was initiated through an extensive process that utilized the following:

- Core Planning Team
- Local Working Group
- Subject Matter Experts
- Community and Public individuals
- Elected Officials
- City and County Agencies
- Utah Division of Emergency Management
- Utah Geological Survey
- Utah Geographic Reference Center

The natural hazards in Table 6.5.1.1 below have the potential of impacting the County. The identification process for County utilized those natural hazards that consistently impacted the County prior to and during the planning process based on history of occurrences, future probability, and risk. Table 9.2 identifies those natural hazards for easy reference.

County created maps that identified the location of critical facilities and the municipalities affected by each identified hazard. Initial data from this study was also used to determine hazards that presented the greatest risk to the County. The geographic extent of each hazard is identified through maps. County hazard intensity/magnitude and probability profiles are also outlined.

County conducted and updated risk assessment analyses for each identified hazard.

6.5.1 Hazard Identification Methodology

The hazard identification process for Emery County involved a systematic approach to evaluate which natural hazards pose the most significant threat to communities within the county. This methodology included:

1. **Historical Analysis**: Review of past disaster events, declarations, and losses to identify hazards with demonstrated impacts on the county.
2. **Spatial Analysis**: Utilization of GIS mapping to determine geographic exposure of populations and assets to various hazards.
3. **Probability Assessment**: Evaluation of the likelihood of future occurrences based on historical frequency, changing conditions, and expert input.
4. **Magnitude/Severity Potential**: Assessment of the potential impact of each hazard on life, property, and infrastructure, using both quantitative and qualitative measures.
5. **Stakeholder Input**: Gathering of information from local officials, emergency managers, and community representatives regarding perceived risks and priorities.

6.5.2 Probability and Magnitude Definitions

To ensure consistency in hazard assessment, the following definitions were used for probability and magnitude:

Probability Categories:

- **Highly Likely**: Near 100% annual probability; occurs more than once per year
- **Likely**: Between 10% and 100% annual probability; occurs at least once in a 10-year period
- **Possible**: Between 1% and 10% annual probability; occurs once in a 100-year period
- **Unlikely**: Less than 1% annual probability; may occur once in more than 100 years

Magnitude Categories:

- **Catastrophic**: More than 50% of the jurisdiction affected; critical facilities shut down for 30+ days; more than 50% of property severely damaged
- **Critical**: 25-50% of the jurisdiction affected; critical facilities shut down for 14-29 days; 25-50% of property severely damaged
- **Limited**: 10-25% of the jurisdiction affected; critical facilities shut down for 7-14 days; 10-25% of property severely damaged
- **Negligible**: Less than 10% of the jurisdiction affected; critical facilities shut down for less than 7 days; less than 10% of property severely damaged

6.5.3 Hazard Selection and Prioritization

This plan addresses natural hazards that potentially threaten Emery County and its participating jurisdictions. The hazards selected for inclusion were determined through a comprehensive review process that included:

1. Analysis of historical occurrences and impacts within the planning area;
2. Review of state and federal disaster declarations affecting the county;
3. Evaluation of existing plans and reports;
4. Consultation with local officials and subject matter experts; and
5. Input from stakeholders and community members.

The planning team identified the primary natural hazards that pose significant risk to Emery County: Flooding, Earthquake, Landslide, Wildfire, Problem Soils, Drought, Dam Failure, Severe Weather (including Lightning, Heat Wave, Cold Wave, Ice Storm, Tornado, Hail, and Strong Wind), and Infestation. Climate change factors are addressed within each relevant hazard profile rather than as a separate hazard, as its primary impacts manifest through intensification of existing hazards.

Each participating jurisdiction has carefully evaluated which hazards pose significant threats to their community. Table 6.5.2 (below) identifies the specific hazards of concern for each jurisdiction. For any hazard not identified as a concern by a particular jurisdiction, a rationale is provided in Section 6.5.4 explaining why that hazard was determined not to pose a significant risk to that community.

6.5.4 Local Hazards Identification

The hazard identification process serves as the foundation for the detailed hazard-specific profiles, vulnerability assessments, and mitigation strategies presented in subsequent sections of this plan. This comprehensive approach ensures that all significant hazards are thoroughly addressed and that mitigation efforts are appropriately prioritized based on risk.

The hazards identified in this process have been analyzed for their potential impacts on:

- Critical facilities and infrastructure
- Residential and commercial structures
- Vulnerable populations
- Essential services

- Economic activities
- Natural resources

The Risk Index scores presented in this plan provide a standardized way to compare different hazard types. These scores combine expected annual losses, social vulnerability, and community resilience to generate an overall risk measurement. Hazards with higher Risk Index scores generally warrant greater attention in mitigation planning, though local context and specific vulnerabilities must also be considered when prioritizing mitigation actions.

For hazards not measured by the FEMA National Risk Index, local historical data, stakeholder input, and best professional judgment were used to establish relative risk levels. These assessments will be updated as additional data becomes available through ongoing monitoring and future plan updates.

Table 6.5.4.1 - Local Hazards Identification

EARTHQUAKE	
How Identified	**Why Identified**
• Review of County Emergency Operations Plan • Review of past disaster declarations • Input from City and County Emergency Operations Managers, USGS, UGS, Utah DEM, and community members	• Utah has a 1:5 chance of experiencing a large earthquake within the next fifty years. • Numerous faults throughout Utah including the Intermountain Seismic Zone. • Yearly, Utah averages approximately 13 earthquakes having a magnitude 3.0 or greater. • Earthquakes can create fire, flooding, hazardous materials incidents, transportation, and communication limitations. • The Wasatch Front has recorded large earthquakes in the past and can be expected to experience large earthquakes in the future.
LANDSLIDE	
How Identified	**Why Identified**
• Input from City and County Emergency Operations Managers, USGS, UGS, NCDC, Utah DEM, and community members	• Have caused damage in the past to residential and commercial infrastructure. • Can be life threatening. • Generally occur in known historic locations therefore risks exist throughout much of Emery County. • To increase community awareness.
WILDFIRE	
How Identified	**Why Identified**

• Review of County Emergency Operations Plan • Review of Community Wildland Protection Plans (CWPP) • Input from County Emergency Managers, Utah DEM, Utah FFSL, Utah FS, NWS, FEMA, and local community members	• Serious threat to life and property. • Increasing threat due to urban growth in WUI areas. Secondary threat associated with flooding, drought, and earthquake. • Much of the mountain front portion of Emery County is at risk. Additional funding and resources offered by local and state agencies to reduce risk. • To increase community awareness.
PROBLEM SOILS	
How Identified	**Why Identified**
• Review of County Emergency Operations Plan • Input from community members, Utah, DEM, and UGS • Researched historical data	• Related to subsequent effects from earthquakes. • Have affected infrastructure and the local economy in the past.
DAM FAILURE	
How Identified	**Why Identified**
• Review of County Emergency Operations Plan • Input from community members, Utah DWS, Dam Safety Section, Utah DEM • Review of inundation maps	• Can cause serious damage to life and property and have subsequent effects such as flooding, fire, debris flow, etc. Emery County has several irrigation reservoirs. • Threat to downhill communities. • Subsequent effects include flooding, and debris flows. To increase community awareness. • To incorporate mitigation measures into existing plans to help serve local residents.
FLOOD	
How Identified	**Why Identified**
• Review of past disaster declarations • Input from City and County Emergency Operations Managers, Utah DWS, UGS, Utah Army Corps of Engineers, Utah DEM, and community members • Review of Flood Insurance Studies, Floodplain maps, and Flood Insurance Rate Maps	• Several incidents have caused severe damage and loss of life. Many of the rivers and streams are located near neighborhoods. Many neighborhoods are located on floodplains, alluvial fans. • Topography and climate lead to cloudburst storms and heavy precipitation can result in flash flooding throughout Emery County.
SEVERE WEATHER	
How Identified	**Why Identified**

• Review of County Emergency Operations Plan • Review of past disaster declarations • Input from City and County Emergency Managers, Utah Avalanche, Forecast Center, Utah Department of Transportation, and community members • Analysis of NOAA Storm Events Database and National Weather Service records	• Damage to communities, homes, infrastructure, roads, and residents. • Can cause property damage and loss of life. Results in economic loss. • Lightning is the number one cause of natural hazard death in Utah and can be costly to recover from. • Winter storms, high winds, heat or cold waves, tornados, and hailstorms all present significant hazards to residents and infrastructure. • Historical records show approximately 60 significant severe weather events since 2016, resulting in deaths, injuries, and substantial property damage.
CLIMATE CHANGE	
How Identified	**Why Identified**
• Review of Utah State Hazard Mitigation Plan	• Long-term climate change has the potential to result in a wide range of impacts across the region and in many sectors of the economy.

The hazard identification process was aided using FEMA How to Guidance documents, FEMA 386- 1,2,3,7 FEMA Post Disaster Hazard Mitigation Planning Guidance DAP-12, Disaster Mitigation Act of 2000, 44 CFR Parts 201 and 206, Interim Final Rule, and FEMA Region VIII Crosswalk. The risk assessment process also utilized assistance from local County GIS using the best available data.

6.5.4.2 Rationale for Omitted Hazards

The hazards identified in Table 6.5.4.1 reflect the primary natural hazards determined to pose significant risk to each jurisdiction. For hazards not selected by individual jurisdictions, the following rationales were considered:

1. **Lightning and Heat Wave**: These hazards were not individually identified as priority hazards by jurisdictions because these phenomena are addressed within jurisdictions' broader severe weather preparedness strategies. Additionally, while these hazards occur frequently, participating jurisdictions determined that their current mitigation capabilities for these specific hazards are adequate relative to other prioritized hazards that require additional mitigation focus.

2. **Avalanche**: This hazard was not prioritized by most jurisdictions due to limited occurrence in populated areas and existing mitigation measures through state highway departments.

3. **Ice Storm, Tornado, and Hail**: These severe weather events, while potentially destructive, occur less frequently in Emery County than other hazards and are addressed through general severe weather preparedness measures.

4. **Infestation**: Only Emery County identified this as a priority hazard because the County manages countywide weed and pest control programs through its Weed and Mosquito Department, while individual municipalities rely on these County services.

6.5.5 Hazard Rankings

Table 6.5.5.1 - Emery County Natural Hazards Rankings (Hazard Type Risk Index for Emery County (FEMA National Risk Index for Emery County, Utah)

Hazard Type	Risk Index Rating	Risk Index Score
Avalanche	Relatively Low	66.8
Climate Change	not measured	not measured
Cold Wave	Very Low	27.6
Dam Failure	not measured	not measured
Drought	Very Low	33.1
Earthquake	Very Low	45.4
Flood	Very Low	24.1
Hail	Very Low	1.1
Heat Wave	Relatively Low	62.5
Ice Storm	Very Low	11.4
Infestation	not measured	not measured
Landslide	Very High	98.7
Lightning	Relatively Low	59.3
Problem Soils	not measured	not measured
Severe Weather	not measured	not measured
Strong Winds	Very Low	5.7
Tornado	Very Low	4.6
Wildland Fire	Very Low	61.3
Winter Weather	Very Low	19.9

*FEMA National Risk Index did not rate problem soils, infestation, Dam Failure, or Climate Change. These hazards were identified with the use of FEMA How to Guidance documents, FEMA 386- 1,2,3,7 FEMA Post Disaster Hazard Mitigation Planning Guidance DAP-12, Disaster Mitigation Act of 2000, 44 CFR Parts 201 and 206, Interim Final Rule, and FEMA Region VIII Crosswalk. The risk assessment process also utilized assistance from local County GIS using the best available data.

**The Risk Indexes for some of the identified risks are unknown at this time. This table will be updated when the information becomes available.

The top 14 risks were calculated by the National Risk Index. This index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards. The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United

States County and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analysis to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at hazards.fema.gov/nri/map or visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

The probability of the remaining hazards (*) were determined by the calculated risk to the County, as identified by FEMA How to Guidance documents with the assistance from local County GIS using the best available data. The probability or likelihood of an occurrence is categorized into four categories: Highly Likely, Likely, Possible, and Unlikely. The hazards were profiled based on history of occurrence, local input, County emergency operations plans, and County master or general plans, scientific reports, historical evidence, and hazard analysis plans.

Maps were created using GIS software to identify the location and extent of each identified hazard area. The following risk assessment maps were created for Emery County:

- Earthquakes
- Geologic hazards
- Liquefaction potential
- Flood history
- Drainage basins
- Landslide susceptibility
- Fire hazard potential
- Dam failure potential

6.5.6 Hazard History

Table 6.5.6.1 - Emery County Natural Hazard History

Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Hail	September 29, 1951	Emery County	Highway 10 flooded	Heaviest hailstorm recorded in U.S.
Cloudburst	August 26, 1952	Castle Dale	Buckhorn Wash	Considerable road damage
Flood	August 8, 1957	Castle Dale Orangeville	not specific	Flood damage to homes, crops, and streets
Tornado	May 4, 1961	Emery City	Near Green River, Emery County and Grand County	3k in property damage Time: 1400 MST, 38 59'N, 110 10'W A tornado touched down near the town of Green River, Emery County and moved eastward across the Green River into Grand County before leaving the ground and ascending back into the clouds. The tornado traveled nearly nine and half miles. http://www.wrh.noaa.gov/slc/climate/tornado.php
Cloudburst	August 2-5, 1961	Moore	Emery Canal, Muddy Creek	Farmland and canal damage
Hail	September 8, 1961	Emery Town	not specific	1” magnitude
Flash Flood	September 21, 1962	Woodside	Saleratus Wash	Destroyed section of Highway 6 and railroad track

Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Flood	August 1-2, 1964	Orangeville City	Cottonwood Creek	Farmland, canal, and road damage $17,500
Flood	July 25, 1965	Emery	Ivie Creek	Farmland, bridge, and irrigations facilities damage bridge

Tornado	May 9, 1966	Emery Town	Southwest of Ferron, Emery County	Time: 1330 MST, 39 03'N, 111 11'W A tornado touched down five to six miles southwest of Ferron, Emery County. No damage reported. http://www.wrh.noaa.gov/slc/climate/tornado.php
Earthquake	April 3, 1967	Emery County	Northwest of Huntington	Richter magnitude 3.4
Flood	May 25, 1967	Orangeville City	Clipper Canal	Highway 59 flooded, home and canal damage
Cloudburst	July 17, 1967	Green River		Farmland, bridge and crop damage
Flash Flood	July 23, 1967	Ferron City	South Straight Hollow and Dutch Flat Wash	Canal, road, and construction project damage
Cloudburst	August 1967	Ferron City	Dutch Flat Canal	Ferron watershed and road damage
Tornado	November 2, 1967	Emery City	Emery, Emery County	*Intensity: F*2, time: 0830 MST, 38 55'N, 111 15'W A cone-shaped tornado, 20 yards wide, completely destroyed the Last Chance Motel in Emery, Emery County. Furniture and bedding were strewn for hundreds of yards. There were no injuries. $15,000+ in damage was tallied. http://www.wrh.noaa.gov/slc/climate/tornado.php
Severe Weather	July 30, 1968	Ferron City	Molen Steeps Wash, Dry Wash	Thunderstorm causes damage on city culinary water system, roads, irrigation flumes; damaged and destroyed
Cloudburst	August 1, 1968	Ferron City	North Canal	Farmland, road, business damage
Storm	September 9, 1969	Huntington City	Huntington Canyon	Damage irrigation systems and crops about $20,000.00
Earthquake	August 20, 1971	Emery County	North of Green River	Richter magnitude 3.1

Hazard	Date	Location	Critical Facility or Area Impacted	Comments

Earthquake	April 17, 1972	Emery County	San Rafael Swell	Richter magnitude 3.1
Earthquake	November 15, 1972	Emery County	Near Emery	Richter magnitude 3.1
Tornado	May 1, 1978	Emery County	Ferron	Time: 1100 MST, 39 5'N, 111 9'W The tornado was on the ground for several minutes, traveled southeast to northwest for about three miles. Damage: Removed a front porch and carried it for two blocks. http://www.wrh.noaa.gov/slc/climate/tornado.php
Severe Weather	March 31, 1978	Emery Town	not specific	57 miles per hour winds with rain and severe lightning and thunder
Severe Weather	July 21, 1984	Emery Town	not specific	63.4 mile per hour winds with rain and severe lightning and thunder
Hail	August 30, 1986	Emery Town	not specific	1.00 inch
Earthquake	August 18, 1988	San Rafael Swell	Buckhorn	Richter magnitude 5.3
Earthquake	June 10, 1905	Fish Lake	not specific	Richter magnitude 6.0
Hail	Sept 21, 1988	Emery Town	not specific	1.00 inch
Hail	Sept 21, 1988	Emery Town	not specific	0.75 inch
Tornado	July 26, 1991	Emery Town	Northwest of Green River, Emery County	FO Time: 1610 MST, 39 01'N, 110 3'W http://www.wrh.noaa.gov/slc/climate/tornado.p hp
Tornado	July 26, 1991	Emery County	West of Green River, Emery County	FO Time: 1615 MST, 38 59'N, 110 8'W http://www.wrh.noaa.gov/slc/climate/tornado.p hp
Earthquake**	June 24, 1992	Emery County	45.4 miles away from County center.	Felt throughout the County. Occurred at 07:31:20, a magnitude 4.4 (4.4 MB, 4.4 ML, Depth: 0.1 mi). *Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)*
Heavy Snow	January 11, 1993	Emery County	not specific	1 injury, 1k in property damage

Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Heavy Snow	January 29, 1993	Emery County-	not specific	none

Heavy Snow	February 1, 1993	Emery County-	not specific	none
Heavy Snow	February 8, 1993	Emery County-	not specific	none
Heavy Snow	February 16, 1993	Emery County-	not specific	none
Lightning	February 4, 1994	Orangeville City	not specific	1 injury
Heavy Snow	February 4, 1994	Emery County-	not specific	none
Drought (Heat)	June 1, 1994	Countywide	not specific	none
Flash Flood	June 19, 1994	Orangeville City	not specific	none
Flash Flood	August 11, 1995	Ferron City	not specific	none
Flash Flood	August 23, 1995	Huntington City	not specific	none
Earthquake**	January 6, 1996	Emery County	2.8 miles away from County center.	Occurred at 12:55:58, a magnitude 4.3 (4.3 MB, 4.2 MD, Depth: 0.4 mi). *Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)*
Heavy Snow	February 25, 1996	Emery County-	not specific	1 death, 1 injury, 10k in property damage
High Wind	March 28, 1996	Emery County-	not specific	51kts. 17k in property damage
High Wind	December 16, 1996	Emery County-	not specific	96kts. 6 injuries, 100k in property damage
Blizzard	January 11, 1997	Emery County-	not specific	3 deaths, 50 injuries, $40,000 in property damage
Hail	June 14, 1997	Ferron City	not specific	0.75 inch
Flash Flood	July 28, 1997	Emery Town	not specific	40k in property damage

Hazard	Date	Location	Critical Facility or Area Impacted	Comments

Thunderstorm/ Wind	August 12, 1997	Green River	not specific	61kts. 1 injury, 10k in property damage
Flood	September 13, 1997	Ferron City	not specific	
Thunderstorm/ Wind	September 19, 1997	Green River	not specific	61kts. 8k in property damage
Heavy Rain	July 28, 1998	Green River	not specific	45k in property damage, 2k in crop damage
Flash Flood	August 21, 1998	Green River	not specific	2k in property damage, 1k in crop damage
Hail	September 29, 1998	Ferron	not specific	0.75 inch, 1k in crop damage
Winter Storm	October 15, 1998	Emery County	not specific	100k in property damage
Winter Storm	November 8, 1998	Emery County	not specific	10 injuries, 500k in property damage
Winter Storm	December 19, 1998	Emery County	not specific	10 injuries, 100k in property damage
Extreme Cold	December 21, 1998	Emery County –	not specific	20k in property damage
Heavy Snow	April 4, 1999	Emery County –	not specific	
Earthquake**	March 7, 2000	Emery County	40.9 miles away from County center	Occurred at 02:16:04, a magnitude 4.3 (4.3 MB, 4.2 ML, Depth: 1.1 mi). Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)
Earthquake**	July 19, 2001	Emery County	46.2 miles from County center	Occurred at 20:15:34, a magnitude 4.5 (4.5 MB, 4.3 ML, Depth: 2.3 mi) Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)
High Wind	April 15, 2002	Emery County	Countywide	75kts. 10 injuries, $2M, in property damage, 100k in crop loss
Wild Fire *	June 5, 2002	Manti -La Sal National Forest	Ferron Mountain Fire" –	~500 acres and ~$85,000

Hazard	Date	Location	Critical Facility or Area Impacted	Comments

Wild Fire*	July 20, 2002	Green River City Area	"Rattle Complex Fire"— 20 miles NW of Green River City	Sparked by lightning, total of 95,000 acres with a total cost of ~$10 million.
Severe Weather*	April 5, 2003	Emery County—	West of Green River City	Small Tornado (F0) touched down. Moving off to the northeast, little damage was reported.
Earthquake**	April 17, 2003	Emery County	58.6 miles away from the County center	Occurred at 01:04:19, a magnitude 4.7 (4.7 MB, 4.4 ML, Depth: 0.2 mi, Class: Light, Intensity: IV - V) Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)
Wild Fire *	July 10, 2004	Emery County	Desolation Canyon	~508 Acres
Wild Fire *	August 15, 2004	Emery County	Big Canyon Fire	Lightning strike burned the north slope of Big Canyon at an elevation of 8000 feet. ~3,415 acres
Flooding *	Fall 2006	Emery County—	Green River and San Rafael Rivers	Significant rainfall with ground saturation. Canals & rivers brought debris filled floodwaters into the surrounding communities.
Earthquake	January 26, 2006	Emery County	Eight Miles East of Castle Dale	11:47PM (MST) Magnitude 3.6
Severe Weather *	June 8, 2006	Green River City	SW of Green River City, S of I-70	F (0) tornado briefly touched down over open country land. Described as a rope-like and short lived.
Flooding	October 1, 2006	Green River City	Watermelon Crop, Green River High School, Residential, and City Sewer	Flooding throughout city due to heavy rain: Green River went from 2,000cfs to 12,000cfs with debris, San Rafael River normal flow is 30-40 cfs, October 6 it was 2,750 and October 8 it was near 5,000 cfs decreasing to 200cfs by October 13.
Infestation / Drought	June 1, 2007	Emery County	Countywide	Tamarisk is a non-native species that uses large amounts of water and chokes out native vegetation. They spread rapidly. County Weed and Mosquito department developed a project to control this specie.

Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Earthquake	August 6, 2007	Emery County	29.1 miles from County center	Occurred at 08:48:40, a magnitude 4.2 (4.2 MB, 3.9 ML, Depth: 1.0 mi).
Flooding	July 22, 2010	Ferron	Millsite State Park and Town area	Roadway damage
Severe Weather	February 5, 2011	Castle Dale, Emery Town and Ferron	Transmission Line	Extremely strong morning winds broke a power pole. Restoration of power to 1,714 customers within hours and 980 customers later that same day.
Flooding	June 16, 2011	Ferron area	Millsite Golf Course, Road and Culvert located at 800 West Canyon Road	Significant damage to the road/culvert due to heavy rains that caused flooding that carried debris. Estimated cost damage was $2145.82. In addition, FEMA determined the bridge needs replaced at a cost of $73,265.89. Damages at Millsite Golf Course were $2457.15
Flooding	June 1-30, 2011	Green River City	Green River State Park	Heavy rains added to the snowpack melting that caused flooding along the Green River throughout the month of June. Damages were $79,962.79.
Flooding	July 12, 2011	Orangeville	Mammoth Canal & Residential yards and basements.	The Mammoth Canal located above Orangeville flooded due to being full for irrigation purposes, the runoff from heavy rains added to the flow creating the canal to breach and causing residential havoc. Estimated damage cost of $1700; however this does not include private property damage.
Earthquake	November 9, 2011	Emery County	Six miles NW of Orangeville town and nine miles WSW of Huntington city.	Magnitude 4.1 at 9:27PM (MST)

Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Wildland Fire	June 26, 2012	Emery County	Northwest Mountain & recreational areas	The Seeley Fire began on the Manti-LaSal National Forest with a lightning strike on June 26 and was reported at about 6 a.m. that day. Cabins, homes and a historic ranger station were quickly threatened. Evacuations of the Electric Lake area, Scofield, Clear Creek, Hiawatha and two youth camps were implemented. Due to the vicinity of the fire, a major oil and gas field has been shut down. Last report of 48,000+ acres of forest land. Estimate cost of $7.8 Million. Area contained large components of decadent standing beetle-killed timber, dead and down fuels and some sage and pinion juniper.
Earthquake	July 3, 2012	Emery County	Orangeville & Huntington	Micro earthquake at 9:26PM (MDT). Magnitude 1.5. Sixteen miles NNW of Orangeville and 15 miles WNW of Huntington.
Flash Flood	July 16, 2013	Huntington Canyon	Hwy 31	Flash Flood near the Seeley Fire Burn Scar Mud, Rocks, Debris covered Hwy 31 forcing a closure between MM 24 and MM 34
Land Slide	July 19, 2013	Huntington Canyon	Hwy 31	Landslide covered Hwy 31 at MM 34
Earthquake	January 4, 2014	Emery County	17 Miles from Ferron	2.0 Mag. No injuries or damage reported
Earthquake	January 11, 2014	Emery County	17 Miles from Ferron	2.2 Mag. No injuries or damage reported
Earthquake	January 15, 2014	Emery County	17 Miles from Ferron	2.3 Mag. No injuries or damage reported
Earthquakes	March 5-7, 2014	Emery County	17 Miles from Ferron	2.7,2.1,2.6,2.1, and 2.1 Mag. No injuries or damage reported
Earthquake	March 15, 2014	Emery County	16 Miles from Ferron	2.7 Mag No injuries or damage reported

Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Earthquakes	April 3, 2014	Emery County	8 Miles from Emery Town	2.4,2.1, and 2.0 No damage or injuries reported
Earthquake	April 22, 2014	Emery County	8 Miles from Emery Town	2.2 Mag. No injuries or damage reported
Earthquake	May 16, 2014	Emery County	16 Miles from Ferron	2.9 Mag. No injuries or damage reported
Flash Flood	August 5, 2014	Huntington Canyon	Hwy 31	Mud and Debris overflowing the road way closed Hwy 31
Earthquake	August 19, 2014	Emery County	18 Miles from Ferron	3.3 Mag. No injuries or damage reported
Flash Flood	September 27, 2014	Orangeville and Castle Dale	Hwy 29 and Hwy 31	Cotton Creek overflowed its banks flooding property in Orangeville and Castle Dale. Hwy 29 and Hwy 31 impacted with mud and debris
Thunderstorm	September 22, 2016	Emery County	Countywide	Heavy rains and the Sheriff reports homes throughout the County have been flooded

6.5.7 Summary Table of Hazards Addressed by Stakeholders

Hazards Addressed by Stakeholder Goals																	
	EC	**CD**	**CL**	**CVL**	**EL**	**ET**	**FE**	**GR**	**HU**	**OR**	**CSSD**	**ECEMS**	**ERSSD**	**ESD**	**ESSD**	**NEW**	**SRSSD**
Earthquake	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Flood	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
Landslide	✓					✓	✓					✓	✓	✓			✓
Wildfire	✓			✓		✓			✓	✓	✓		✓	✓		✓	✓
Problem Soils	✓			✓		✓					✓		✓	✓	✓		
Dam Failure	✓	✓							✓	✓	✓		✓	✓			✓
Drought	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
Severe Weather	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
*Lightning**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓					
*Heat Wave**	✓		✓				✓				✓	✓					
Winter Weather	✓	✓	✓					✓	✓			✓		✓			

Cold Wave	✓		✓				✓				✓	✓					
Ice Storm	✓										✓					✓	
Tornado	✓					✓		✓									
Hail	✓														✓		
Strong Wind	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			
Avalanche																	
Infestation	✓												✓	✓			

Abbreviations Used:

- **EC:** Emery County
- **CD:** Castle Dale
- **CL:** Clawson
- **CVL:** Cleveland
- **EL:** Elmo
- **ET:** Emery Town
- **FE:** Ferron
- **GR:** Green River
- **HU:** Huntington
- **OR:** Orangeville
- **CSSD:** Castle Valley SSD
- **ECEMS:** Emery County EMS
- **ERSSD:** Emery Recreation SSD
- **ESD:** Emery School District
- **ESSD:** Emery SSD #1
- **NEW:** North Emery Water
- **SRSSD:** San Rafael SSD

** Lightning and Heat Wave were not individually identified as priority hazards by jurisdictions because these phenomena are addressed within jurisdictions' broader severe weather preparedness strategies. Additionally, while these hazards occur frequently, participating jurisdictions determined that their current mitigation capabilities for these specific hazards are adequate relative to other prioritized hazards that require additional mitigation focus.*

While some hazards such as Lightning, Heat Wave, Cold Wave, Avalanche, Ice Storm, Tornado, Hail, and Strong Wind were not selected as top priorities by any single jurisdiction, they remain important considerations within the "Severe Weather" category. These hazards were incorporated into the Severe Weather profile because:

1. They share similar preparedness and response mechanisms;
2. They often occur in conjunction with one another;

3. Their individual impacts, while significant during specific events, typically affect smaller geographic areas or cause less widespread damage than the prioritized hazards; and

4. Local emergency management capabilities are structured to address these hazards collectively.

Further, while Table 6.5.7 identifies the hazards of concern for each jurisdiction, the specific mitigation actions developed by each jurisdiction reflect their unique vulnerabilities, capabilities, and priorities. In some cases, a jurisdiction may acknowledge a hazard as present in their area but determine that specific mitigation actions are not warranted due to low vulnerability, existing measures, or other considerations. Section 7 provides detailed mitigation strategies for each jurisdiction, including explicit justification for any hazards that do not have specific mitigation actions.

6.5.8 Mitigation Action Prioritization

All mitigation actions in this plan have been assigned a priority level (High, Medium, or Low) based on the following criteria:

- **High Priority**: Actions that have a direct impact on reducing risk to life and property, are cost-effective, technically feasible, and can be implemented in the near-term (1-3 years). These actions address hazards that pose the most significant threat to the community based on risk assessment findings.
- **Medium Priority**: Actions that meet most criteria for effectiveness and implementation but may have slightly longer timeframes (3-5 years), more complex funding requirements, or address hazards with moderate risk profiles.
- **Low Priority**: Actions that are still important but may have longer implementation timeframes (5+ years), more complex implementation requirements, or address hazards with lower risk profiles.

Priority levels are assigned to each mitigation action in the jurisdiction-specific action plans presented in Chapter 7.

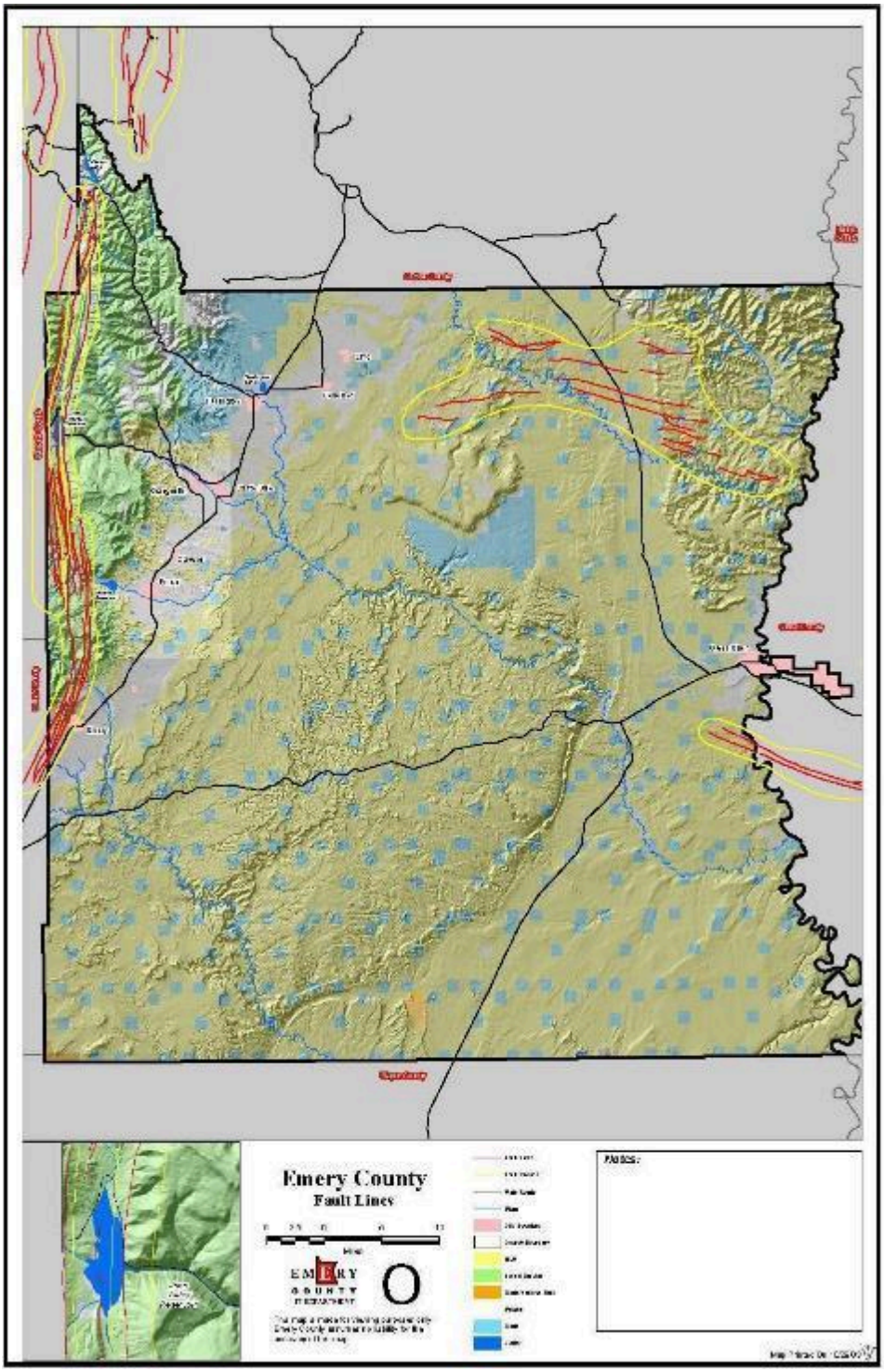
6.6 Earthquake (E)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to dam failures have been issued for Emery County since the last plan update in 2018.

There have been 78 recorded earthquakes in Emery County since 1931. A 5.5 Magnitude earthquake occurred in 1988 14 miles from Cleveland, UT, with many of the earthquakes being 2.0 Magnitude or lower centered in the mountains southwest of Ferron, UT, and in the uninhabited areas of the San Rafael Swell. There have been no reported damage or injuries from these earthquakes.

6.6.1 Location & Extent

There have been 78 recorded earthquakes in Emery County since 1931. A 5.5 Magnitude earthquake occurred in 1988 14 miles from Cleveland, UT, with many of the earthquakes being 2.0 Magnitude or lower centered in the mountains southwest of Ferron, UT, and in the unhabituated areas of the San Rafael Swell. There have been no reported damage or injuries from these earthquakes.


Emery County
Fault Lines
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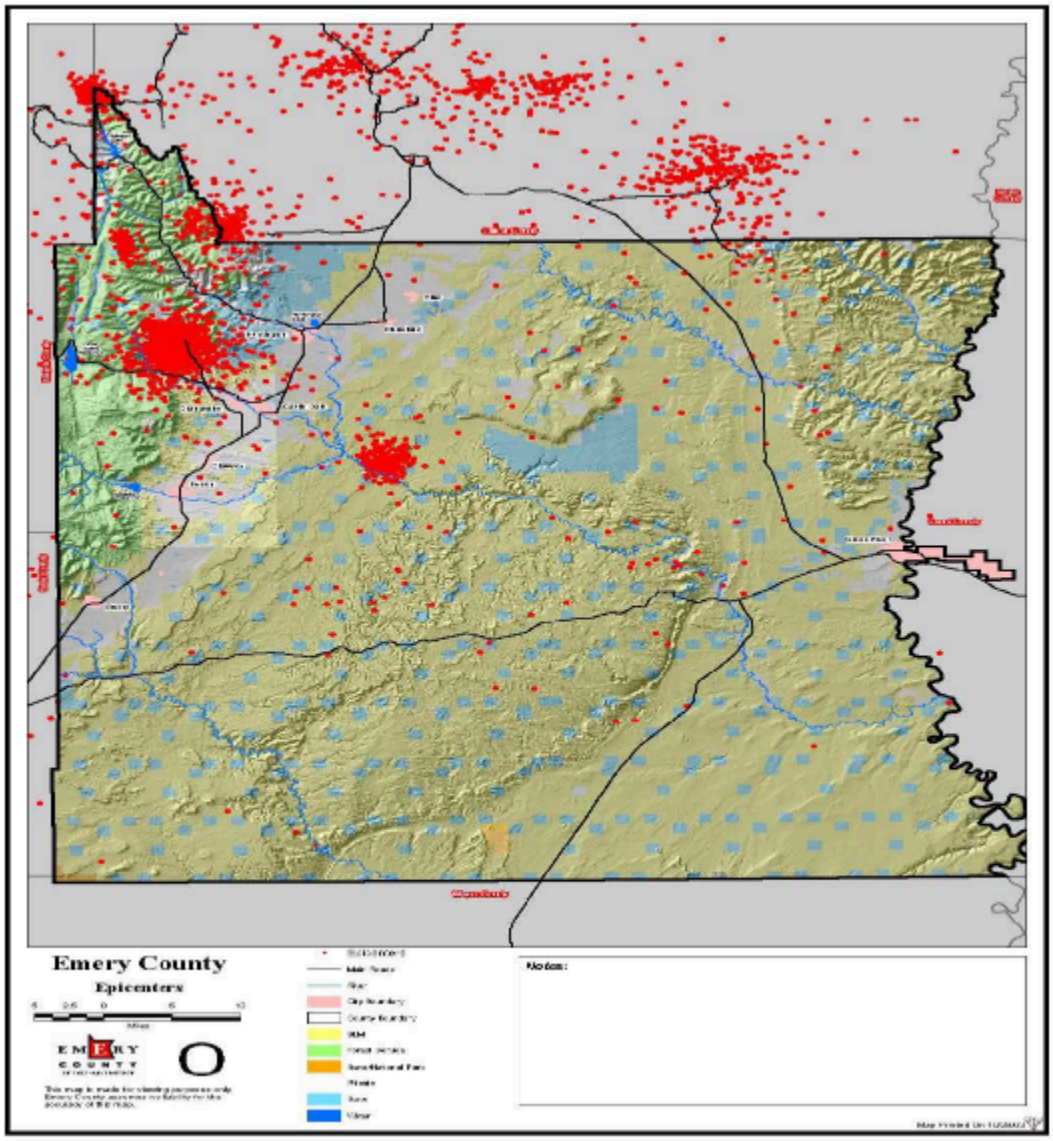
COUNTY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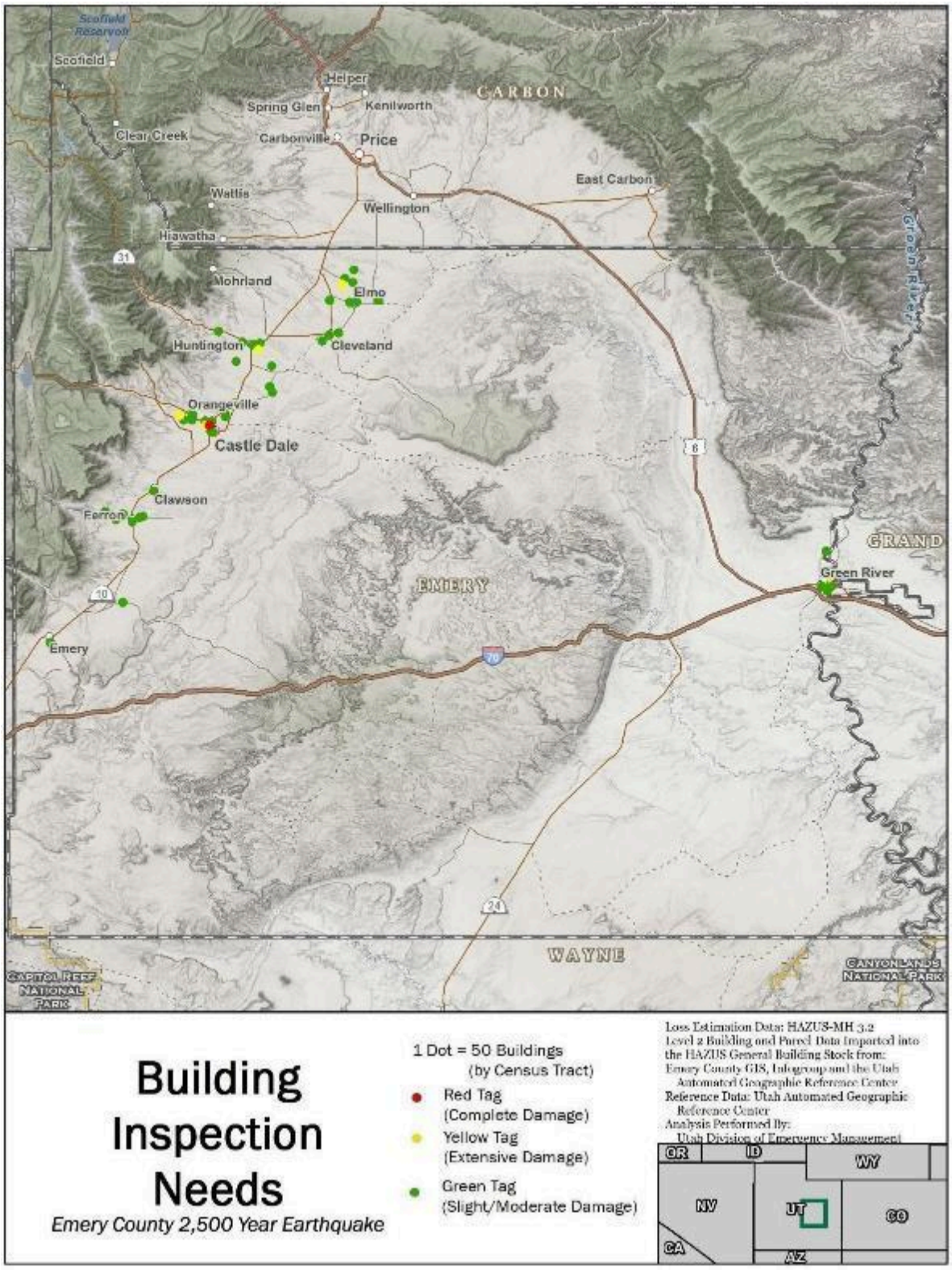

Scofield Reservoir
Scofield
Helper
Spring Glen
Kenilworth
CARBON
Clear Creek
Carbonville
Price
East Carbon
Wattis
Wellington
Hiawatha
Green River
Mohrland
Elmo
Huntington
Cleveland
Orangeville
Castle Dale
Clawson
Ferron
GRAND
Green River
EMERY
Emery
WAYNE
CAPITOL REEF NATIONAL PARK
CANYONLANDS NATIONAL PARK
Building Inspection Needs
Emery County 2,500 Year Earthquake
1 Dot = 50 Buildings
(by Census Tract)
Red Tag
(Complete Damage)
Yellow Tag
(Extensive Damage)
Green Tag
(Slight/Moderate Damage)
Loss Estimation Data: HAZUS-MH 3.2
Level 2 Building and Parcel Data Imported into the HAZUS General Building Stock from:
Emery County GIS, Intergroup and the Utah Automated Geographic Reference Center
Reference Data: Utah Automated Geographic Reference Center
Analysis Performed By:
Utah Division of Emergency Management
OR
ID
WY
NV
UT
CO
CA
AZ

6.6.2 Overview & Profile

The Utah Geologic Survey defines an earthquake as the result of "…sudden breakage of rocks that can no longer withstand the stresses that build up deep beneath the earth's surface.". The energy that is released is abrupt shaking, trembling or sudden motion in the earth and rocks that break along faults or zones of weakness along which the rocks slip. Seismic waves are then transmitted outward and also produce ground shaking or vibrations in the earth. The Richter scale measures the magnitude of earthquakes on a seismograph. A Richter magnitude 6 earthquake is 30 times more powerful than a Richter magnitude 5. A Richter magnitude 7 is 1000 times more powerful than a Richter magnitude 5.

Utah experiences approximately 700 earthquakes each year, and approximately six of those have a magnitude 3.0 or greater (see Table 6.6.3.2). On average, a magnitude 5.5 or greater earthquake occurs in Utah every 10 years.

Generally, in order for humans to feel an earthquake, it needs to be at least a magnitude 2.0. In order for significant damage to occur, an earthquake needs to be at least a magnitude of 5.5 or greater. The amount of damage that occurs from an earthquake depends on soil type, rock type, ground-water depth and topography. Other factors include the type of construction in an area and the population density.

6.6.3 Slopes & Faults

Emery County is characterized by its diverse geology, which includes a variety of slopes and faults. The County is located within the Colorado Plateau region, known for its spectacular cliffs, canyons, and mesas. The slopes in Emery County vary in steepness and composition, ranging from rolling hills to more rugged and precipitous terrain.

The region is intersected by several faults, which are fractures in the Earth's crust that have displaced rock layers. These faults, such as the San Rafael Fault, contribute to the complex geology of the area and have played a role in shaping the landscape. The presence of slopes and faults in Emery County adds to its natural beauty and provides opportunities for outdoor recreation and geological exploration, but it also adds to the risk profile of the region.

EARTHQUAKE (E): Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.

Table 6.6.3.1- Earthquake Hazard Summary Profile

Potential Magnitude		Catastrophic (>50%)	**Probability**		Highly Likely
	X	Critical (25-50%)		x	Likely
		Limited (10-25%)			Possible
		Negligible (<10%)			Unlikely
Location	Countywide				
Extent	Events are expected to be up to 7.0 (Richter).				
Seasonal Pattern	There is no seasonal pattern for earthquakes, they can occur at any time of the year or day during any or all weather conditions.				

Conditions	Historic movement along faults: Intermountain Seismic Zone, and the Wasatch Fault Zone.
Duration	Actual ground shaking will be under one minute, aftershocks can occur for weeks or even months.
Secondary Hazards	Fire, landslide, rock falls, avalanche, flooding.
Climate Change	Climate change is not expected to impact earthquake risk directly, but it could exacerbate hazards Utah already experiences.
Analysis Used	Review of hazard analysis plans and other information provided by the University of Utah Seismograph Station, UGS, USGS, DEM, AGRC.

6.6.4 Vulnerability Analysis

Vulnerability to earthquakes in Emery County was obtained from the modeling program Hazards United States -- Multi Hazards (HAZUS-MH). The following numbers were based on a probabilistic 2500-year event with a Richter magnitude of 7.1 as well as an arbitrary 5.9 event located in close proximity to the County's most populated areas. These locations and magnitudes were chosen for their likelihood and proximity respectively. Default HAZUS-MH inventory for all infrastructure was used.

6.6.4.1 - Jurisdictional Vulnerability - Earthquakes

Earthquake vulnerability varies across Emery County jurisdictions based on building age, construction type, soil conditions, and proximity to fault lines:

- **Castle Dale City**: Moderate vulnerability with several pre-1970s buildings in the downtown district constructed before modern seismic codes. Critical facilities including the County Courthouse and Sheriff's Office are vulnerable. Underlying soil conditions could amplify ground motion in parts of the city with approximately 35% of downtown buildings constructed before seismic code implementation. Damage to these structures could disrupt government operations and emergency response capabilities.
- **Clawson Town**: Lower vulnerability with predominantly newer wood-frame residential structures. The community center, built in 1958, represents the highest risk building. Potential impacts include loss of community gathering space, temporary displacement for social services, and possible injuries to occupants during events.
- **Cleveland Town**: Moderate vulnerability with a mix of older and newer structures. The fire station may require seismic evaluation and potential retrofitting. Potential impacts include compromised emergency response capabilities if the fire station sustains damage, extended response times, and community safety implications during secondary emergencies.
- **Elmo Town**: Limited vulnerability with mostly newer construction, though water delivery infrastructure crosses areas susceptible to liquefaction. Potential impacts include water service disruption, repair costs for infrastructure, and possible contamination of water supplies due to pipe breakage.

- **Emery Town**: Higher vulnerability from building stock predominantly constructed before 1980 and hillside development with potential for slope failure during seismic events. A significant seismic event could result in isolation of the community due to roadway damage in addition to structural failures. Potential impacts include residential structure damage, road accessibility issues from landslides, and potential for injuries or displacement of residents, particularly elderly populations.
- **Ferron City**: Moderate risk with concentration of unreinforced masonry buildings in the downtown area. The city's location near canyon mouths increases potential for amplified ground motion. Potential impacts include damage to historic commercial buildings, economic losses to businesses, and possible injuries to occupants of older structures.
- **Green River City**: Moderate vulnerability, particularly in older commercial structures along Main Street where approximately 15 commercial buildings could suffer significant damage during moderate seismic events, potentially disrupting essential services and commerce. The city's location near the San Rafael Swell creates unique seismic risk profiles. Potential impacts include damage to tourism infrastructure, regional transportation disruption along I-70, and economic losses due to business interruption.
- **Huntington City**: Higher vulnerability with significant number of pre-1970 structures and critical infrastructure including the power plant, including the power plant which serves multiple communities. Failure of this facility during a seismic event would have cascading effects throughout the region's power grid. Potential impacts include damage to residential and commercial buildings, possible power generation disruption affecting the wider region, and substantial reconstruction costs.
- **Orangeville City**: Moderate vulnerability with several public buildings requiring seismic assessment. Damage to these buildings could disrupt essential municipal services during emergency response operations. Potential impacts include damage to municipal facilities, service disruptions, and possible injuries to building occupants during events.
- **Emery County School District**: School facilities built before 1975 present higher vulnerability, with several requiring seismic upgrades. Emergency shelter roles during disasters increase the importance of their seismic resilience. A seismic event during school hours could affect up to 1,500 students and staff, with particular concern for the two remaining unreinforced masonry school buildings. Potential impacts include building damage, risk of injury to students and staff, educational disruption, loss of emergency shelter facilities, and high reconstruction costs.
- **Emery Water Conservancy District**: Water delivery systems, particularly aging transmission lines and treatment facilities, are vulnerable to ground deformation. Multiple earthquake-induced failures could severely impact the county's water delivery capability. Even minor pipeline failures could leave communities without water service for extended periods, complicating emergency response and recovery. Potential impacts include water service disruptions, contamination risks, insufficient fire suppression capability, and substantial repair costs.

All jurisdictions face potential secondary hazards including landslides, liquefaction in susceptible areas, infrastructure disruption, and limited emergency response capabilities immediately following a significant earthquake. Section 7 provides more detailed jurisdiction-specific assessments and mitigation priorities.

Table 6.6.4.2 - Building Damage Counts and Estimated Losses

	Number of Structures with >50% Damage			Estimated Losses	
	Emery M5.9	2500-yr M7.1		Emery M5.9	2500-yr M7.1
Residential	7,618	41,310	Structural Losses	$96,362,000	$751,502,550
Commercial	282	954	Non-Structural Losses	$345,379,000	$2,646,616,900
Industrial	91	294	Content Losses	$131,812,000	$844,568,670
Government	15	49	Inventory Losses	$4,504,000	$38,314,060
Education	11	38	Income + Relocation Losses	$90,090,000	$3,983,479,080
Totals	8,017	42,645	Totals	$668,147,000	$8,264,481,260
Source: HAZUS-MH, 2018, 2018					

6.6.5 Critical Facilities Protection

Table 6.6.51- Fire Following Event, Population Exposed, and Building Stock Exposed

Category	Number Of Structures Emery M5.9	2,500-yr M7.1
Ignitions	11	12
Persons Exposed	261	447
Value Exposed	$13,663,000	$28,594,000
Source: HAZUS-MH, 2018		

Table 6.6.5.2- Damage to Transportation and Utilities

	Total	At Least Moderate Damage (>50%)		Estimated Losses	
		Emery M5.9	2500-yr M7.1	Emery M5.9	2500-yr M7.1
Wastewater Facilities	3	1	3	$21,559,000	$77,769,000
Wastewater	1,242 km	203	4,455	$730,000	$16,039,000

Pipelines		leaks/breaks	leaks/breaks		
Potable Water Pipelines	2,069 miles	256 leaks/breaks	5,633 leaks/breaks	$923,000	$20,279,000
Natural Gas Pipelines	828 km	216 leaks/breaks	4,775 leaks/breaks	$780,000	$17,145,000
Electrical Power Facilities	1	0	1	$11,375,000	$51,503,000
Communication Facilities	5	0	4	$46,000	$220,000
Highway Bridges	130	0	81	$3,359,000	$61,530,000
Railway Facilities	2	0	2	$712,000	$2,169,000
Airport Facilities	4	0	4	$2,569,000	$9,719,000
			Totals .	**$42,053,000**	**$256,373,000**
Source: HAZUS-MH, 2018					

Table 6.6.5.3 - Debris Generated/Number of Loads

Category	Number of Structures	
	Emery M5.9	2,500-yr M7.1
Brick, Wood & Others	111,000 tons / 4,440 loads	758,000 tons / 30,320 loads
Concrete & Steel	197,000 tons / 7,880 loads	1,603,000 tons / 64,120 loads
Source: HAZUS-MH, 2018		

Table 6.6.5.4 - Potential Casualties

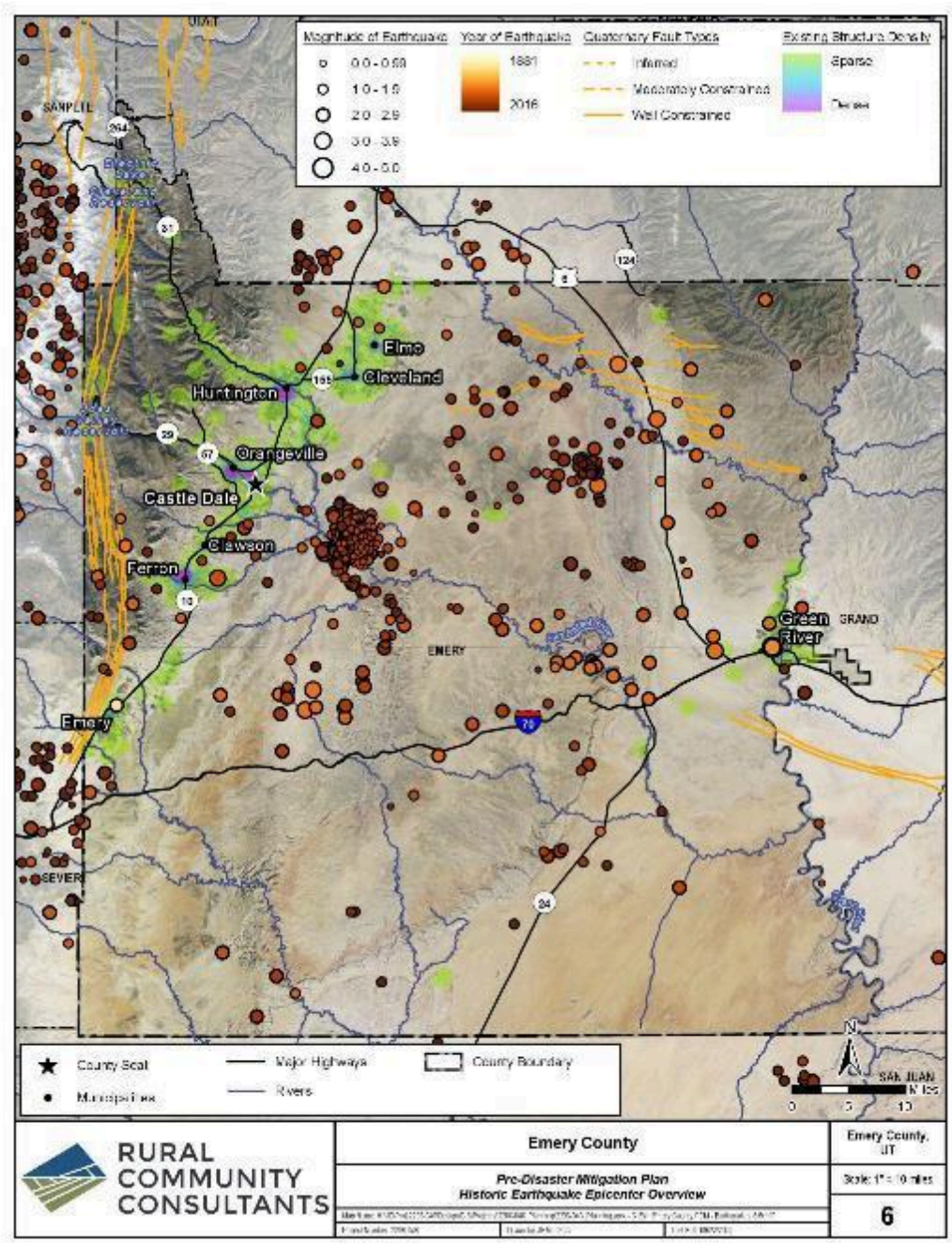
	Night Event		Day Event		Commute Event	
	Emery M5.9	2,500-yr M7.1	Emery M5.9	2,500-yr M7.1	Emery M5.9	2,500-yr M7.1
Minor	223	2,589	250	3,039	227	2,700
Major	46	792	62	1,086	59	924
Fatalities	9	186	14	302	13	243
Source: HAZUS-MH, 2018						

6.6.6 Natural Resource Protection

Earthquakes can significantly impact natural resources in Emery County through secondary effects such as landslides, soil liquefaction, and changes to groundwater systems. Key natural resource protection considerations include:

1. **Watershed Protection**: Earthquakes can alter stream channels and damage riparian vegetation. Protecting intact watersheds provides natural resilience against earthquake-induced erosion and landslides. The County should prioritize preserving natural vegetation buffers along riparian corridors, particularly in the Green River, San Rafael River, and Huntington Creek watersheds.
2. **Open Space Preservation**: Maintaining undeveloped land in hazard-prone areas serves multiple purposes, including reducing potential earthquake damage while preserving natural habitat. The County should continue to identify and protect critical open spaces, particularly in canyon bottoms and along fault lines.
3. **Wetland Conservation**: Wetlands provide natural water filtration and habitat values that could be compromised by earthquake-induced changes to hydrology. The County should continue mapping and protecting wetland resources, particularly those associated with the Green River floodplain and scattered spring areas in the San Rafael Swell.
4. **Forest Management**: Healthy forest ecosystems in the Wasatch Plateau are more resilient to earthquake-triggered landslides. The County should coordinate with the U.S. Forest Service to implement management practices that enhance forest health and root structure stability on steep slopes.

Figure 6.6.6.1 Map Illustrating Earthquake Epicenters



Map illustrating earthquake epicenters in the Emery County area (click for original).

6.6.7 Secondary Hazards

Associated earthquake hazards include ground shaking, surface fault rupture and tectonic subsidence, soil liquefaction, flooding, avalanches, dam failure, fire, and slope failure.

6.6.7.1 Ground Shaking

Ground shaking is caused by the passage of seismic waves generated by an earthquake. Shaking can vary in intensity but is the greatest secondary hazard because it affects large areas and stimulates many of the other hazards associated with earthquakes. The waves move the earth's surface laterally and horizontally and vary in frequency and amplitude. High frequency, small amplitude waves cause more damage to short, stiff buildings. Low frequency, large amplitude waves have a greater effect on high-rise buildings. The intensity depends on geologic features such as bedrock and rock type, topography, and the location and magnitude of the earthquake. Other significant factors include groundwater depth, basin shape, thickness of sediment, and the degree of sediment consolidation. Moderate to large earthquake events generally produce trembling for about 10 to 30 seconds. Aftershocks can occur erratically for weeks or even months after the main earthquake event. .

6.6.7.2 Surface Fault Rupture and Tectonic Subsidence

Surface fault rupture or down dropping and tilting associated with tectonic subsidence can rupture the ground surface and in Utah the result is the formation of scarps or steep breaks in the slope.

Also, earthquakes having a magnitude of 6.5 or greater could result in surface faulting of 16 to 20 feet high and 12 to 44 mile long break segments. Surface displacement generally occurs over a zone of hundreds of feet wide called the zone of deformation. Tectonic subsidence generally depends on the amount of surface fault displacement. The greatest amount of subsidence will be in the fault zone and will gradually diminish out into the valley.

6.6.7.3 Soil Liquefaction

Liquefaction occurs when there is a sudden large decrease in shear strength of sandy soils. It is caused by the collapse of the soil structure in which the soil loses its bearing capacity, and also by a temporary increase in pore-water pressure, or water saturation during earthquake ground shaking. Liquefaction is common in areas of shallow ground water and sandy or silty sediments. Two conditions must be met in order for soils to liquefy; first, the soils must be susceptible to liquefaction (sandy, loose, water-saturated, soils typically between 0 and 30 feet below the ground surface) and second, ground shaking must be strong enough to cause susceptible soils to liquefy (UGS 2015). The result is soils that will flow even on the gentlest of slopes.

6.6.7.4 Lateral Spreading

Lateral spreading is a type of failure that results in surface soil layers breaking up and moving, up to 3 feet or more, independently over the liquefied layer. On slopes more than 5 percent, flow failures can move several miles at speeds up to 10s of miles per hour. On slopes less than 0.5 percent the bearing capacity will lessen and can cause buildings to settle or tip. No matter the slope percent, ground cracking and differential settlement will occur. Liquefaction can also cause foundation materials to liquefy and fail and/or cause sand boils. Sand boils are deposits of sandy sediment ejected to the surface during an earthquake along fissures. Liquefaction can occur during earthquakes of magnitude 5.0 or greater.

6.6.7.5 Slope Failure

Ground shaking can cause rock falls and landslides in mountainous or canyon areas. Rock falls are the most common slope failure and can occur up to 50 miles away from a 6.0 magnitude earthquake. Landslides occur along benches in wet unconsolidated materials. During a 6.0 magnitude earthquake, landslides may happen within 25 miles of the source.

6.6.7.6 Flooding

Flooding can happen due to tectonic subsidence and tilting, dam failure, seiches (waves generated in standing bodies of water) in lakes and reservoirs, surface-water diversion or disruption, and increased ground-water discharge.

6.6.7.7 Avalanches

Avalanches could be triggered because of the associated ground movement. The most vulnerable areas include those that have steep terrain, high precipitation, high earthquake potential, and high population density. In winter or spring months with a snowpack, avalanches may be expected anywhere along the steep hillsides following an earthquake.

6.6.7.8 Sensitive Clays

Sensitive clays are a soil type that lose strength when disturbed and result in liquefaction or collapse. The resulting type of ground failure is similar to liquefaction.

6.6.7.9 Subsidence

A settling or sinking of the earth's crust in loose granular materials such as gravel that do not contain clay.

6.6.8 Climate Change

While climate change does not directly impact the frequency or magnitude of earthquakes in Emery County, several indirect relationships exist that could affect earthquake-related hazards:

- Changes in precipitation patterns may alter groundwater levels, potentially affecting soil stability and the response of certain geological formations to seismic activity.
- Increased wildfire activity and subsequent vegetation loss on slopes could exacerbate landslide risks triggered by earthquakes, particularly in burn scar areas along the Wasatch Plateau.
- Extreme temperature fluctuations may accelerate weathering processes of exposed rock formations, potentially destabilizing slopes and increasing rockfall hazards during seismic events.
- More intense precipitation events following drought periods could increase liquefaction potential in susceptible areas if ground-shaking occurs during saturated conditions.

Current research indicates that these secondary effects represent the primary linkage between climate change and earthquake hazards in Emery County. While the direct earthquake risk remains primarily determined by geological factors, emergency management planning should consider how these climate-influenced conditions might amplify secondary earthquake hazards, particularly in areas with multiple overlapping vulnerabilities.

6.7 Flood (F)

The following state disaster declarations have affected Emery County since the last plan update in 2018:

- Sept. 9, 2021: Executive Order 2021-14 Declaring a State of Emergency Due to Flooding.

- Aug. 23, 2022: Executive Order 2022-05 Declaring a State of Emergency Due to Southern Utah Flooding.
- April 18, 2023: Executive Order 2023-05 – Declaring a State of Emergency Due to Flooding.

No federal disaster declarations specific to flooding have been issued for Emery County during this period.

6.7.1 Overview & Profile

Flooding is a natural event for rivers and streams, defined as the overflow of water onto land that is normally dry. This phenomenon can be triggered by an excess of snowmelt, rainfall, or the failure of natural or engineered impoundments, affecting the banks and adjacent floodplains. Floodplains, which are lowland areas near rivers, lakes, reservoirs, and urban areas with low terrain, are particularly susceptible to recurring floods.

Flooding results in various forms of damage, including land and property saturation, erosion, deposition of mud and debris, and the fast-flowing waters themselves. Injuries and fatalities often stem from the swift movement of floodwaters, while property damage mainly results from inundation by sediment-filled water. Flash flood conditions, characterized by intense rainfall over a short duration, pose significant risks.

6.7.2 Location & Extent

The greatest flood risk within Emery County has been associated with cloudburst storms that generally result in flash flooding in localized areas. Heavy rain and rapid snowpack melt can also result in unusually heavy water, and/or mud and debris flows.

These streams have flooded in the past and also pose a future flood threat, many of which are mapped through the NFIP. Many channels within the County can pose a threat due to channel constrictions from debris and could result in residential flooding. All of the alluvial fans in the County have been developed or are being developed, and therefore, residential and commercial flooding is probable. Floods can also pose a threat to the agricultural lands that are in the lower portions of the alluvial fans.

6.7.2.1 Flood Extent

Flooding in Emery County varies in extent from minor nuisance flooding affecting isolated roads and properties to major events impacting multiple communities and critical infrastructure. The extent of flooding is measured using the following classifications:

1. **Minor Flooding**: Minimal or no property damage, but possibly some public inconvenience.
    - Water levels: Generally less than 1 foot above flood stage.
    - Impacts: Temporary road closures, water in low-lying areas, minor erosion.
2. **Moderate Flooding**: Some inundation of structures and roads near streams.
    - Water levels: 1-3 feet above flood stage.
    - Impacts: Evacuation of people and/or transfer of property to higher elevations may be necessary, secondary roads and highways may be closed.
3. **Major Flooding**: Extensive inundation of structures and roads.
    - Water levels: More than 3 feet above flood stage.
    - Impacts: Significant evacuations of people and/or transfer of property to higher elevations,

primary transportation routes may be impacted.

4. **Flash Flooding**: Rapid rise of water in a short period of time, often causing significant damage.
    - Water velocity: High, often carrying debris.
    - Warning time: Limited, sometimes less than 60 minutes.
    - Impacts: Can cause significant damage even in areas outside typical flood zones.

Table 6.7.2.2- Flooding Hazard Profile

Potential Magnitude		Catastrophic (>50%)	**Probability**		Highly Likely
	X	Critical (25-50%)		x	Likely
		Limited (10-25%)			Possible
		Negligible (<10%)			Unlikely
Location	The major rivers are Green River, Price River, Muddy Creek, and the San Rafael. Flash flooding occurs throughout the County.				
Extent	See map (below).				
Prior Occurrences	Minor flooding has occurred in different locations throughout the County.				
Seasonal Pattern	Spring, Cloudburst Storms and heavy Snowfall Runoff.				
Conditions	Cloudburst storms and heavy snowfall runoff.				
Duration	Flooding can last anywhere from hours to days and even months.				
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.				
Climate Change	The increase in flood risk will occur in two ways. One, warmer temperatures will increase the risk of rain-on-snow events. Two, climate change will increase the incidence of extreme precipitation events and likely lead to an increase in flash flooding.				
Analysis Used	Review of Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), HAZUS Flood Risk Report 1/03/2018, and Geographic Information System (GIS) data.				

6.7.3 National Flood Insurance Program Participation

The National Flood Insurance Program was created in 1968 by the Federal Emergency Management Agency (FEMA) to provide homeowners living in the 100-year floodplain an opportunity to purchase flood insurance for their home. In order for individuals to be eligible to purchase flood insurance, their community needs to participate in the National Flood Insurance Program (NFIP). Assistance for community participation in the NFIP is provided by the State Floodplain Manager at DEM. There is also limited funding for flood mitigation projects for communities participating in the NFIP.

6.7.3.1 Floodplain Administration in Emery County

The Emery County Flood Plain Administration is conducted by the Emergency Manager and assisted by the Emery County IT Director. They apply the zoning ordinance 2-2015. All the cities and towns except for Green River City defer to the County for their floodplain administration.

The Green River City Code Enforcement Officer is the designated Flood Plain Administrator and applies the Green River City Ordinance Title 12, Flood Control, Chapters 1-4.

6.7.3.2 Implementation of Substantial Damage/Improvement Provisions

Emery County and participating municipalities implement substantial damage and substantial improvement provisions of their floodplain management regulations as follows:

- **Emery County (Unincorporated Areas)**: The County Emergency Manager, assisted by the IT Director, enforces substantial damage/improvement provisions by requiring damage assessments after flood events. Structures with damage exceeding 50% of pre-flood market value must be brought into compliance with current floodplain regulations during repairs. The county maintains a database of flood-prone structures and coordinates with building officials to track cumulative improvements.
- **Green River City**: The City Code Enforcement Officer serves as Floodplain Administrator and implements substantial damage provisions through a three-step process: 1) rapid damage assessment immediately following flood events, 2) detailed assessment of structures identified as potentially substantially damaged, and 3) monitoring of compliance during the rebuilding process. The city maintains separate tracking for substantial improvements.
- **Castle Dale, Ferron, Huntington, Orangeville, Emery, and Cleveland**: These communities defer floodplain administration to Emery County through interlocal agreements. The County's substantial damage assessment procedures apply to these communities, with local building officials coordinating with the County Emergency Manager during post-flood assessments.
- **Clawson and Elmo**: These communities do not currently participate in the NFIP.

6.7.3.3 NFIP Enforcement Procedures

Enforcement of NFIP regulations varies slightly between jurisdictions:

- **Emery County (Unincorporated Areas):** Enforcement occurs through the building permit process. Applicants for development in Special Flood Hazard Areas must submit elevation certificates and hydraulic analyses where appropriate. Inspections verify compliance during construction. Violations are addressed through stop-work orders and potential civil penalties.
- **Green River City:** The city maintains independent enforcement through its municipal code (Title 12, Flood Control, Chapters 1-4). The process includes dedicated floodplain development permits, required elevation certificates, and a progressive enforcement approach for non-compliance.
- **Participating Municipalities with County Administration:** While administration is provided by the County, enforcement actions remain under municipal authority. Local officials coordinate with County floodplain administrators to issue municipal citations or enforcement orders for violations.
- **Communities Deferring to County Administration:** Castle Dale, Ferron, Huntington, Orangeville, Emery, and Cleveland have formal interlocal agreements with Emery County for floodplain

administration. These communities enforce NFIP regulations through the following standardized procedures:

  - **Castle Dale City:** Municipal building permits require compliance verification from County floodplain administrator before issuance. City building officials coordinate with County Emergency Manager for post-construction inspections in Special Flood Hazard Areas.
  - **Ferron City:** City Code Enforcement Officer works directly with County floodplain administration to ensure permit applications include required elevation certificates and hydraulic studies where applicable.
  - **Huntington City:** Municipal permit process includes mandatory County floodplain review for all development within mapped flood zones. City maintains local enforcement authority for violations identified by County administrators.
  - **Orangeville City:** City building officials require County floodplain compliance documentation before final permit approval. Local enforcement includes stop-work orders for violations identified during County inspections.
  - **Emery Town:** Town Administration coordinates with County Emergency Manager for all floodplain development reviews. Municipal citations may be issued for violations identified through County enforcement procedures.
  - **Cleveland Town:** Town building permit process includes County floodplain review requirements. Local officials coordinate with County for both permit review and violation enforcement.

- **Non-Participating Communities:** Clawson and Elmo do not participate in the NFIP. These communities are not subject to federal flood insurance requirements, and residents cannot purchase federal flood insurance. Both communities rely on private insurance options and individual preparedness measures for flood-related risks.

Each participating community requires FEMA elevation certificates for new construction and substantial improvements in Special Flood Hazard Areas, maintains records of floodplain development, and conducts regular staff training on NFIP requirements.

Table 6.7.3.4 - Emery County National Flood Insurance Policy Information

Area	Number of Policies	Information Source	
Unincorporated	1 Policy	12/11/85 Entry into NFIP	All Zone C, No SFHA, No Flood Zone Map
Castle Dale City	0 Policies	5/1/80 Entry into NFIP	5/1/80 Date of Flood Zone Map on file
Emery Town	0 Policies	9/11/78 Entry into NFIP	All Zone C, No SFHA, No Flood Zone Map
Ferron City	0 Policies	1/30/84 Entry into NFIP	All Zone C, No SFHA, No Flood Zone Map

Green River City	1 Policy	3/18/86 Entry into NFIP	Level A 3/18/86 Date of Flood Zone Map on file
Huntington City	0 Policies	2/2/84 Entry into NFIP	All Zone C, No SFHA, No Flood Zone Map
Orangeville City	4 Policies	3/1/79 Entry into NFIP	Level A, 3/1/79 Date of Flood Zone Map on file
Clawson Town		Non-Participant in NFIP	
Cleveland Town	0 Policies	6/11/92 Entry into NFIP	Level A, 7/12/77 Date of Flood ZoneMap on file
Elmo Town		Non-Participant in NFIP	
Source: SFHA: Special Flood Hazard Area (Utah Division of Emergency Management Flood Plain Manager 2017)			

6.7.4 Vulnerability Analysis

Flood data for Emery County was obtained from the modeling program Hazards United States – Multihazards (HAZUS-MH), for both 100-year (NFIP Zone A) and 500-year (NFIP Zone B or Zone X (shaded)) flood events. Analysis was completed using Flood Insurance Rate Maps (FIRM) or Digital Flood Insurance Rate Maps (DFIRM). Only streams which contained detailed flood cross-section data could be evaluated.

6.7.4.1 - Jurisdictional Vulnerability - Flooding

Flood vulnerability varies considerably across Emery County jurisdictions based on topography, proximity to waterways, development patterns, and existing mitigation measures:

- **Castle Dale City**: Moderate flood risk primarily from Cottonwood Creek, with approximately 45 structures in the designated floodplain. Several neighborhoods experience periodic sheet flooding during heavy precipitation events. The city's stormwater system has limited capacity in older neighborhoods. Flooding could disrupt access to the County Courthouse and emergency services facilities, potentially hampering disaster response.
- **Clawson Town**: Limited flood risk with isolated areas of localized flooding during heavy precipitation events.
- **Cleveland Town**: Low to moderate flood vulnerability with isolated issues along smaller drainages.
- **Elmo Town**: Minimal riverine flood risk but experiences localized flooding from inadequate drainage infrastructure during heavy rainfall events.
- **Emery Town**: Moderate flood vulnerability from Ivie Creek and its tributaries, with approximately 35 structures in flood-prone areas. Agricultural lands experience periodic inundation.
- **Ferron City**: Higher flood vulnerability due to proximity to Ferron Creek with approximately 94 structures in flood hazard areas. The city has experienced repeated flooding events, particularly

near canyon mouths where debris flows can exacerbate flooding. Past flood events have caused approximately $250,000 in damage to public infrastructure and private property.

- **Green River City**: Significant flood vulnerability from the Green River, with approximately 484 structures potentially affected during a 100-year flood event. This includes critical transportation infrastructure supporting I-70 and several commercial properties essential to the city's tourism economy. The city's industrial areas near the river faces particular risk.
- **Huntington City**: Moderate flood risk from Huntington Creek, particularly in neighborhoods on the eastern side of the city. Flash flooding from canyon areas has caused repeated damage.
- **Orangeville City**: Moderate flood risk primarily from Cottonwood Creek, with previous flooding events affecting residential areas near the creek including approximately 12 residences that have experienced repeated flooding. The city's water treatment facilities are also at risk during extreme precipitation events.
- **Emery County School District**: Several school facilities are in or near flood-prone areas, particularly in Ferron and Green River, requiring specific emergency action plans. Flooding could block transportation routes to school facilities, potentially isolating students and staff.
- **Emery Water Conservancy District**: Water and wastewater infrastructure, particularly collection systems and pump stations in low-lying areas, are vulnerable to flood damage and contamination during flood events with potential for contamination of drinking water supplies affecting thousands of residents.

Section 7 provides detailed jurisdiction-specific assessments, including critical facilities affected, estimated losses, and prioritized mitigation actions. Overall, unincorporated areas of the county along major waterways face the highest flood risks, with agricultural impacts representing a significant economic vulnerability.

Table 6.7.4.2- Number of Structure in Floodplains

	Acres Flooded	Population Displaced	Residential Units Total Losses	Commercial/Industrial Units Total Losses
100-year Flood	683	2,311	245	3
			$37,810,000	$18,370,000
500-year Flood	1,155	2,492	266	3
			$43,430,000	$23,210,000
Source: HAZUS-MH, 2018				

Table 6.7.4.3- Agricultural Losses, June 15 Scenario (Emery County, UT)

	100-year Losses Day 3	100-year Losses Day 7	500-year Losses Day 3	500-year Losses Day 7
Barley	$14,749	$19,665	$15,899	$21,198
Corn Silage	$151,723	$202,297	$163,549	$218,066

Source: HAZUS-MH, 2018

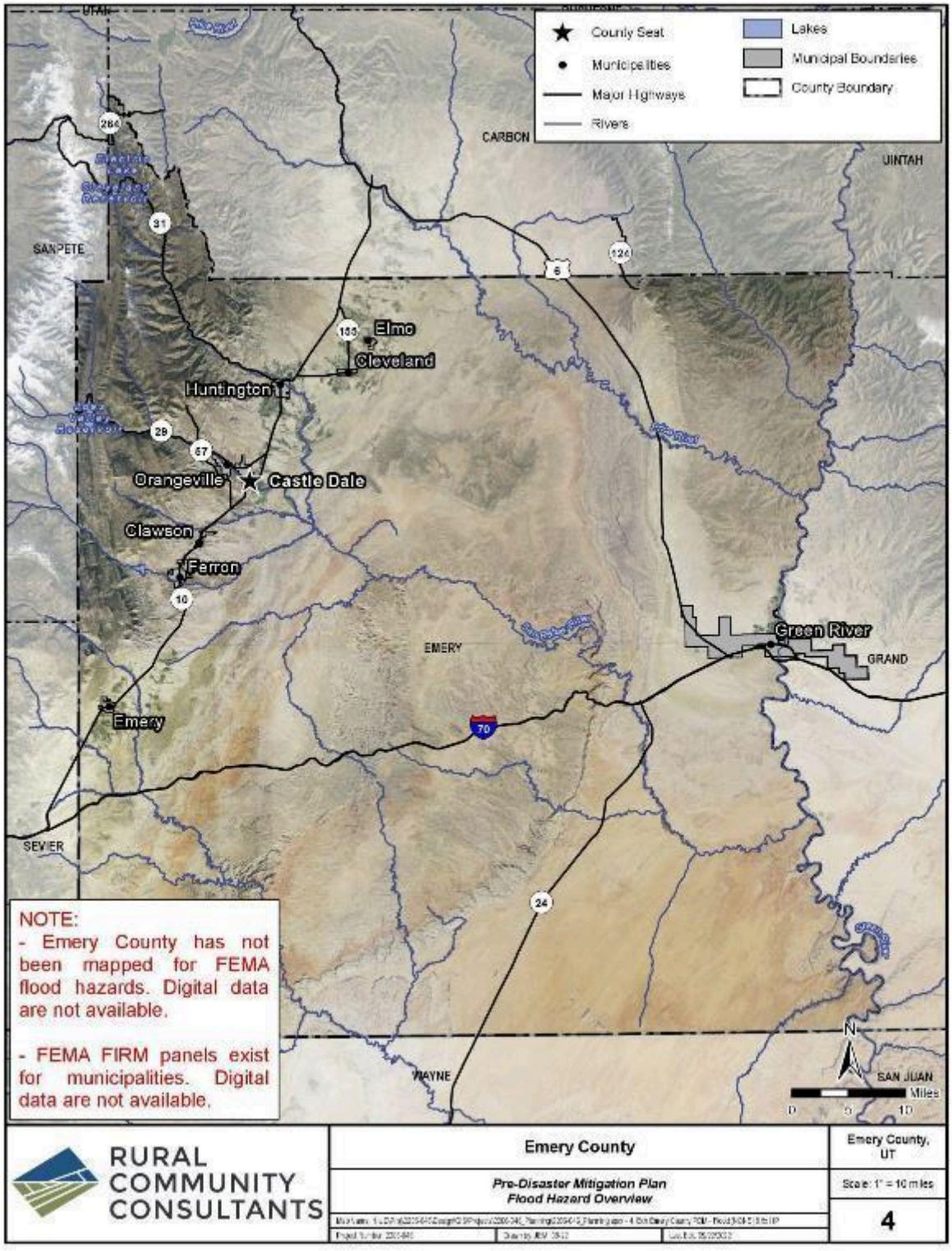
Table 6.7.4.4- Vehicle Losses

	100-year	500-year
Daytime Scenario	$1,535,794	$1,603,936
Nighttime Scenario	$2,533,427	$2,751,553
Source: HAZUS-MH, 2018		

Table 6.7.4.5 Debris Generation and Removal

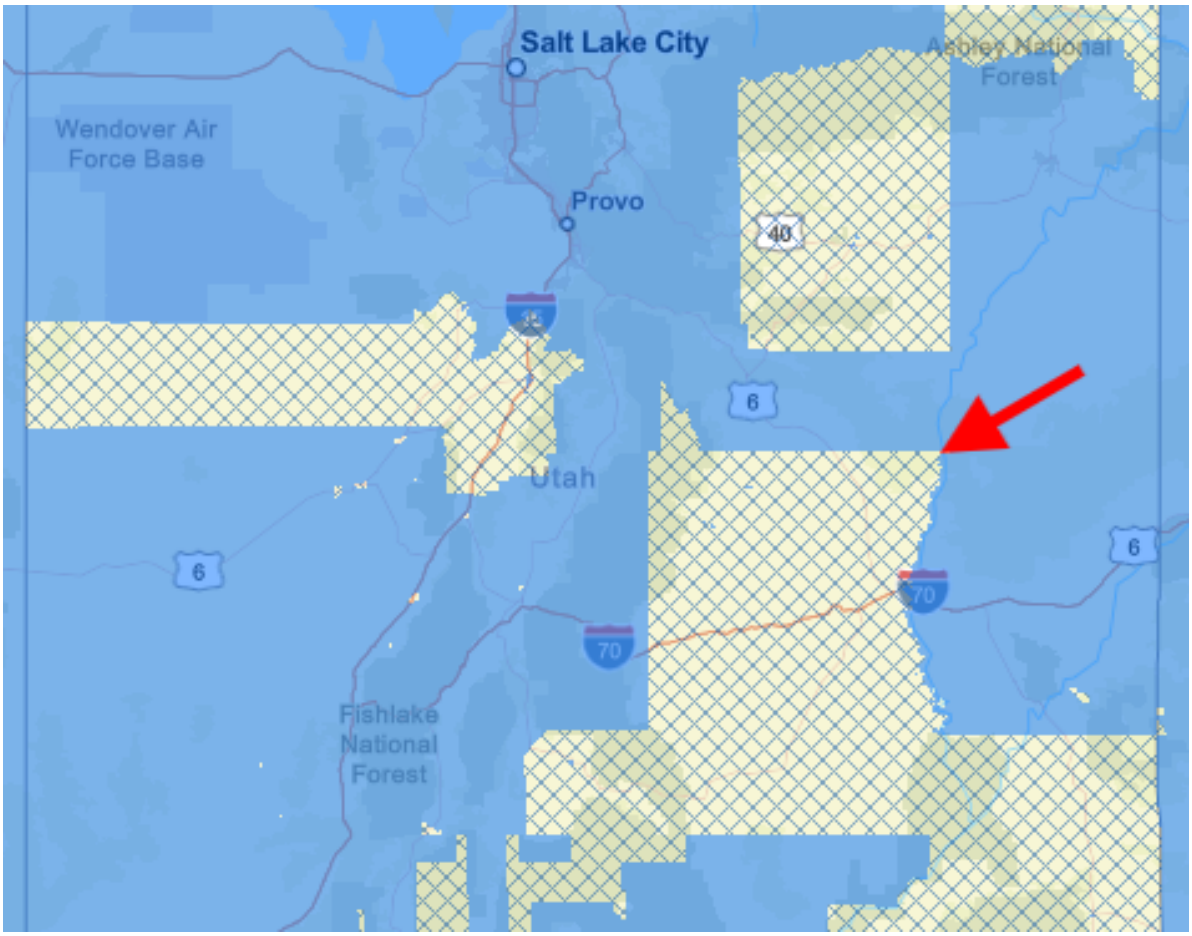
	100-year	500-year
Finishes	3,563 tons/143 loads	4,145 tons/166 loads
Structures	3,637 tons/146 loads	4,289 tons/ 172 loads
Foundations	3,771 tons/151 loads	4,461 tons/179 loads
Totals	**10,970 tons/440 loads**	**12,895 tons/517 loads**
Source: HAZUS-MH, 2018		

Figure 6.7.4.6 Map of Drainage Basins



Map illustrating drainage basins in the Emery County area (click for original).

Figure 6.7.4.7 FEMA Flood Mapping Data Availability



The map above shows that the County will need to update its analysis of flooding risk once data is available.

6.7.5 Secondary Hazards

6.7.5.1 Snowmelt

Snowmelt floods occur from the rapid snowmelt in the mountains. These floods generally happen in April, May and June. Warm air masses with mostly sunny skies melt the mountain watershed snowpack. The large accumulations of water generally last several days and the magnitude depends on the amount of snowpack and the warm weather. Snowmelt flood risk is reduced when the snowpack is below normal and/or the weather changes from winter to spring and summer gradually without an abrupt warming trend.

6.7.5.2 Rainfall

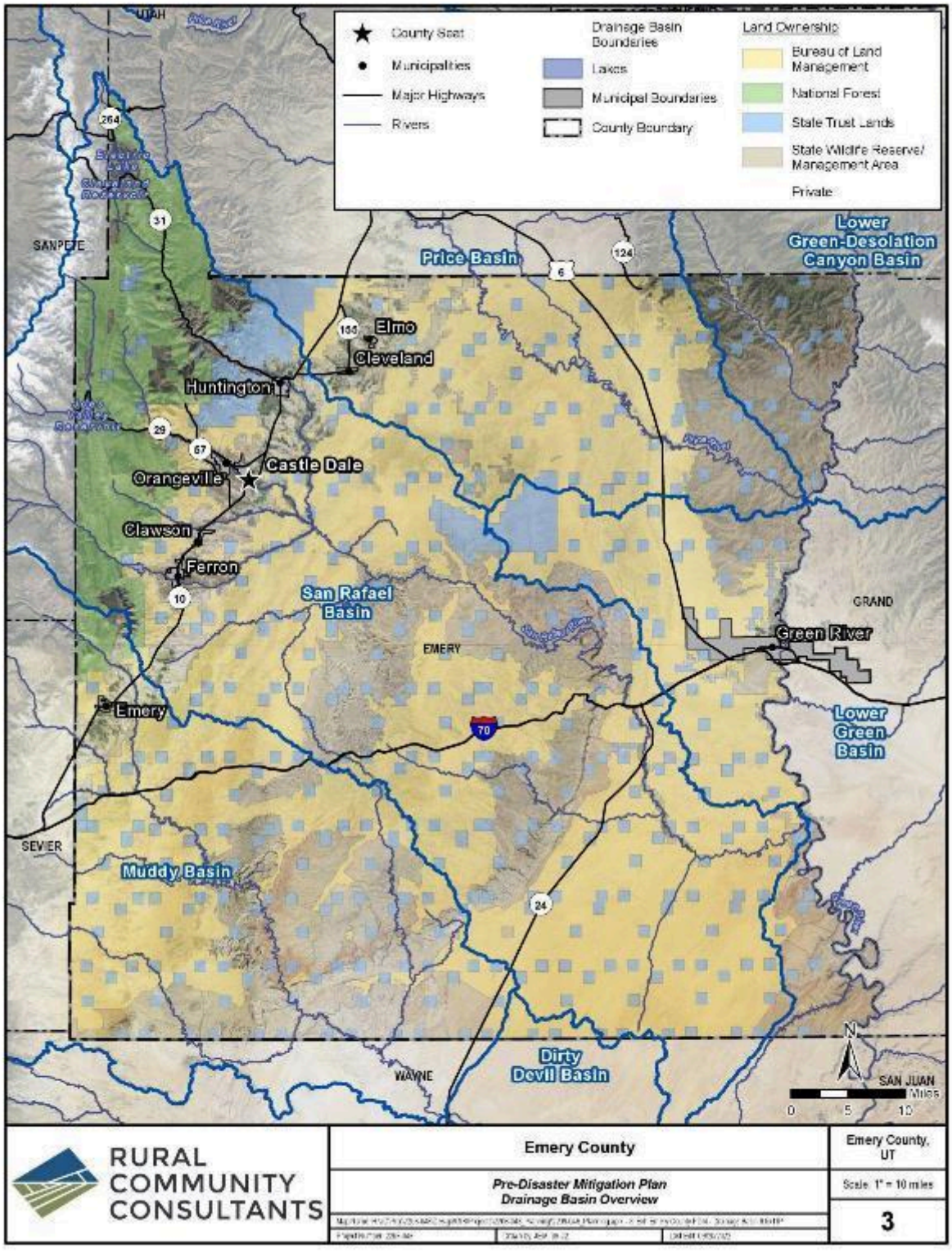
Rainfall floods result from large amounts of precipitation. Short duration local storms such as cloudburst or thunderstorms with a high intensity rainfall as well as the general storms that last several days with a less intense rainfall can produce a flooding event.

Areas prone to flooding, according to the Utah Natural Hazards Handbook, include lake and reservoir shorelines which may flood when the flow of water into the lakes or reservoirs is greater than the outflow capacity.

River and creek floodplain areas range from narrow zones to extensive lowlands extending great distances from a natural drainage area. Construction in floodplains is also dangerous because of the high flood risk.

Urban areas are also prone to flooding because of the decrease in vegetation of the natural watershed. Houses, driveways, parking lots, buildings, and streets are all replacing the vegetative cover that is so important in lessening the potential for flood. This type of development prevents water infiltration into the soil and greatly increases the runoff. In some areas undersized piping and channels are used which may cause flooding. Man-made drainage channels can also play a role in flooding. Trash and debris can obstruct passageways.

Figure 6.7.5.3 - Map of Drainage Basins



Map illustrating drainage basins in the Emery County area (click for original).

6.7.6 Natural Resource Protection

Emery County's natural systems play a critical role in mitigating flood impacts. Key natural resource protection strategies include:

1. **Riparian Buffer Protection**: Natural vegetation along riverbanks helps stabilize soils, slow floodwaters, and filter pollutants. The County should identify and protect critical riparian buffers along the Green River, San Rafael River, Muddy Creek, and their tributaries through development restrictions and restoration initiatives.
2. **Wetland Preservation**: Wetlands act as natural sponges, absorbing excess water during flood events. Protecting remaining wetland areas, particularly in the Green River floodplain and around springs in the San Rafael Desert, provides natural flood storage capacity.
3. **Natural Channel Maintenance**: Maintaining the natural meander patterns and floodplain connectivity of streams allows for natural flood energy dissipation. The County should limit channel modifications and encourage restoration of natural stream dynamics where feasible.
4. **Upland Vegetation Management**: Healthy vegetation in watershed uplands increases soil infiltration and reduces runoff volume. Coordinating with federal land managers to maintain appropriate vegetation cover in the Wasatch Plateau and desert uplands helps moderate flood peaks.

6.7.7 Climate Change

Climate change is already altering flood risk patterns in Emery County and is expected to continue this trend:

- Precipitation is projected to become more variable and intense, with increases in "flashy" storm events that can quickly overwhelm drainage systems.
- Earlier spring snowmelt is changing seasonal flood timing, with peak flows occurring earlier than historical averages.
- More precipitation falling as rain rather than snow in winter months increases winter and early spring flooding potential.
- Extended drought periods can reduce soil permeability, potentially increasing runoff during subsequent rainfall events.

Local stream gauge data indicates a shift toward earlier peak flows and more extreme discharge variability over the past decade. Flood mitigation planning should account for these changing patterns rather than relying solely on historical flood data. Special attention should be given to smaller tributaries and alluvial fan areas that may be particularly sensitive to intense, localized rainfall events

6.8 Landslide (L)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to dam failures have been issued for Emery County since the last plan update in 2018.

6.8.1 Overview & Profile

Utah ranked third in the nation in terms of largest total landslide damage cost and cost per person between 1973 and 1983. Utah's landslide hazard rating is "severe", the highest level of five hazard classes given by the U.S. Geological Survey. The three main contributing factors to slope failure include areas with moderate to steep slopes, conductive geology, and high precipitation. The main elements that cause slope failure include precipitation events, topography, and vegetation . Landslide distribution in Utah is associated with topography and physiographic provinces. The two physiographic regions that are conducive to landslides in Utah are the Middle Rocky Mountains province and the High Plateaus subdivision of the Colorado Plateau physiographic province. Landslides are also known as slope failure and are classified according to the type of movement and the material involved. The five types of movement include falls, topples, slides, lateral spreads, and flows. The types of materials include rocks, debris (course-grained soil), and earth (fine-grained soil). Slope failure types are identified as rock falls, rock topples, rock slides, debris flows, debris topples, debris slides, slumps, and earth flows.

Table 6.8.1.1- Landslide Hazard Profile

Potential Magnitude		Catastrophic (>50%)	**Probability**		Highly Likely
	x	Critical (25-50%)			Likely
		Limited (10-25%)		x	Possible
		Negligible (<10%)			Unlikely
Location	Generally occur in canyon mouths and foothill areas.				
Seasonal Pattern	Spring and Summer; usually caused by the stress release of over-weighted soils and or loosening of rock and debris.				
Conditions	Usually caused by the stress release of over-weighted soils, shallow groundwater in certain soils, or loosening of rock and debris.				
Duration	Landslides generally last hours or days, but some can last weeks.				
Secondary Hazards	Flooding (natural dams), traffic accidents.				
Climate Change	Warmer, future winter temperatures will create a scenario where landslides may be more likely. Warmer winter temperatures mean it is less likely that soils are frozen, even if snowpack exists.				
Analysis Used	Information and maps provided by Emery County Emergency Manager, UDOT, NOAA, DEM - 2019 Utah Hazard Mitigation Plan, UGS, FEMA National Risk Index				

Future landslide areas are usually located in the areas of historical landslides, which are well defined and localized. Landslides have been one of the most reoccurring hazards within Emery County along the canyon benches. The homes in these areas have the greatest vulnerability to rock falls, debris flows, landslides, and other types of slope failure.

Table 6.8.1.2 - Overall National Risk Index Score for Landslides

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	100.00	Very High
976300	Castle Dale, Orangeville, Unincorporated County	98.70	Relatively High
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	99.50	Very High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024			

6.8.2 Location & Extent

Recorded landslides have taken place primarily in the northern portion of the County within Black Butte, Red Plateau, Buckhorn Flat, and Cleveland Lloyd Dinosaur Quarry. Other areas include the northernmost tips of the County as well as in the lower western portion near the Coal Cliffs and Molen Reef. Landslides generally occur in well-defined, localized areas, but are not always identifiable and can have County-wide impacts.

Several small-scale rockslides and landslides occur annually in Emery County, usually due to heavy rain and flash flooding. These rockslides are often classified as debris flows, in which moving water carries mud, rocks, and other debris over the affected areas. The following table from the NOAA Storm Events Database lists the debris flows that triggered rockslides/mudslides between 2000–2024 in the County.

Table 6.8.2.1 - Debris Flow that Triggered Rockslides / Mudslides (2000-2024)

Debris Flow Location	Date	Description
MOHRLAND (8W)	7/16/2013	Heavy rain resulted in a large debris flow off the Seeley Fire burn scar, covering a 10-mile stretch of State Route 31 in water, mud, and debris. This flow caused extensive damage and undercutting in the Horse Canyon area, near milepost 31.
MOHRLAND (5WSW)	8/18/2013	Heavy rain caused a debris flow off the Seeley Fire burn scar, covering parts of State Route 32 with mud.
HUNTINGTON (W)	8/23/2013	A debris flow occurred off of the Seeley Fire burn scar, covering State Route 31 with mud, and producing significant rises on Huntington Creek.
MOHRLAND (SSW)	8/28/2013	A large debris flow occurred off of the Seeley Fire burn scar. Water and debris covered State Route 31, and the road was closed at both the top and bottom for several hours.

MOHRLAND (WNW)	9/3/2013	A small debris flow was reported off the Seeley Fire burn scar, with mud moving past the Huntington Power Plant.
HUNTINGTON (NO)	7/14/2015	Heavy rain over the Seeley Fire burn scar caused flash flooding and debris flows onto State Route 31.
MOHRLAND (W)	7/23/2020	A debris flow from the Trail Mountain Fire burn scar reached the Crandall Canyon Mine parking lot.
PINE CREEK (NE)	7/6/2022	A thunderstorm produced heavy rain over portions of the Trail Mountain Fire burn scar, with a 1-hour Multi-Radar Multi-Sensor rainfall estimate of around 1 inch noted in the immediate vicinity of Crandall Canyon. This resulted in a debris flow that moved through Crandall Canyon, with flash flooding extending downstream through Huntington Creek, as reported by Law Enforcement.
MOHRLAND (WSW)	7/13/2022	A thunderstorm produced heavy rain over portions of the Trail Mountain Fire burn scar, with a 1-hour Multi-Radar/Multi-Sensor rainfall estimate of around 1 inch noted in the immediate vicinity of Millfork Canyon. This resulted in a debris flow that moved through Millfork Canyon, with flash flooding extending downstream through Huntington Creek, as reported by an emergency manager.
Source: NOAA Storm Events Database (2024)		

6.8.3 Vulnerability Analysis

Losses due to landslide events are generally tied to the repair of roadways or the removal of debris on roadways. These roads are maintained by UDOT. A limited course of mitigation may occur because it is not economically feasible for UDOT to spend tax dollars to rebuild a new road route or remove the large facing walls of rock and soil.

6.8.3.1 Jurisdictional Vulnerability - Landslide

Landslide vulnerability varies significantly across participating jurisdictions based on topography and development patterns.

- Emery County's unincorporated areas include numerous hillsides and canyon areas with moderate to high landslide potential, particularly along roadway cuts and in areas of previous mining activity. Historical landslides have damaged Highway 6 and other transportation corridors, with repair costs exceeding $500,000 over the past decade.
- Castle Dale, Ferron, and Orangeville face moderate landslide risk due to their location near canyon mouths where steep slopes could impact residential areas and transportation corridors.
- Green River confronts landslide hazards related to the surrounding cliffs and geological features that could affect access routes and utility infrastructure. A major landslide upstream could potentially impact water intake structures critical to the city's culinary water system.

- Huntington has moderate vulnerability concentrated in areas where development approaches steeper terrain including several areas where previous slides have damaged water delivery infrastructure.
- Smaller communities have limited direct landslide exposure except where critical infrastructure crosses vulnerable terrain.
- Special service districts must consider landslide risk in transportation routes and where water transmission lines cross landslide-prone areas, particularly in canyon corridors where failure could cut off water service to multiple communities simultaneously.

Section 7 provides detailed jurisdiction-specific landslide vulnerability assessments and potential impacts.

Figure 6.8.3.2 - Expected Annual Loss from Landslides (FEMA NRI)

Census Tract	Communities in Census Tract	Expected Annual Loss - Score	Expected Annual Loss - Amount	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	100.00	$772,000	Very High
976300	Castle Dale, Orangeville, Unincorporated County	98.90	$28,000	Relatively High
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	99.50	$69,000	Very High
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2024				

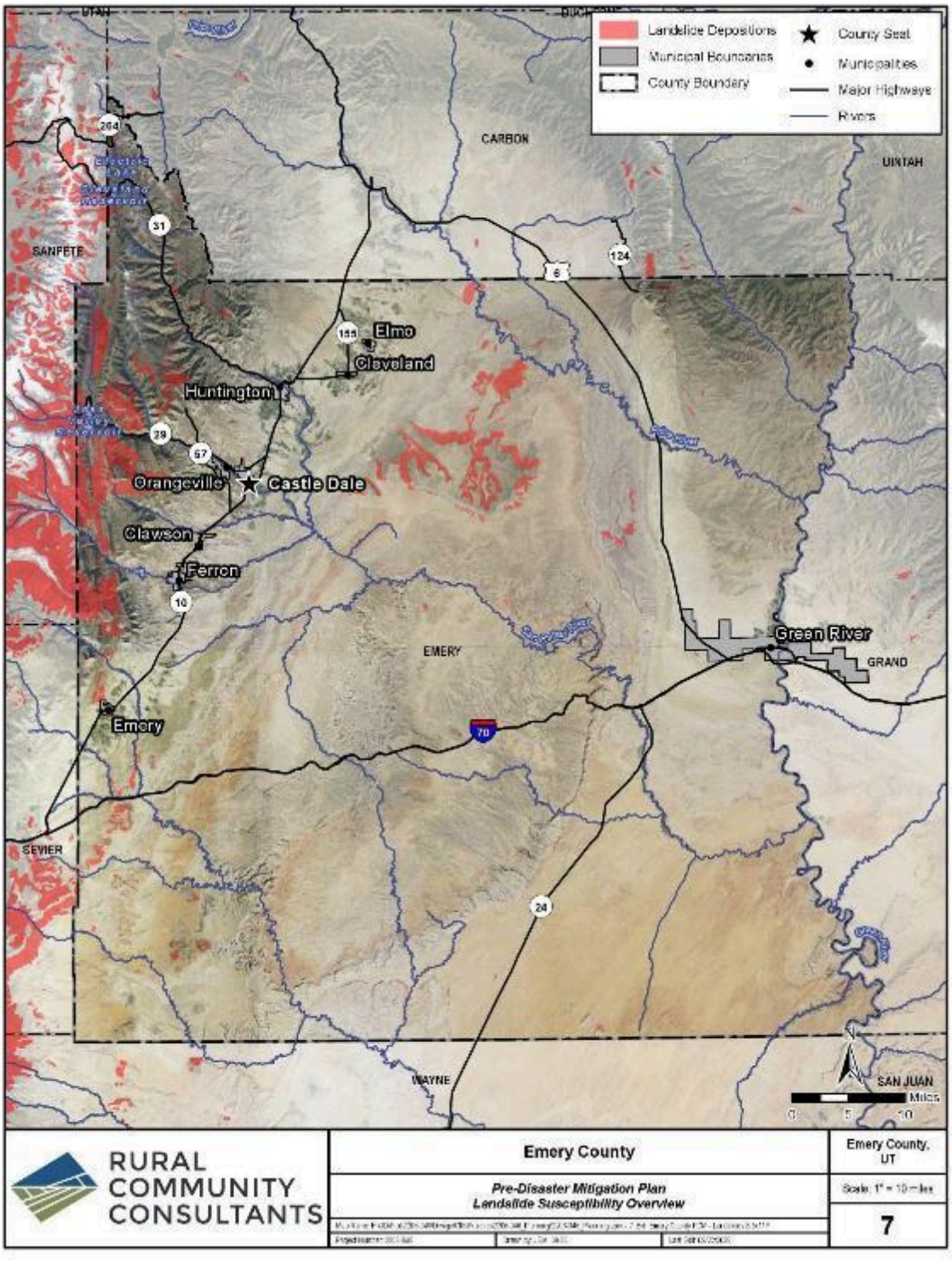
The hazard analysis indicates that there are no businesses or critical facilities in Emery County that are located within the high landslide risk area. However, the possibility of power lines and gas line infrastructure is common throughout the County.

Table 6.8.3.3 - Infrastructure in Landslide Area (2018)

Infrastructure	Length (miles)	Replacement Cost
Local Roads	3.80	$9,500,000
State Highways	25	$125,000,000
US Highways	0.00	$0.00
US Interstates	0.25	$1,250,000
Power Lines	0.26	$368,550
Gas Lines	0.00	$0.00
Note: There are no known residences, businesses, or populations located in landslide risk areas for Emery County.		

SOURCE: Utah Department of Transportation

Figure 6.8.3.4 - Map of Landslide Susceptibility



Map illustrating landslide susceptibility in the Emery County area (click for original).

Figure 6.8.3.5 - USGS Post-Fire Debris Flow Hazard Assessment

The USGS provides estimates of the probability and volume of debris flows that may be produced by a storm in a recently burned area, using a model with characteristics related to basin shape, burn severity, soil properties, and rainfall. This model showed that there are landslide risks associated with the 2018 Trail Mountain Fire.

Map showing post-fire landslide risk in Emery County. (Source: USGS)

6.8.4 Types of Landslides

Rock Falls and Rock Topples

These occur when loosened blocks or boulders from an area of bedrock move down slope. Rock falls and topples generally occur along steep canyons, cliffs, and steep road cuts. Rock fall damage usually affects roads, railroad tracks, and utilities.

Debris Slides and Debris Flows

Slides and flows generally occur in mountainous areas and involve the relatively rapid, viscous flow of coarse- grained soil, rock, and other surficial materials. Debris flows generally occur in mountainous areas and are considered a flow rather than a slide because of the high water content coupled with the debris. Debris flows are typically more dangerous because of the high speeds under which they form and travel. Debris flows generally remain in stream channels but can flow out from canyon mouths for a considerable distance. Debris flows and slides can damage anything in their path including buildings, roads, railroad tracks, life lines/utilities, and reservoirs.

Slumps

Slumps are common along road embankments and river terraces. They slip or slide along a curved failure plane away from the upper part of a slope leaving a scarp (a relatively steeper slope separating two more gentle slopes). Slumps generally do not move very far from the source area.

Earth Flows

Earth flows are slumps with the addition of water that slump away from the top or upper part of a slope, leaving a scarp. These can range in size from very small to flows involving hundreds of tons of material and result in a bulging toe that can block streams and cause flooding, and damage buildings or other structures.

Causes of landslides are the result of hillside instability. Slope makeup, slope gradient, and slope weight all play a role. Other important factors of slope instability include rock type and structure, topography, water content, vegetative cover, and slope aspect. Debris flows, for example, occur when these elements are modified by natural processes or by human created processes.

Natural Processes

Natural processes that can induce slope failure include ground shaking, wind and water weathering and erosion.

Human Causes

Human created processes such as lawn watering and irrigation may place excess water on already unstable ground by adding water weight to the material and raise the pore pressure, leading to a loss of shear strength. Water can also change the consistency of the slope material reducing cohesion leading to an unstable mixture.

Rock types containing clay, mudstone, shale, or weakly cemented units, which are strongly affected by weathering and erosion, are particularly prone to landsliding because of expansive and lubricating properties. Other processes include the removal or addition of slope materials during construction.

Vegetation is very important in the stabilization of slopes because it prevents rainfall from impacting the soil directly and helps protect from erosion by retaining water and decreasing surface runoff. The roots systems serve as slope-stabilizing elements by binding the soil together or binding the soil to the bedrock. Increases in slope gradient such as placing heavy loads at the top of a slope and /or the removal of material at the toe of a slope all affect the equilibrium and result in slope failure because of slope instability.

6.8.5 Critical Facilities Protection

This section will be completed as data becomes available. For County policies regarding natural resources, please refer to the Emery County Resource Management Plan.

6.8.6 Natural Resource Protection

Natural resources play a crucial role in mitigating landslide hazards in Emery County. Key natural resource protection strategies include:

1. **Vegetation Management**: Native vegetation, particularly deep-rooted plants, stabilizes slopes by binding soil particles and reducing erosion. The County should prioritize preservation and restoration of natural vegetation on steep slopes, particularly in the canyon areas of the Wasatch Plateau and along the San Rafael Swell escarpments.
2. **Watershed Protection**: Healthy watersheds moderate water flows that could otherwise destabilize slopes. Maintaining natural drainage patterns and protecting headwater areas in the Manti-La Sal National Forest helps regulate water movement through vulnerable landscapes.

3. **Riparian Area Conservation**: Vegetation along waterways stabilizes banks and prevents undercutting that can trigger landslides. The County should identify and protect critical riparian zones along streams such as Huntington Creek, Cottonwood Creek, and Ferron Creek where they intersect with unstable slopes.
4. **Post-Fire Restoration**: Areas affected by wildfire are particularly vulnerable to landslides. Implementing native vegetation restoration in burn scars, particularly in the 2012 Seeley Fire and 2018 Trail Mountain Fire areas, reduces landslide potential while restoring ecosystem function.
5. **Sediment Management**: Natural sediment transport processes can be disrupted by development, increasing landslide risk. The County should work with land managers to maintain appropriate sediment movement patterns in canyon systems to prevent excessive accumulation or erosion.

6.8.7 Secondary Hazards

Landslides can trigger various secondary hazards, including but not limited to:

6.8.7.1 Flooding

Landslides can block rivers and streams, leading to the formation of temporary dams. If these dams fail or breach, they can release large volumes of water downstream, causing flash flooding and inundating surrounding areas.

6.8.7.2 Damaging Infrastructure

Landslides can damage or destroy roads, bridges, utilities, and other critical infrastructure, disrupting transportation networks, communication systems, and access to essential services.

Impact on Water Resources: Landslides can alter the flow of surface water and groundwater, leading to changes in water quality, availability, and distribution. This can affect drinking water supplies, agricultural irrigation, and ecosystem health.

6.8.7.3 Environmental Impacts

Landslides can cause soil erosion, habitat destruction, and loss of biodiversity. They can also introduce sediment and pollutants into water bodies, affecting aquatic ecosystems and downstream water users.

6.8.8 Climate Change

Climate change is expected to increase landslide risk in Emery County through several mechanisms:

- Projected increases in precipitation intensity may saturate slopes more frequently and to greater depths, reducing soil cohesion and stability.
- Extended drought periods followed by intense rainfall events create ideal conditions for debris flows, particularly in areas previously affected by wildfire.
- Increased wildfire activity due to higher temperatures and drought conditions removes stabilizing vegetation, significantly increasing landslide susceptibility in burned areas.
- Winter precipitation shifting from snow to rain in mid-elevation areas may introduce moisture into slopes during typically frozen periods.

Historical data shows an increase in reported shallow landslides following intense rainfall events, particularly in the burn scar areas of recent wildfires. Areas with steeper slopes and those affected by recent wildfires should be considered priority zones for enhanced monitoring and mitigation efforts.

6.9 Wildfire (WF)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to dam failures have been issued for Emery County since the last plan update in 2018.

6.9.1 Overview & Profile

The Wildland-Urban Interface (WUI) area is where residential areas meet wildland areas. It is known as the interface zone and presents a serious fire threat to people and property.

The urban aspect includes homes, schools, storage areas, recreational facilities, transmission lines and commercial buildings. Wildland refers to unincorporated areas including hills, benches, plateaus, and forests. Homes are built on the benches adjacent to wildland areas. Wildfires remove vegetation which results in slope failure, erosion, water runoff and depletion of wildlife resources. The three conditions that affect fire behavior are topography, vegetation, and weather.

Topography includes such factors as slope, aspect, and elevation. Fires spread faster up-slope because the fuels are closer to the flames on the upslope. The heat from a fire moves uphill and dries fuels in front of the fire allowing for easier ignition. The aspect of slope dictates moisture content. In short, the sun dries out fuels on south and west facing slopes more than on north and east facing slopes. Elevation and weather are interrelated because, generally, higher elevations result in cooler temperatures and a higher relative humidity. Elevation also determines the types of vegetation present .

Vegetation plays a major role in the speed of a fire. Light grasses burn rapidly and heavy dense fuels burn slowly but with a greater intensity. The five major fuel types in Utah's vegetation include grass/sagebrush, pinyon-juniper, mountain bush, hardwoods, and softwoods. The grass/sagebrush area poses a serious threat because people underestimate the danger of wildfires in this area.

These fires burn across thousands of acres rapidly and pose a serious threat to not only property but also life. Pinyon-juniper fuel will contribute to the fire hazard when conditions are hot, dry, and windy. When a fire does occur here, it will burn intensely and spread rapidly. Mountain brush is commonly found in Utah's foothills and if moderate to extreme fire conditions are present, this type of fuel will burn hot and fast. Hardwood-forest and softwood (deciduous) fuel types are generally less risky.

Size, continuity, and compactness all affect the fuel's rate of spread. Large fuels do not burn as readily as smaller fuels and need more heat to ignite. Small fuels on the other hand ignite easier, and a fire will spread more rapidly through them. Continuity is described by how fuel is arranged horizontally. Fuels that are broken up burn unevenly and slower than uniform fuels. Compactness is how fuel is arranged vertically. Tall, deep fuels have more oxygen available so they burn more rapidly. Less oxygen is available to compact fuels such as leaf litter and stacked logs, therefore they burn slower.

Weather factors include temperature, humidity, precipitation, and wind. Weather affects the ease with which a fuel ignites, the intensity at which it burns, and how easy or difficult fire control may be.

High temperatures increase fire danger because it heats fuels and reduces water content, which increases flammability. Humidity influences fuel ignition and how intensely fuel burns. A decrease in relative humidity causes fuels to dry, promoting easier ignition and more intense burning. Wind speed can increase burning intensity and the direction that the fire moves. Wind carries heat from a fire into unburned fuels drying them out and causing them to ignite easier. The wind may also blow burning embers into unburned areas well ahead of the main fire's starting spot fires.

Fire protection in these areas is difficult because the tactics used for wildland fire suppression cannot be used for structure protection and suppression. The energy that is emitted from a wildland fire is very dangerous to firefighters and homeowners and makes protection of homes almost impossible. One third of all firefighting deaths occur fighting wildfires. Many believe that WUI areas increase the risks to firefighters significantly.

Legally, federal wildland protection agencies seldom have the responsibility to protect structures. The legal responsibility for protecting structures on non-federal wildlands varies widely among state forestry agencies.

Table 6.9.1.1 - Wildfire Hazard History (2002-2018)

Start Date	Fire Name	Fire Cause	Size (Acres)	Total Fire Cost (est.)
7/8/2002	Old Woman		100	$2,173
7/20/2002	Power Plant		0.1	$2,492
9/4/2002	Boulder		1	$9,914
7/19/2003	Joe Hatch		167	$352,664
8/21/2003	Bear Canyon		0.25	$2,935
6/25/2004	Uphill		0.1	$2,422
7/10/2004	Trail Canyon		505	$2,740
8/7/2004	Big Canyon		3,415	$1,880,310
7/3/2006	Wimmer		2	$2,298
6/2/2007	Dilly		170	$3,975
7/17/2007	Carson		0.5	$4,174
7/17/2007	Desert Lake		1.3	$1,764
7/25/2007	Neilson		N/A	$1,200
7/1/2008	Mm 266 Hwy 6		0.1	$1,253
7/6/2009	Joes Hutch		631	$4,545
7/20/2009	I Don't Know (That's the event name)		0.1	$1,134
9/16/2009	Bull Hollow		0.1	$1,540
8/1/2010	Lyla		0.1	$1,425

8/17/2011	Xmas		4.9	$3,650
8/18/2011	Des Bee		0.1	$1,547
4/05/2012	Greenriver	Camp Fire	.10	$1,840
4/10/2012	Elmo	Debris	6.0	$2,525
5/07/2012	Barrell Hill	Misc.	.10	$1,086
6/02/2012	Cedar Creek	Lightning	2.00	$26,420
6/03/2012	Cherry	Lightning	20.00	$33,982
6/26/2012	Seeley Fire		48,000+	$10,000,000+
7/12/2012	N.O. Bald Ridge	FA	00	$1,480
8/26/2012	James	Lightning	.10	$1,419
5/04/2013	Price River	Misc.	24.00	$5,809
6/25/2013	Carpet	Equipment	.10	$1,000
6/30/2013	Bear	Lightning	.10	$3,750
7/01/2013	Maple Gulch	Lightning	.10	$3,500
7/02/2013	Meetinghouse	Lightning	.10	$1,062
7/03/2013	Spotted Wolf	Misc.	.10	$1,770
7/20/2013	Black Dragon	Lightning	.10	$1,176

Start Date	Fire Name	Fire Cause	Size (Acres)	Total Fire Cost (est.)
8/03/2013	Power Plant	Lightning	.10	$2,775
8/03/2013	Three Amigos	Lightning	.10	$4,800
8/07/2013	Fly Canyon	Lightning	.25	$5,710
8/17/2013	Black Hawk Canyon	Lightning	.10	$2,460
6/14/2014	Wood	Camp Fire	.50	$1,590
8/02/2014	Bear Creek C.G.	Camp Fire	.10	$1,654
8/09/214	Nelson Gravel Pit	Lightning	.10	$1,193
3/28/2015	San Rafael	Debris Burning	100.00	$2,960
7/20/2015	Elmo	Lightning	.42	$3,660
7/24/2015	Cottonwood	Lightning	66.00	$1,680
5/25/2016	Ferron Creek	Lightning	.10	$947
6/29/2016	Sagebrush Bench	Equipment	.10	$2,341

7/05/2016	Old Cabin	Lightning	.46	$13,593
7/12/2016	Squeeze	Equipment	.25	$1,524
7/21/2016	Sphinx	Equipment	.10	$912
7/26/2016	North Reservoir	Misc.	.10	$1,610
8/16/2016	Horn Mountain	Lightning	1.00	$1,593
11/19/2016	Salt Lake Knoll	Equipment	4.50	$904
9/05/2017	Dilly Canyon	Lightning	50	$19.418.25
9/18/2017	Range Creek	Lighting	1.00	$916.15
10/20/2017	McElprang	Debris Burn	.05	$737.97

Table 6.9.1.2 - Wildfire Hazard Profile

Potential Magnitude	X	Catastrophic (>50%)	**Probability**	X	Highly Likely
		Critical (25-50%)			Likely
		Limited (10-25%)			Possible
		Negligible (<10%)			Unlikely
Location	Wildland-Urban Interface (WUI) areas near the foothills and in forested areas throughout the County.				
Extent	The potential magnitude of wildfire in Emery County is relative to the amount of fuel on the foothills and canyons.				
Seasonal Pattern	Summer months are the worst and areas affected by drought and/or heavily overgrown and dry brush, standing/lying beetle killed/infected trees. Triggers may be lightning and human.				
Conditions	Areas affected by drought and/or heavily overgrown dry brush and debris. Common triggers: lightning and humans.				
Duration	Days to months; depends on climate and fuel load as well as resources (financial, manpower) to extinguish the fire.				
Secondary Hazards	Landslides, debris flows, erosion, traffic accidents, air pollution.				
Climate Change	Prolonged increases in temperature will increase the risk of wildfire occurrence in Utah because of the potential for extensive changes to both the length and severity of the fire season.				
Analysis Used	Review of plans and data provided by US Forest Service, National Climatic Data Center, FEMA, AGRC, County Hazard Analysis Plans, and DEM.				

Figure 6.9.1.2 - Overall National Risk Index Score for Wildfire

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	92.90	Relatively Moderate
976300	Castle Dale, Orangeville, Unincorporated County	82.20	Relatively Low
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	74.90	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024			

6.9.2 Location & Extent

Potential wildfire hazard within Emery County is growing as population growth is spreading into wildland areas where the threat is most severe. Over the past 30 years, urban growth has encroached upon forested foothill areas and wildland areas.

The wildfire threat in Emery County has had a significant effect on watersheds, including landslide, debris flow, and other forms of erosion. Federal, state and local agencies have worked together to enforce ordinances and other programs such as re-vegetation zones to protect watersheds.

6.9.3 Vulnerability Analysis

Loss estimates were made by identifying the wildland fire areas of extreme, high, and moderate within the County and then overlaying the infrastructure and the housing databases to identify vulnerable areas. The tables below show the number of commercial and residential structures inside vulnerable areas.

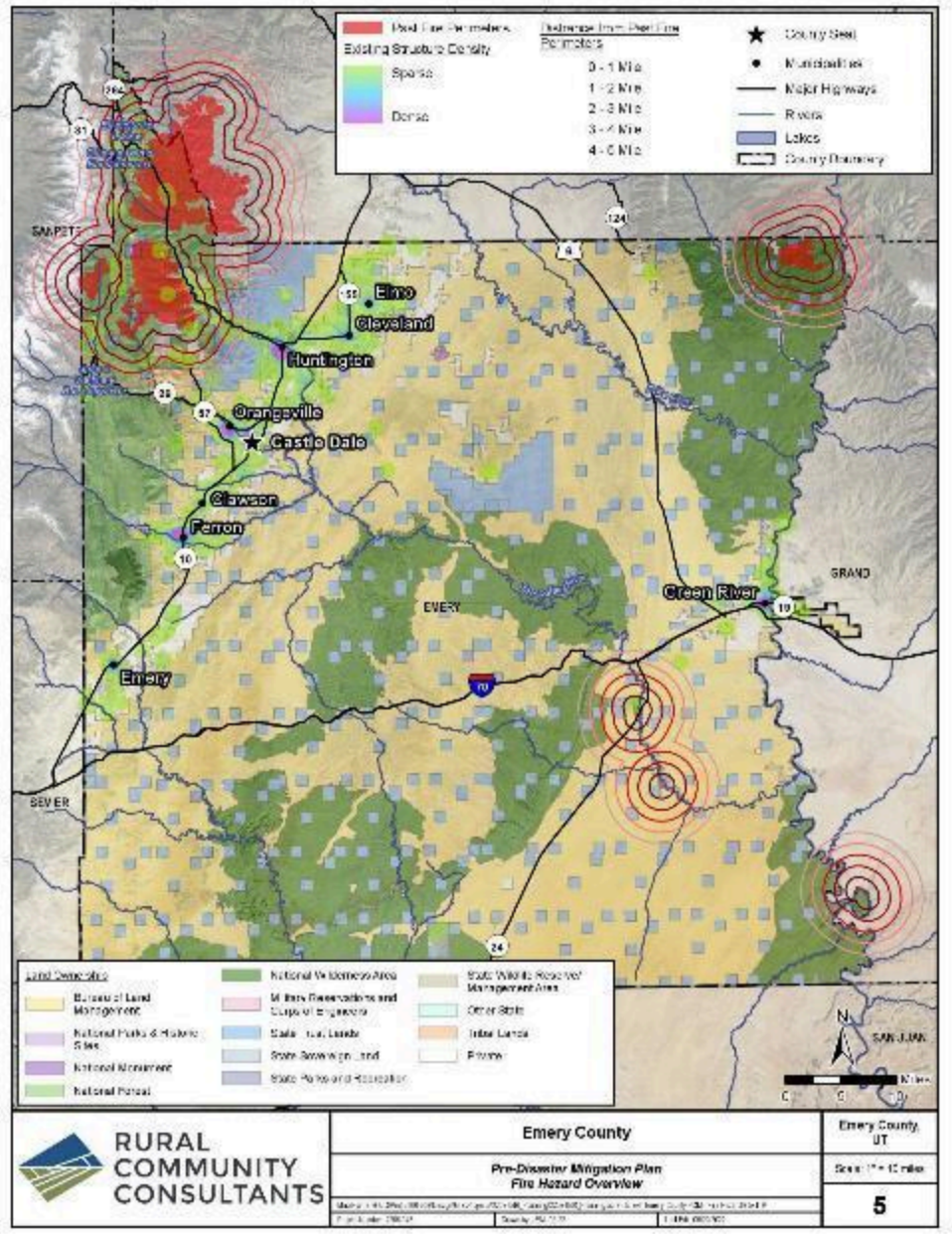
6.9.3.1 Jurisdictional Vulnerability - Wildfire

Each participating jurisdiction in Emery County faces unique wildfire vulnerabilities based on its geographic location and development patterns:

- The County's municipalities experience varying levels of wildfire risk primarily along the Wildland-Urban Interface (WUI) zones. Based on mapping analysis, approximately 2,500 structures countywide are located within the WUI zone with varying degrees of risk.
- Castle Dale, Orangeville, Ferron, and Huntington face elevated risk due to their proximity to vegetated foothills and canyons, with potential impacts to residential areas, commercial districts, and critical facilities. These communities have approximately 350 structures in high or moderate wildfire hazard areas, including several critical facilities. Wildfire could also compromise watershed health, affecting municipal water supplies.
- Green River has moderate risk concentrated around vegetated areas near the river corridor where damage could impact tourism-related businesses that form a significant portion of the local economy.

- Smaller communities face localized wildfire risks in areas where development meets natural vegetation.
- Special service districts have several facilities within potential wildfire zones, while water providers face operational challenges during wildfire events due to potential impacts to water treatment facilities and distribution infrastructure in canyon areas. Water districts face particular challenges during wildfire events, as power outages and infrastructure damage can disrupt water delivery when it's most needed for firefighting operations.

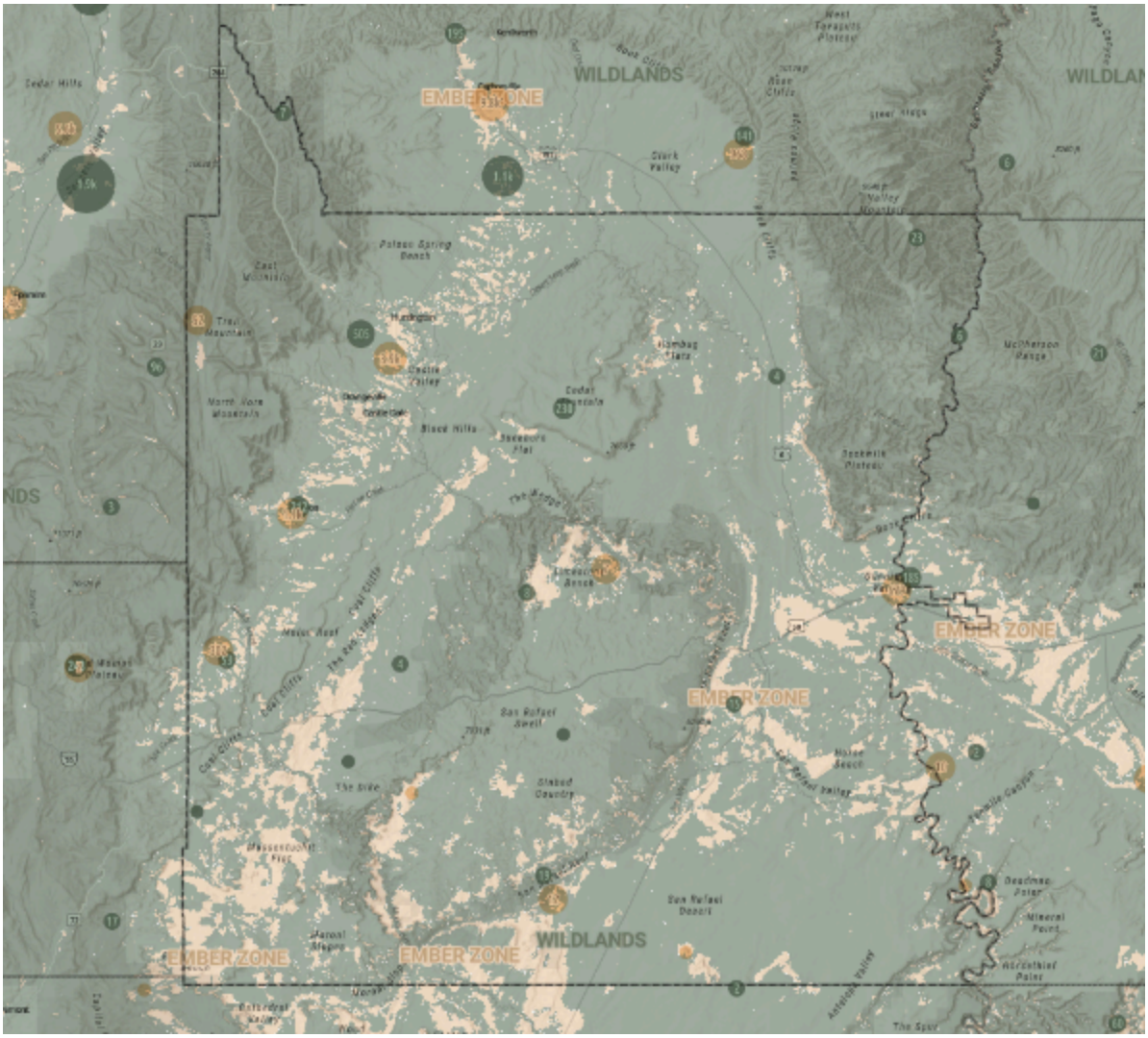
Section 7 provides detailed jurisdiction-specific vulnerability assessments and potential impacts."



Map illustrating wildfire risk in the Emery County area (click for original).

Figure 6.9.3.2 - Emery County Structural Assessment

According to the US fire administration, there are 1,500 structures in wildland areas of Emery County. There are 5,400 structures in the ember zone, and 2,100 structures in the ignition zones.



Source: US Fire Administration - [WUI Fire Community Awareness Explorer, 2024](#).

Table 6.9.3.3 - Infrastructure Vulnerable to Wildland Fire

	Length (Miles)	Replacement Cost
Local Roads	1021	$2,552,500,000
State Highways	177.7	$4,442,500,000
US Interstates	86.36	$4,318,000,000
Power Lines	N/A*	N/A*
Gas Lines	0	0
Source: PacifiCorp		

Table 6.9.3.3 - Vulnerability Assessment for Wildland Fires in Emery County

	Acres Affected	Population Affected	Residential Structures (Replacement Value)
Castle Dale	31	195	0
Clawson	20	226	0
Cleveland			
Elmo	158	198	0
Emery	56	0	273
Ferron	99	0	94
Green River	7394	0	484
Huntington	230	140	0
Orangeville	12	164	0
Source: HAZUS-MH, 2018			

Figure 6.9.3.4 - Expected Annual Loss from Wildfire (FEMA NRI)

Census Tract	Communities in Census Tract	Expected Annual Loss - Score	Expected Annual Loss - Amount	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	93.00	$71,000	Relatively Moderate
976300	Castle Dale, Orangeville, Unincorporated County	82.80	$7,400	Relatively Low
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	72.70	$1,700	Relatively Low
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2024				

6.9.4 Critical Facilities Protection

Information for this section will be included in the plan once it is developed by the stakeholders.

6.9.5 Natural Resource Protection

Table 6.9.3.2 Vulnerability Assessment for Wildland Fires in Emery County contains the number of acres for wildfire risk areas within the municipal boundaries of the cities in Emery County. Table 6.9.3.1 shows the infrastructures that may be affected, while Table 6.9.1.1 lists the Wildland Fires hazard history for Emery County.

6.9.6 Secondary Hazards

The occurrence of a Catastrophic Wildfire in Emery County is fortunately a rare event. The post fire effect may produce a cascading series of events requiring immediate action and mitigation. The effect on the watershed may impinge upon the County or communities' wells, springs, and the water delivery system. There may be landslides, mudflows, and debris flow in the burn scar that may impact streams and reservoirs or damage infrastructure such as roads and power transmission lines. Awareness of the potential and considering a plan of action to implement if a Catastrophic Wildfire should occur may mitigate the effects on the County and Communities of the cascading series of events.

Wildfires can trigger various secondary hazards, including but not limited to:

6.9.6.1 Smoke Inhalation

Wildfires can degrade air quality over large areas, leading to increased levels of pollutants such as carbon monoxide, nitrogen oxides, and volatile organic compounds. Poor air quality can impact public health, especially for vulnerable populations, and may necessitate evacuation or sheltering in place.

6.9.6.2 Air Quality Degradation

Wildfires can degrade air quality over large areas, leading to increased levels of pollutants such as carbon monoxide, nitrogen oxides, and volatile organic compounds. Poor air quality can impact public health, especially for vulnerable populations, and may necessitate evacuation or sheltering in place.

6.9.6.3 Erosion and Flooding

Wildfires can remove vegetation and alter soil properties, increasing the risk of erosion and flash flooding during rainfall events. The loss of vegetation cover reduces soil stability and infiltration capacity, leading to accelerated runoff and sedimentation in waterways.

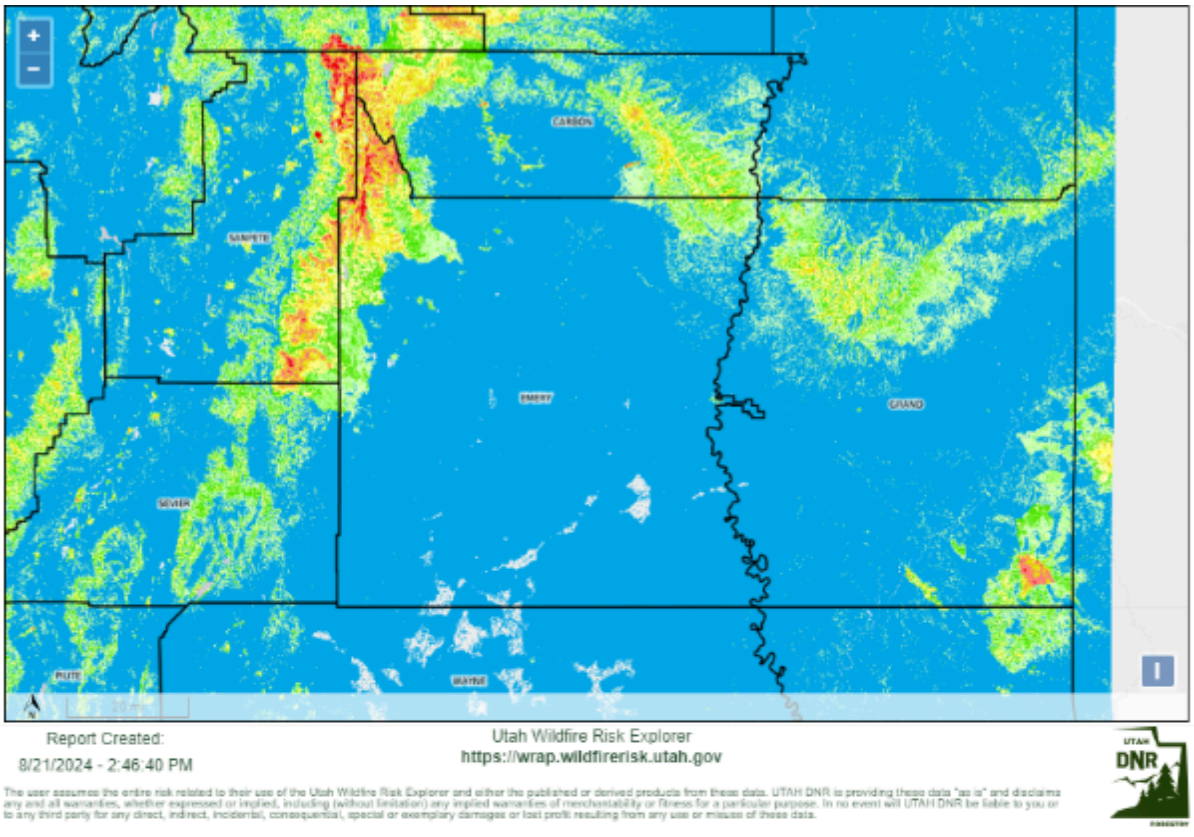
6.9.6.4 Landslides and Debris Flows

Wildfires can destabilize slopes and increase the likelihood of landslides and debris flows, especially in areas with steep terrain and shallow soils. Burned vegetation and soil become more susceptible to erosion, which can result in hazardous mass movements during intense rainfall.

6.9.6.5 Water Quality Impacts

Wildfires can contaminate surface water and groundwater with ash, sediment, and chemical residues from burned materials. This can affect drinking water sources, aquatic ecosystems, and downstream water users, posing risks to human health and the environment.

Figure 6.9.6.6 - Risk to Drinking Watersheds and Population



Source: Utah Wildfire Risk Assessment Portal, 2024

6.9.6.7 Post-Fire Debris Flow Risk

The USGS provides estimates of the probability and volume of debris flows that may be produced by a storm in a recently burned area, using a model with characteristics related to basin shape, burn severity, soil properties, and rainfall. This model has identified specific wildfire burn scars in Emery County that present elevated risk for post-fire debris flows.

The Seeley Fire and Trail Mountain Fire burn scars continue to pose significant debris flow hazards during intense rainfall events. These areas should be prioritized for monitoring during precipitation events and for implementation of erosion control measures.

6.9.7 Climate Change

Climate change is significantly altering wildfire behavior, frequency, and intensity in Emery County through several interrelated mechanisms:

- Rising temperatures and changing precipitation patterns are extending the fire season by 2-3 weeks compared to historical averages, with earlier snow melt in spring and later onset of autumn precipitation creating longer periods of vegetation dryness.
- Increased drought frequency and severity is reducing fuel moisture content across all vegetation types, with particular impact on coniferous forests at higher elevations where tree mortality from drought stress and beetle infestations creates additional dry fuels.
- More frequent and intense heat waves are creating favorable conditions for rapid fire spread and extreme fire behavior, particularly in sagebrush and pinyon-juniper ecosystems that dominate portions of the county.
- Changing weather patterns may lead to more frequent dry lightning events and stronger downdraft winds during thunderstorms, increasing both ignition sources and fire spread potential.

Historical fire data for Emery County shows a trend toward larger average fire size and more acres burned annually over the past two decades. The 2012 Seeley Fire and 2018 Trail Mountain Fire exemplify the increased potential for large, high-severity wildfires that climate models project will become more common. Communities in the wildland-urban interface should prepare for more frequent evacuations, extended fire seasons, and greater resource demands for fire suppression activities.

Adaptation strategies should include enhanced fuel reduction projects in priority areas, improved evacuation planning for vulnerable communities, updated building codes to increase structure resilience, and expanded water storage capacity for extended fire operations. Long-term forest and rangeland management plans should incorporate climate projections to prioritize areas for treatment based on changing fire regime conditions.

6.10 Problem Soils (PS)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to problem soils have been issued for Emery County since the last plan update in 2018.

6.10.1 Overview & Profile

Soil-related risks and hazards often conceal potential dangers that may not be immediately evident. Establishing facilities in areas with soil-related hazards can significantly increase the risk of loss of life, health, and property. Emery County contains three types of problematic soils: oolitic sands, limestone, and peat bogs.

1. **Oolitic Sands**: Oolitic sands are composed of small, spherical grains formed by concentric layers of calcium carbonate. These sands can be unstable and prone to shifting, which poses a risk to foundations and other structures. Their loose, unconsolidated nature makes them difficult to build upon without extensive soil stabilization measures.
2. **Limestone**: Limestone karst structures are easily eroded by water, forming caverns and crevices. Large caverns can cause the ground above to collapse, creating sinkholes and subsidence. Structures built over these karst structures are at high risk of collapse. Groundwater contamination is also a concern.
3. **Peat Bogs**: Peat bogs consist of decomposing plant material, which can easily compress and cause subsidence. These bogs can also produce methane, a highly flammable gas.

Despite the dangers posed by problem soils, no deaths have been reported in Utah. However, these soils have caused significant infrastructure damage and economic impact.

PROBLEM SOILS (PS): Problem soils are a risk to property and life due to their instability.

Table 6.10.1.1- Problem Soils Hazard Profile

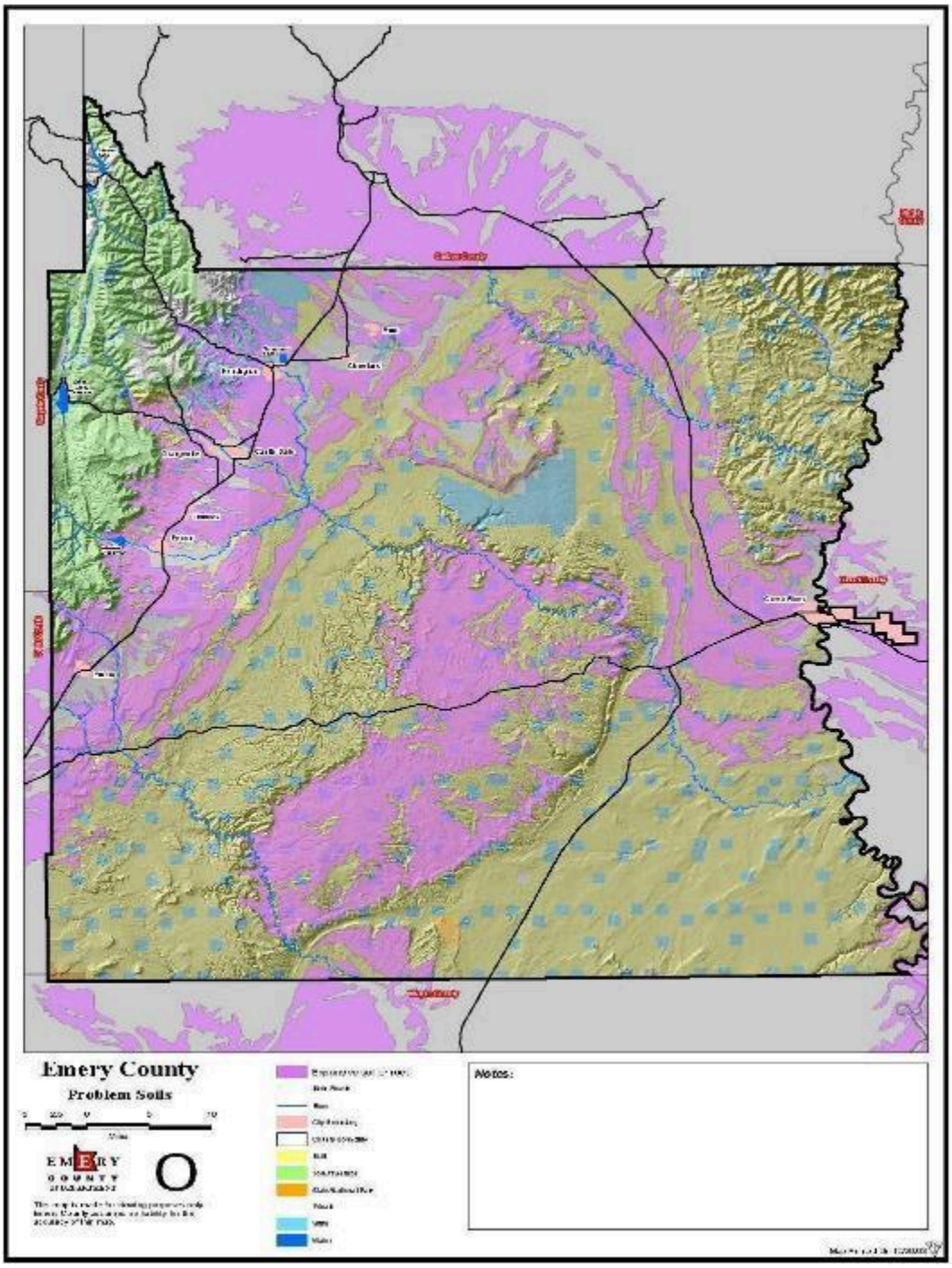
Potential Magnitude		Catastrophic (>50%)			Highly Likely
		Critical (25-50%)			Likely
	X	Limited (10-25%)		X	Possible
		Negligible (<10%)			Unlikely
Location	Region-wide. See soil map.				
Extent	Low hazard potential (see commentary below).				
Seasonal Pattern	Anytime, dependent on the geology of the County.				
Conditions	Conditions vary by geologic formation.				
Duration	Minutes to years. Problem soils are constant engineering problems for new construction.				
Secondary Hazards	Flooding (broken water pipes), fire (broken gas pipes).				
Climate Change	N/A				
Analysis Used	Reviewed maps provided by Emery County GIS, information from County soil classification books, interview with USU Extension Office, USGS, Utah Division of Emergency Management (DEM), AGRC, and local input.				

6.10.2 Location & Extent

Problem soils pose significant challenges to construction, utility trenching, and agriculture in Emery County. The area is characterized by large quantities of compacted Mancos shale and soils with high alkali content. However, the soil pH does not pose a major issue.

Expansive soils, which swell or shrink with moisture changes, are a primary concern for structures built on them. These soils, found in the West-Central States including Emery County, are often composed of sedimentary rock containing clay minerals known as swelling clays. Although avoiding construction on these soils is ideal, it is nearly impossible due to their prevalence throughout the County.

Applied engineering practices such as heavy loads to offset the swelling pressure, preventing access to water, and presetting are addressed in the Emery County Building Codes. Refer to the "Problem Soils" Map below to identify the location and/or geographic extent.


Emery County
Problem Soils
Notes:

6.10.3 Vulnerability Analysis

Emery County is mainly clay, alkali with a high salt content of Gypsum. This affects agricultural crops that can be grown in the County. Mancos soil can cause shrinking and swelling clay that affects buildings and road structures. The potential of erosion due to running water flow has the potential to leak salts into streams which end up in the Colorado River. There is a small top soil content for growing vegetation.

The problem soil of this nature requires engineering requirements and special agriculture practices to help best use these types of soils. Wildfire, as experienced with the Seely Fire can accelerate erosion that may affect wildlife, and downstream usage of the water. Agriculture soil practices should be followed to encourage environmentally healthy watershed.

6.10.3.1 - Jurisdictional Vulnerability - Problem Soils

Problem soils present varying degrees of risk across participating jurisdictions in Emery County:

- **Castle Dale City**: Moderate vulnerability in areas with expansive clay soils, particularly in newer developments along the western edge of the city.
- **Clawson Town**: Limited exposure primarily in the southeast portion where soil conditions can impact infrastructure and residential buildings.
- **Cleveland Town**: Minimal vulnerability with isolated pockets of problem soils near the eastern town limit.
- **Elmo Town**: Limited exposure with some collapsible soils in the northern neighborhoods.
- **Emery Town**: Moderate risk from expansive soils throughout the community, particularly affecting roads and utility infrastructure.
- **Ferron City**: Experiences challenges with expansive soils in newer development areas, particularly affecting municipal water and sewer lines.
- **Green River City**: Higher vulnerability due to presence of gypsum-rich soils and some karst features that can impact building foundations and underground infrastructure. The city has experienced approximately $75,000 in annual infrastructure repair costs related to expansive soil damage to water and sewer lines.
- **Huntington City**: Moderate exposure to problem soils, primarily affecting roads and utility systems with recurring maintenance issues on several major streets resulting in increased transportation hazards.
- **Orangeville City**: Limited vulnerability, though some areas experience seasonal soil movement.
- **Emery County School District**: Must consider soil conditions in facility planning and maintenance. Several school facilities are located in areas with moderate soil hazards, requiring specialized construction techniques. Several school buildings have required foundation repairs due to soil movement, with costs exceeding $120,000 over the past decade.
- **Emery Water Conservancy District**: Infrastructure, particularly underground water and sewer lines, can be vulnerable to soil movement and subsidence. Annual repair costs for soil-related pipeline damage average approximately $30,000 across the district's service area.

More detailed jurisdiction-specific impacts are addressed in Section 7.

6.10.4 Critical Facilities Protection

This section will be completed as data becomes available. For County policies regarding natural resources, please refer to the Emery County Resource Management Plan.

6.10.5 Natural Resource Protection

Natural resources can both mitigate and be affected by problem soil conditions in Emery County. Key natural resource protection considerations include:

1. **Native Vegetation Conservation**: Plants adapted to local soil conditions stabilize soil structure and reduce erosion potential. The County should identify and protect native plant communities that have evolved with Emery County's challenging soil types, particularly in areas with expansive clays and gypsum-rich soils.
2. **Soil Organic Matter Enhancement**: Healthy soils with adequate organic content are more resilient to expansion, contraction, and erosion. The County should encourage agricultural and land management practices that build soil organic matter, particularly in areas with marginal soils.
3. **Wetland and Riparian Protection**: These ecosystems often coincide with areas susceptible to soil problems but provide important hydrological buffering. Identifying and protecting wetlands and riparian corridors helps manage soil moisture fluctuations that can exacerbate problem soil behavior.
4. **Groundwater Management**: Subsurface water movement significantly influences problem soil behavior. The County should work with water managers to maintain appropriate groundwater levels that minimize soil volume changes and dissolution of soluble minerals.
5. **Desert Biological Soil Crust Preservation**: These living soil surfaces stabilize otherwise mobile desert soils. The County should coordinate with land managers to protect biological soil crusts in the San Rafael Desert through appropriate recreation management and grazing practices.

6.10.6 Secondary Hazards

Problem soils can encompass a range of issues such as expansive soils, collapsible soils, liquefaction-prone soils, and soils prone to erosion or landslides. These soil conditions can pose various secondary hazards, including:

6.10.6.1 Structural Damage

Expansive soils, which swell and shrink with changes in moisture content, can cause structural damage to buildings and infrastructure over time. This can result in foundation settlement, cracking, and other forms of structural distress.

6.10.6.2 Slope Instability

Soils prone to erosion or landslides can lead to slope instability, increasing the risk of mass movements and property damage in areas with steep terrain or poor soil conditions.

6.10.6.3 Infrastructure Failure

Problem soils can compromise the integrity of roads, bridges, utilities, and other critical infrastructure, impacting transportation networks, water supply systems, and communication services.

6.10.6.4 Water Management Challenges

Problem soils may affect drainage patterns, surface water runoff, and groundwater recharge rates, leading to localized flooding, soil erosion, and water quality issues.

6.10.6.5 Environmental Degradation

Soil-related hazards can contribute to environmental degradation, including habitat loss, sedimentation in waterways, and contamination of soil and water resources.

6.10.7 Climate Change

Climate change is expected to exacerbate problem soil impacts in Emery County through increased variability in precipitation patterns. More intense wet periods followed by extended dry periods can cause expansive soils to undergo more extreme cycles of swelling and shrinking. This cycle may accelerate damage to foundations, roads, and underground utilities. Additionally, areas with gypsum or salt-bearing soils may experience increased dissolution during heavier rainfall events, potentially leading to more frequent subsidence issues. Local planning efforts should anticipate these amplified effects, particularly for critical infrastructure located in areas with documented problem soils.

6.11 Dam Failure (DF)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to dam failures have been issued for Emery County since the last plan update in 2018. In 2022, Millsite Dam completed a rehabilitation project that enlarged the spillway to handle a Probable Maximum Flow (PMF) of 31,000 cfs and added a stability berm on the downstream side, significantly improving its safety profile. This project, which raised the dam by four feet, also increased water storage capacity to 18,000 acre-feet while enhancing its resilience to potential seismic events.

6.11.1 Overview & Profile

Dams and associated water delivery systems serve various functions and are built by different agencies and entities, including; the Bureau of Reclamation, Army Corps of Engineers, Soil Conservation Service, cities, counties, and private irrigation companies. Dams are built for hydroelectric power generation, flood control, recreation, water storage for irrigation, as well as municipal and industrial uses. Utah's dry climate makes it critical for the storage of the winter snow melt runoff for uses all year round. Federal dams impound more than 84% of Utah's stored water. The 650 non-federal dams store more than 1.2 million acre-feet of water. Dam placement is important and needs to be in an area where it can collect and distribute the greatest amount of water. Dam sites with strong impermeable bedrock are the best in terms of strength.

Several Emery County jurisdictions are located directly downstream from dams and reservoirs. Huntington City is downstream from Electric Lake, Huntington (Mammoth) Reservoir, and Cleveland Reservoir as well as being adjacent to Huntington North Reservoir. Ferron is downstream from Millsite Reservoir; Towns of Orangeville and Castle Dale are downstream from Joe's Valley Reservoir; and Green River City is located approximately 228 kilometers (142 Miles) south of Flaming Gorge Reservoir located on the Utah/Wyoming

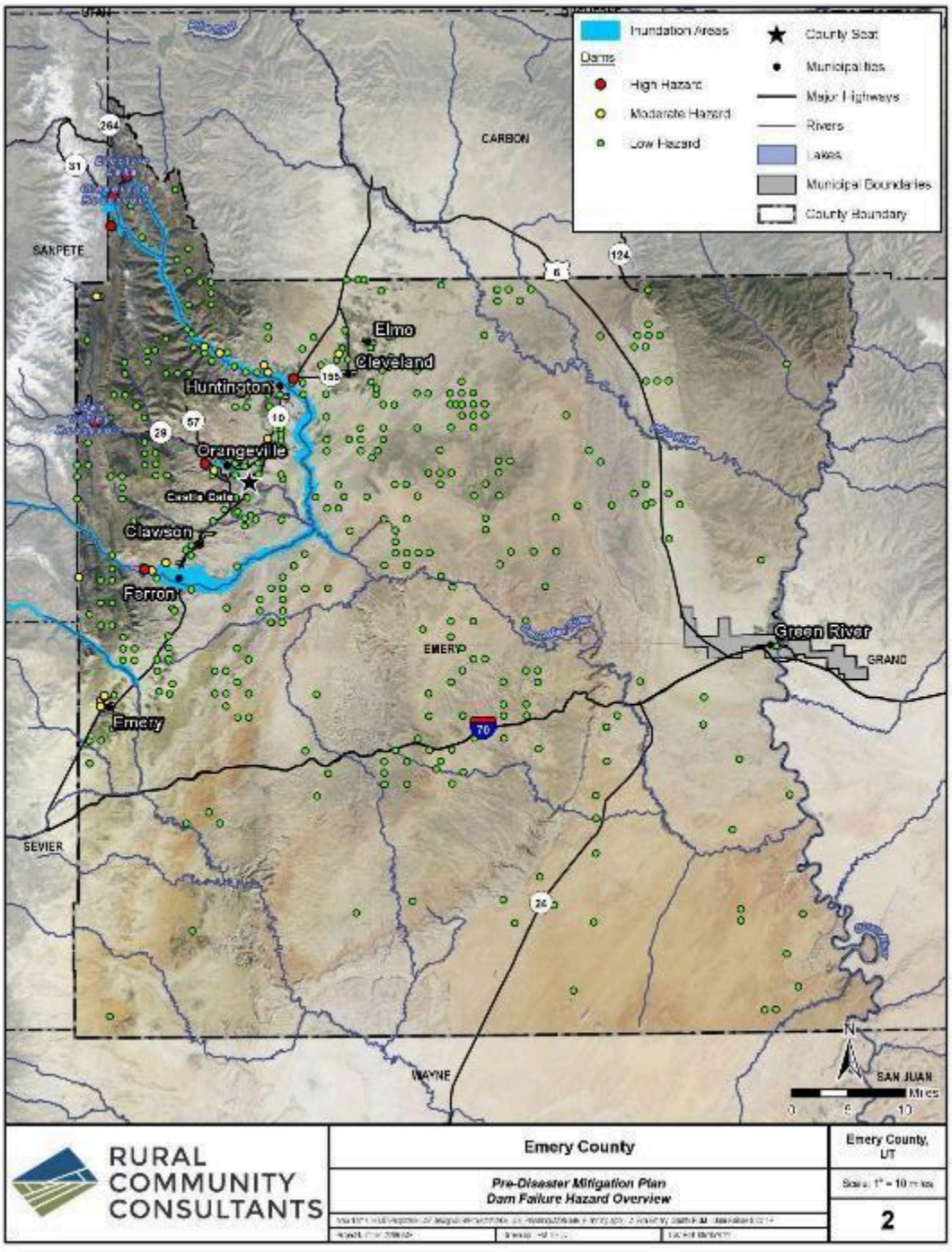
border. The Emery County's Sheriff's Office Command Post is the designated area for all current dam inundation maps.

DAM FAILURE (DF): National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for 34% of all dam failures. Foundation defects, including settlement and slope instability, account for 30% of all failures. Piping and seepage cause 20% of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows, and cracks in the dam. The remaining 16% of failures are caused by other means.

6.11.1.1- Dam Failure Profile

Potential Magnitude		Catastrophic (>50%)	**Probability**		Highly Likely
	X	Critical (25-50%)			Likely
		Limited (10-25%)		X	Possible
		Negligible (<10%)			Unlikely
Location	Dam locations are mainly in the mid-to-northwestern portion of the County.				
Extent	There are numerous dam locations in the county.				
Seasonal Pattern	Rainy day failure happens mainly during heavy precipitation events and can have warning time. Sunny-day failure happens without warning and can happen at any time.				
Conditions	Varies based on dam capacity and location				
Duration	Hours, Days. Depends on spillway type and area, maximum cubic feet per second (cfs) discharge, overflow or breach type, dam type. Refer to Dam Inventory for more information.				
Secondary Hazards	Flooding, landslides				
Climate Change	Changes in the increased variability of storms increase dam failure risk.				
Analysis Used	Review of Bureau of Reclamation (BOR) inundation maps and plans, Flood Insurance Studies (FIS), and Utah Water Rights information.				

Figure 6.11.1.2 - Emery County Dam Locations and Hazard Ratings



Map illustrating dam locations and their probable hazard ratings in the Emery County area (click here for original).

6.11.2 Vulnerability Assessment

During the vulnerability assessment processes for the 2018 plan, the planning team was able to overlay municipalities, roads, and critical facilities atop dam identification layers provided by Emery County GIS to identify the location of the water reservoirs. Downstream towns were identified that could be potentially affected if a dam were to breach.

6.11.2.1 - Jurisdictional Vulnerability - Dam Failure

Participating jurisdictions face different levels of dam failure risk based on their proximity to high-hazard dams:

- **Castle Dale City and Orangeville City** would be most severely impacted by a Joe's Valley Dam failure, with potential flooding affecting residential areas, transportation routes, and critical facilities. Inundation mapping shows potential water depths of 3-6 feet in some residential areas. Approximately 1,200 residents and 15 commercial properties could be affected. Critical facilities in the inundation zone include the wastewater treatment plant, which if damaged would create long-term recovery challenges.
- **Ferron City** faces significant risk from potential failure of Millsite Dam, which could inundate portions of the city with minimal warning time due to proximity with potential inundation of approximately 200 structures including the city's fire station, potentially compromising emergency response capabilities.
- **Huntington City** would be affected by failures at Electric Lake, Huntington (Mammoth) Reservoir, or Cleveland Reservoir, with variable impact depending on the specific failure scenario. The city is also adjacent to Huntington North Reservoir. The city's location downstream from multiple reservoirs creates a compound risk scenario where simultaneous or sequential dam failures could overwhelm emergency response capabilities.
- **Green River City**, while distant from major dams, could experience delayed flooding impacts from upstream dam failures on the Green River system. While the probability is extremely low, such an event could affect critical transportation infrastructure including I-70 and railroad corridors.
- **Clawson, Cleveland, Elmo, and Emery Towns** face minimal direct inundation risk based on current mapping, though transportation routes and utilities could be affected.
- **Emery County School District** has facilities within potential inundation areas that would require evacuation planning, particularly in Castle Dale, Ferron, and Huntington with particular concern for elementary school facilities that may require specialized evacuation procedures for younger students.
- **Emery Water Conservancy Districts**' water treatment infrastructure could be severely impacted by dam failures, potentially disrupting water service throughout the county.

Section 7 details jurisdiction-specific vulnerability assessments and potential impacts, including specific facilities at risk and recommended mitigation actions.

Figure 6.11.2.2 Joe's Valley Reservoir Inundation

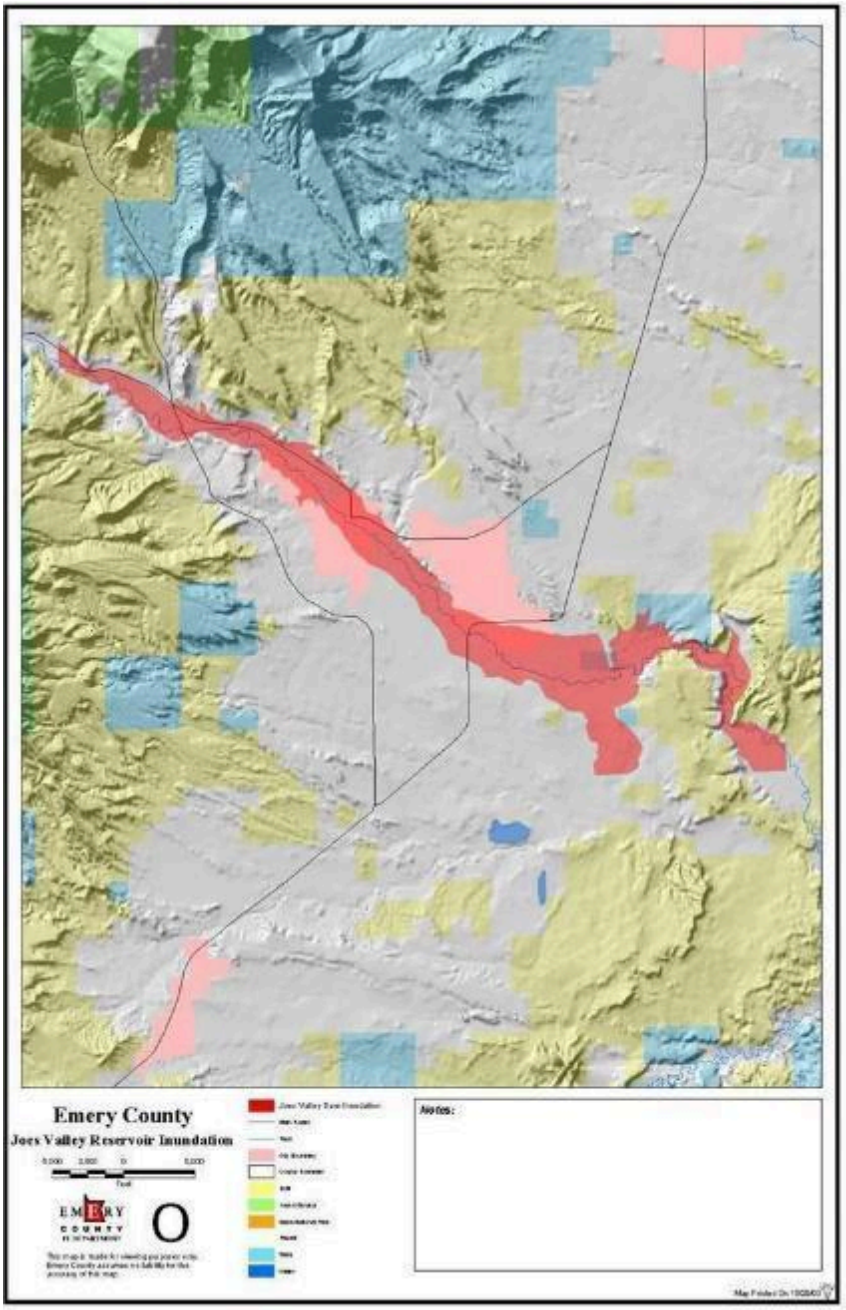


Figure 6.11.2.3 Adobe Wash Regulating Reservoir

Utah Water Rights Dam Inventory, 2018

Castle Dale and Orangeville

The Joe's Valley Reservoir was inspected by the Bureau of Reclamation (BOR) in July of 1990 and was classified to be a high downstream hazard to Orangeville and Castle Dale due partly to the faults that run directly under the reservoir contained by the dam.

Castle Valley Special Service District-Orangeville Adobe Wash Regulating Reservoir dam has a moderate hazard rating. It was built in 1983 and is owned by the Castle Valley Special Service District (CVSSD). The dam has 23 acre-feet reservoir storage at spillway crest and a maximum dam breach flow of 2,000cfs in a 0.1 square mile drainage basin area. The first downstream town is Orangeville, located just 1 mile away from the dam. Castle Dale is just downstream and adjacent to Orangeville to the southeast.

Ferron

The Millsite Reservoir was built in 1971 and modified in 1998. This reservoir has a high hazard rating and is owned by the Ferron Canal and Reservoir Company. The Millsite Reservoir is undergoing a proposed rehabilitation construction project of the dam which will take the dam off the high hazard rating list. The proposal will enlarge the spillway to handle a Probable Maximum Flow (PMF) of 31,000cfs. A stability berm is being built on the downstream side to stabilize the dam during a potential earthquake. The dam is being raised four feet giving it additional water storage with actual water storage of 18,000 acre-feet. The maximum discharge is 5450cfs and the maximum dam breach flow will be 258,000cfs. The construction project is scheduled for completion in 2018. The downstream town of Ferron is located three (3) miles from the dam.

The Ferron Debris Basin No. 4 has moderate hazard rating. This dam was built in 1970 and owned by Ferron Canal and Reservoir & Company. The reservoir storage at spillway crest is 44 acre-feet and the reservoir storage at dam crest is 61 acre-feet. The maximum dam breach flow is 7,000cfs in a one square mile drainage basin area. The first downstream town, Ferron, is only two miles away.

The Ferron Debris Basin No. 5 has a moderate hazard rating. The dam's owner is Ferron Canal and Reservoir Company. The dam was completed in 1970. The reservoir storage at spillway crest is 65 acre-feet with a 207 acre-feet storage area at the dam crest. Maximum dam breach flow would be 10,000cfs in a two-square mile drainage basin area. The spillway maximum discharge is 2080cfs. The downstream town of Ferron is only one mile away.

Figure 6.11.2.4 Ferron Millsite Reservoir

Utah Water Rights Dam Inventory, 2018

Huntington

The Cleveland Reservoir was built in 1909 and modified in 1985. The dam has a high hazard rating and the owner is Huntington-Cleveland Irrigation Company. The reservoir storage at spillway crest is 5340 acre-feet and the storage at dam crest is 6020 acre-feet. The spillway maximum discharge is 2446cfs and the maximum dam breach flow would be 74,000cfs in a nine-square mile drainage basin area. The first downstream town is Huntington, 25 miles away from the dam.

The Miller's Flat Reservoir was built in 1948 and modified in 1985. The dam has a high hazard rating and owner is Huntington-Cleveland Irrigation Company. The reservoir storage at spillway crest is 5560 acre-feet and the storage at dam crest is 6393 acre-feet. The spillway maximum discharge is 2000cfs and the maximum dam breach flow would be 99,000cfs in a nine-square mile drainage basin area. The first downstream town is Huntington, 24 miles away from the dam.

The PacifiCorp--Electric Lake Dam was built in 1974 and has a high hazard rating. The reservoir storage at spillway crest is 31,500 acre-feet and the storage at dam crest is 35,500 acre-feet. The spillway maximum discharge is 2,300cfs and the maximum dam breach flow would be 175,000cfs in a 30-square mile drainage basin area. The first town downstream is Huntington, 24 miles away.

Figure 6.11.2.5 Huntington Inundation Map

Utah Water Rights Dam Inventory, 2018

6.11.3 Dam Failure Risk to Critical Infrastructure

Dam Name	Hazard Risk	Storage Capacity (Acres)

Adobe Wash Regulating Reservoir	High	1,843
BOR Huntington North	High	5,420
BOR Joe's Valley	High	62,500
Cleveland	High	6,020
Huntington Mammoth	High	5,900
Miller's Flat	High	5,560
Millsite	High	20,000
PacifiCorp-Electric Lake	High	31,500
Castle Valley – Emery Town LWR	Moderate	*
Castle Valley – Emery Town UPR	Moderate	*
Castle Valley SP SVC DST – Orangeville	Moderate	23
Duck Fork	Moderate	*
Emery (Sanpete County, drains to Emery County)	Moderate	145
Ferron (Sanpete County drains to Emery County)	Moderate	*
Ferron Debris Basin No. 4	Moderate	44
Ferron Debris Basin No. 5	Moderate	65
HCIC: Upper Pond (north of Huntington)	Moderate	408
Julius Flat Dam	Moderate	2,500
Nielson (John)	Moderate	140
PacifiCorp-Huntington Set.	Moderate	360
PacifiCorp-Huntington	Moderate	463
Potter's Pond 1	Moderate	61
Potter's Pond 2	Moderate	66
Rolfson Dam	Moderate	600
Snowball Pond	Moderate	113
Spinners (Sanpete County drains to Emery County)	Moderate	675
Wilberg #1 (Northern)	Moderate	35
Wilberg #2 (Old Dam)	Moderate	80
Wilberg #3 (New Dam)	Moderate	100
Willow (Sanpete County drains to Emery County)	Moderate	120
Wrigley Springs	Moderate	133
Buckhorn	Low	1,843
Desert lake-Alkali Lake	Low	368

Desert Lake-Desert Lake Dike	Low	808
Desert Lake-Fawn lake	Low	248
Desert Lake-Homestead Lake	Low	236
Desert Lake-Old Desert Lake	Low	44
Desert Lake-Tamarisk Lake	Low	396
Desert lake-Wash Lake	Low	120
Ferron Debris Basin 1	Low	246
Ferron Debris Basin 2	Low	85
Ferron Debris Basin 3	Low	525
Horse Bench	Low	350
Lawrence South Irrigation Pond #2	Low	63
Lower mammoth Pond Dam	Low	38
Olsen	Low	200
PacifiCorp- Hunter Ash	Low	80
PacifiCorp- Hunter Evap.	Low	270
PacifiCorp- Hunter Irr.	Low	670
PacifiCorp- Hunter Snow Lake	Low	2800
Russell	Low	66
***N/A—Not Applicable or unknown at this time. Utah Water Rights Dam Safety, 2018; BOR, 2018**		

6.11.4 Natural Resource Protection

Natural resources both mitigate dam failure impacts and require protection from these events. Key natural resource protection considerations include:

1. **Watershed Management**: Healthy upper watersheds moderate runoff volumes and sediment loads into reservoirs. The County should coordinate with forest managers to maintain appropriate vegetation cover in the Manti-La Sal National Forest watersheds above Joe's Valley, Millsite, Electric Lake, and other major reservoirs.
2. **Riparian Corridor Preservation**: Intact riparian vegetation downstream of dams provides a natural buffer against flood impacts in the event of dam failure. The County should identify and protect critical riparian corridors along rivers below major dams, particularly the Green River, Huntington Creek, Cottonwood Creek, and Ferron Creek.
3. **Wetland Conservation**: Natural wetlands downstream of dams can attenuate flood flows and filter sediments during high-water events. Preserving wetland complexes, particularly along the Green River floodplain, enhances natural resilience to dam-related flooding.

4. **Floodplain Protection**: Undeveloped floodplains provide natural flood storage capacity during extreme events. The County should limit development in natural floodplains downstream of dams to maintain this natural buffer function while directing growth to less hazardous areas.
5. **Sediment Management**: Excessive sediment accumulation in reservoirs can compromise dam safety. Implementing erosion control measures in upstream watersheds preserves reservoir capacity while reducing pressure on dam infrastructure.

6.11.5 Secondary Hazards

Dam failures can trigger various secondary hazards, including but not limited to:

6.11.5.1 Flooding

Dam failures can release large volumes of water downstream, resulting in rapid and potentially catastrophic flooding. This flooding can inundate communities, infrastructure, and agricultural land, causing extensive property damage and posing risks to human life.

6.11.5.2 Sedimentation

The release of sediment trapped behind a dam during a failure event can contribute to sedimentation in rivers, streams, and reservoirs downstream. Excessive sedimentation can degrade water quality, impact aquatic habitats, and impede navigation and water supply infrastructure.

6.11.5.3 Debris and Blockages

Dam failures can mobilize debris, such as rocks, trees, and other debris, downstream, leading to blockages in waterways, bridges, and culverts. These blockages can exacerbate flooding and hamper emergency response efforts.

6.11.5.4 Water Contamination

Dam failures can introduce contaminants, such as oil, chemicals, and hazardous materials stored behind the dam, into downstream water bodies. This can contaminate drinking water supplies, threaten public health, and damage aquatic ecosystems.

6.11.5.5 Infrastructure Damage

Floodwaters resulting from dam failures can damage roads, bridges, utilities, and other critical infrastructure located downstream. This can disrupt transportation networks, communication systems, and access to essential services, further complicating emergency response and recovery efforts.

6.11.7 Climate Change Considerations

While dam failure probability remains low, climate change introduces several factors that warrant monitoring and adaptive management:

- More intense precipitation events could increase the frequency and magnitude of high inflow events, potentially exceeding historical design standards.
- Prolonged drought followed by heavy rainfall can create rapid inflow conditions that challenge reservoir management protocols.

- Increased temperature extremes and freeze-thaw cycles may accelerate deterioration of concrete and earthen dam components over time.
- Changes in watershed vegetation due to wildfire, drought, or invasive species can alter runoff patterns and sediment loads entering reservoirs.
- Older dam infrastructure designed using historical hydrological data may not adequately account for changing precipitation patterns and extremes.

Although Emery County's dams undergo regular inspection and maintenance, ongoing reassessment of hydrological conditions, inspection protocols, and emergency action plans is necessary to maintain safety as climate conditions continue to change. Particular attention should be paid to updating inflow design flood calculations to reflect current and projected climate conditions rather than purely historical data.

6.12 Drought (D)

The following state disaster declarations have affected Emery County since the last plan update in 2018:

- May 13, 2021: Declaring a State of Emergency Due to Drought Conditions.
- March 17, 2021: Declaring a State of Emergency Due to Drought Conditions.
- April 23, 2025: Executive Order 2025-04 Declaring a State of Emergency in Certain Counties Due to Drought Conditions.

No federal disaster declarations specific to drought have been issued for Emery County during this period.

6.12.1 Overview & Profile

According to the National Drought Mitigation Center, drought originates from a shortage of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought is also related to the timing and effectiveness of precipitation. Drought is a normal, recurrent feature of weather and climate but is a particular concern to all affected because of its devastating outcome. It occurs in almost all climatic zones with varying characteristics. Drought is a dry progression through the winter, spring, and summer months that could end in a year or last for many years. The number of dry years correlates with that impact. Usually, a one- to two-year drought affects only agriculture, while a three-year drought may significantly impact culinary water in the local areas and communities.

Table 6.12.1.1 - Drought Hazard Profile

Changes since 2016	The recent drought conditions (over the County's recent history) have increased awareness of the potential impact of drought in the County.				
Potential Magnitude	X	Catastrophic (>50%)	**Probability**	X	Highly Likely
		Critical (25-50%)			Likely
		Limited (10-25%)			Possible

		Negligible (<10%)			Unlikely
Location	County wide				
Extent	Emery County's potential for drought impact is high.				
Prior Occurrences	The US Drought Monitor reports that Emery County has experienced drought conditions at different levels almost continually since 2016.				
Seasonal Pattern	Winter: reduction of snowpack and water supplies Spring: reduction of crop production and/or increased crop water demand Summer: increased water demand, impeded crop production Fall: reduction in soil moisture could reduce snowmelt runoff				
Conditions	Agricultural impact: impeded crop production. Impeded range land. Hydrologic impact: threat to water quality and quantity. Socioeconomic impact: lack of water to support the population. Economic impact to agriculture and water-based tourism.				
Duration	Months, Years				
Secondary Hazards	Wildfire, dust storms, air quality.				
Climate Change	Climate change will increase the incidence of extreme precipitation events and change weather patterns. Extreme, or heavy snowfall events will increase the risk of avalanches. Also, changes in climate will likely cause an increase in drought hazard in Utah (which is one of the driest states in the US).				
Analysis Used	National Weather Service, Utah Climate Center, Utah Division of Water Resources, Newspapers, Local input.				

Table 6.12.1.2 - Overall National Risk Index Score for Drought

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	85.60	Relatively Low
976300	Castle Dale, Orangeville, Unincorporated County	82.80	Relatively Low
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	87.60	Relatively Low

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024

6.12.2 Location & Extent

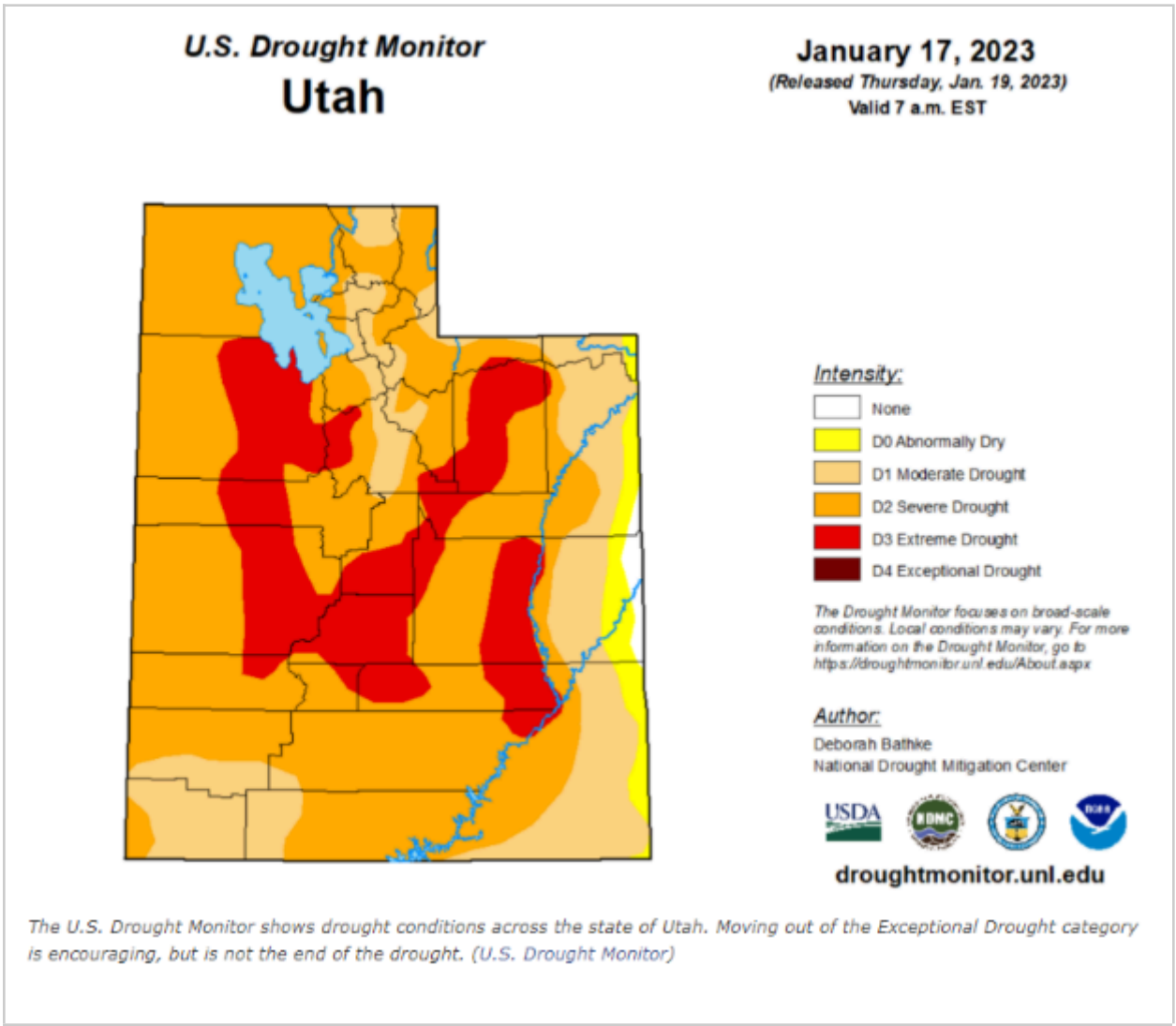
Drought events significantly affect Emery County, including its incorporated cities and unincorporated communities. During a drought, the culinary and irrigation water supplies, recreational reservoirs, and stock

ponds become depleted. Emery County declared a Drought Disaster in April 2018 and has renewed this declaration due to the prolonged drought's ongoing impact.

The cumulative effect of the drought has strained the County's economic, social, and environmental fabric. Utah, the second driest state in the nation, also ranks second in per capita water use from public supplies. According to the Utah Division of Water Resources, Utah experienced statewide drought conditions from 1999 to 2004 and again from 2014 to 2015. Decreased flow from major rivers has led to lower reservoir levels and a decline in the Great Salt Lake. The 2015 water year was among the driest ever recorded (Utah Division of Water Resources, 2015).

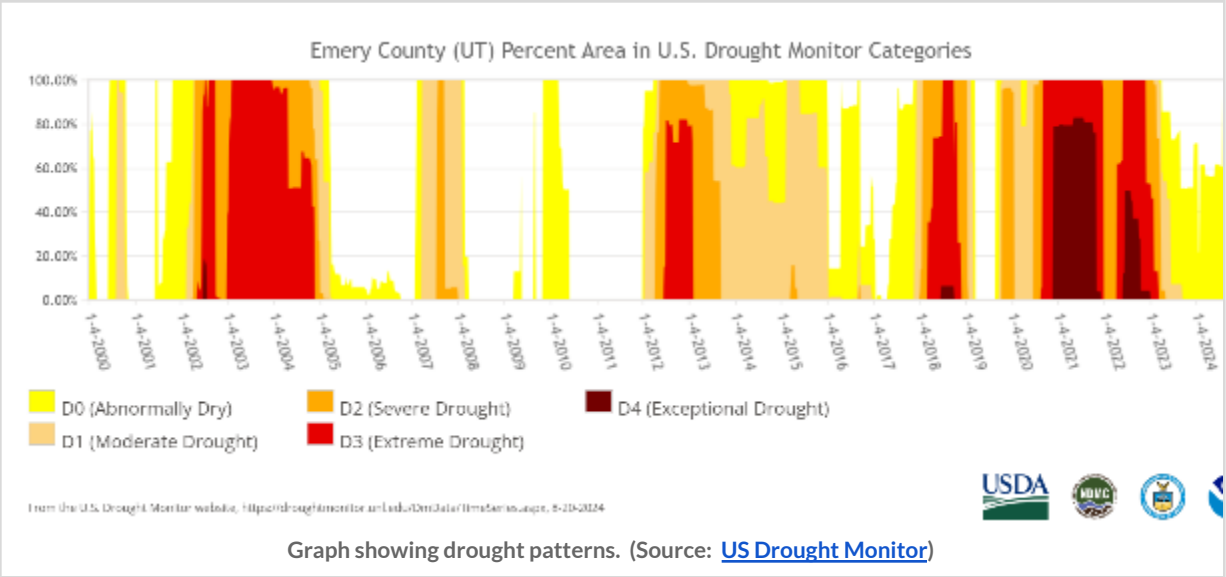
Drought conditions have lessened since 2022, as shown in the 2023 U.S. Drought Monitor figure below. At that time Utah spent 8 out of the past 10 years in drought. This may be considered the "new normal" DNR officials speculate, but 2023 and 2024 have been record-breaking wet years.

Figure 6.12.2.1 - US Drought Monitor, 2023



The U.S. Drought Monitor shows drought conditions across the state of Utah. Moving out of the Exceptional Drought category is encouraging, but is not the end of the drought. (U.S. Drought Monitor)

Figure 6.12.6.2 - Historic Drought Trends - Emery County



Graph showing drought patterns. (Source: US Drought Monitor)

6.12.3 Vulnerability Assessment

Emery County, located in the high desert of Eastern Utah, is susceptible to drought events. The County is situated within the Colorado Plateau region, which influences its weather patterns.

The County is characterized by a semi-arid climate with hot summers and cold winters. Summers in Emery County are generally hot and dry, with temperatures reaching highs in the 90s to low 100s Fahrenheit (32-38 degrees Celsius). Winters are cold, with temperatures often dropping below freezing, and occasional snowfall is common. The region receives limited rainfall throughout the year, averaging around 12 inches annually, which contributes to the arid conditions.

6.12.3.1 Jurisdictional Vulnerability - Drought

Drought vulnerability varies across Emery County jurisdictions based on water sources, economic activities, and population:

- Municipalities relying on surface water sources (streams and reservoirs) face higher vulnerability than those with diversified water portfolios including groundwater sources.
- Agricultural areas experience significant economic impacts during drought conditions, with livestock producers and irrigated cropland particularly vulnerable. The economic impact of a severe drought year can exceed $2 million in lost agricultural production countywide.
- Communities with older water infrastructure face additional challenges during drought conditions due to increased stress on systems and higher leakage rates.
- Emery County's unincorporated areas face agricultural impacts and increased wildfire risk during drought conditions.
- Castle Dale, as the county seat, experiences challenges with water supply management and increased demand during drought periods. The city's reliance on surface water sources makes it particularly vulnerable to extended drought conditions that could require water usage restrictions.

- Ferron, Emery, Huntington, and other municipalities face similar challenges with municipal water supplies during extended dry periods. Extended drought conditions could require costly water hauling operations to supplement municipal supplies.
- Orangeville and Cleveland face particular concerns with groundwater depletion during prolonged drought.
- Special service districts managing water resources must implement drought contingency plans, with particular attention to maintaining adequate supplies for critical facilities and fire protection. Drought conditions increase maintenance costs for water systems due to increased mineral concentration in diminished water sources.
- Green River City faces unique drought challenges due to its dependence on the Green River, which is affected by upstream water usage and management decisions. With its location along the Green River, may experience impacts from reduced river flow affecting both water supply and recreational tourism that supports the local economy. Reduced river flows could impact both the approximately 15,000 annual visitors to the area for river recreation and the city's water intake facilities.

Based on historical drought patterns, all jurisdictions should prepare for periodic severe drought conditions lasting 3-5 years, with increased frequency and intensity expected due to climate change impacts.

6.12.3.2 Surface Water Supply Index (SWSI)

Developed in 1982, the SWSI index uses the same basic classifications as the Palmer Drought Index and is designed to complement the Palmer Index in the western states. The SWSI is more of an indicator of surface water conditions and is described as “mountain water dependent”, in which mountain snowpack is a major component; calculated by river basin, based on snowpack, stream flow, precipitation, and reservoir storage. The objective of the SWSI was to incorporate both hydrological and climatological features into a single standardized index value. The pros and cons of the SWSI is that the index is unique to each basin. The SWSI is centered on 0 and has a range between −4.2 (extremely dry) and 4.2 (abundant supply). The index is calculated by combining pre-runoff reservoir storage with forecasts of spring and summer stream flow that is based on hydrologic variables (NDMC 2006).

6.12.3.3 Standardized Precipitation Index (SPI)

T.B. McKee, N.J. Doesken, and J. Kleist of the Colorado State University, Colorado Climate Center, formulated the SPI in 1993. The Standardized Precipitation Index was designed to quantify the precipitation deficit for multiple time scales; basically, the SPI is an index based on the probability of precipitation for any time scale. It assigns a single numeric value to the precipitation that can be compared across regions with different climates. The SPI is calculated by taking the difference of the precipitation from the mean for a particular time scale and dividing by the standard deviation.

The SPI is normalized and so the wetter and drier climates can be represented in the same way. The SPI can provide early warning of drought and help assess drought severity, yet the values based on preliminary data may change. The SPI values indicate an extremely wet period value at 2.0+, very wet equals 1.5 to 1.99, moderately wet is 1.0 to 1.49, -.99 to .99 is near normal, -1.0 to −1.49 moderately dry, -1.5 to −1.99 is severely dry, -2 and less is extremely dry. The time scales were originally calculated for 3-, 6-, 12-, 24-, and 48- months (NDMC 2006).

6.12.3.4 Localized Drought Analysis

An analysis of 33 gauging stations' data in Utah revealed localized drought occurrences annually since 1924. Drought duration is longer in basins reliant on snowmelt runoff, with greater frequency in areas like the Wasatch Range. Given Utah's reliance on surface water supplies, drought significantly affects both population and industry statewide.

6.12.3.5 Palmer Drought Severity Index (PDSI)

Developed in 1965, the PDSI is a soil moisture algorithm calibrated for relatively homogeneous regions used by government agencies and states to trigger drought relief programs. The PDSI provides a measurement of moisture conditions that were “standardized” so that comparisons using the index could be made between locations and between months. This is the oldest index for measuring drought and is less well suited for mountainous land or areas of frequent climatic extremes and does not include man-made changes. The PDSI is calculated based on precipitation and temperature data as well as local available water content of the soil. This scale is given as monthly values and is the most effective in determining long-term drought. The index ranges from −4 to 4 with negative values denoting dry spells and positive values indicating wet spells. The values 0 to -.5 equal normal, -0.5 to −1.0 equal incipient drought, -1.0 to −2.0 equal mild drought, -2.0 to −3.0 equal moderate drought, -3.0 to −4.0 equal severe drought, greater than −4.0 equals extreme drought. The wet spells use the same adjectives in the positive values (NDMC 2006).

Beginning in 1987, a drought produced some of the hottest years and driest years on record. Statewide reservoir capacity plunged below 50% at times, and farmers and ranchers struggled to continue operations. However, there were a couple wet years mixed in between for some of the climate divisions, but overall drought conditions prevailed and in 2018 were severe. For the first time in about ten years, Utah’s drought conditions reached a threshold that triggered the State’s statutory responsibility to convene Utah’s Drought Review and Reporting Committee. The committee gathered on Sept. 10, 2018 under the direction of the state’s Drought Coordinator, Mike Styler, executive director of the Utah Department of Natural Resources (DNR). On October 15, 2018, Governor Herbert issued an executive order declaring a State of Emergency due to statewide drought conditions. The Drought Review and Reporting Committee is required to hold this meeting by state code, UCA 53-2a, and Utah’s Drought Response, which requires the state to prepare for, respond to and recover from emergencies or disasters with the primary objectives to save lives and protect public health and property.

Drought conditions have developed to the degree that several areas within the state are likely to receive severe impacts to various sectors of their economies.

Table 6.12.3.6 - Palmer Drought Severity Index

High-Hazard Dams	Moderate-Hazard Dams
4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal

-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought
Source: NDMC 2006	

Table 6.12.3.7 - Expected Annual Loss from Drought (FEMA NRI)

Census Tract	Communities in Census Tract	Expected Annual Loss - Score	Expected Annual Loss - Amount	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	85.80	$1,500	Relatively Low
976300	Castle Dale, Orangeville, Unincorporated County	83.40	$757	Relatively Low
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	87.30	$2,300	Relatively Low
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2024				

6.12.4 Secondary Hazards

Drought can trigger various secondary hazards, including but not limited to:

6.12.4.1 Wildfire

Drought conditions increase wildfire risk by reducing moisture in vegetation and soil, creating more combustible fuel. Extended dry periods can transform normally fire-resistant areas into high-risk zones, potentially leading to more frequent, intense, and extensive wildfires.

6.12.4.2 Dust Storms

Dry soil conditions during drought periods can lead to increased dust storm activity, especially in arid regions. These storms reduce visibility, impair air quality, damage crops, and pose health risks through respiratory issues.

6.12.4.3 Water Quality Issues

As water levels in reservoirs, lakes, and streams decline during drought, pollutant concentrations increase. Lower water levels and reduced flow rates can lead to higher water temperatures, decreased oxygen levels, and concentrated contaminants, threatening aquatic ecosystems and potentially compromising drinking water quality.

6.12.4.4 Land Subsidence

Excessive groundwater pumping during drought can lead to land subsidence, where the ground surface sinks due to the removal of underground water. This can damage infrastructure, alter drainage patterns, and permanently reduce aquifer capacity.

6.12.4.5 Economic Impacts

Drought conditions can devastate agricultural production, leading to crop failures, livestock losses, and increased food prices. These impacts can cascade through the economy, affecting food processing industries, transportation, and retail sectors, potentially leading to job losses and economic hardship in affected communities.

6.12.4.6 Social and Health Impacts

Extended drought periods can lead to water use restrictions, increased utility costs, and potential water shortages for basic needs. These conditions can contribute to social stress, increased rates of certain diseases, and mental health challenges within affected communities.

6.12.5 Natural Resource Protection

Protecting natural resources is essential to drought resilience in Emery County. Key considerations include:

1. **Native Vegetation Conservation**: Indigenous plant communities have evolved adaptations to periodic drought conditions. Preserving native plant communities, particularly in the pinyon-juniper woodlands and sagebrush steppe ecosystems, provides ecosystem resilience during drought periods.
2. **Groundwater Recharge Area Protection**: Natural infiltration of precipitation helps replenish groundwater aquifers. The County should identify and protect critical groundwater recharge areas through appropriate land use controls and watershed management.
3. **Soil Health Maintenance**: Healthy soils with high organic content retain moisture more effectively during drought. Agricultural best management practices that enhance soil structure and reduce erosion should be encouraged throughout the County.
4. **Spring and Seep Protection**: Small water sources become critically important wildlife habitat during drought periods. The County should work with land management agencies to identify and protect springs and seeps throughout the San Rafael Desert and plateau regions.
5. **Invasive Species Management**: Non-native species often compete with native vegetation for limited water resources. Coordinated efforts to control invasive plants, particularly tamarisk along riparian corridors, can reduce water consumption and improve habitat values.

6.12.6 Climate Change Considerations

Climate change is expected to intensify drought conditions in Emery County through several interrelated factors:

- Average annual temperatures are projected to increase 2-5°F by mid-century, accelerating evaporation rates from soil, vegetation, and water bodies.
- Precipitation patterns are becoming more variable, with longer dry periods between rainfall events even if total annual precipitation remains similar.
- Earlier snowmelt and reduced snowpack is altering the timing of water availability, with peak runoff occurring 2-3 weeks earlier than historical patterns.
- Higher temperatures increase evapotranspiration rates, reducing soil moisture and stressing vegetation even during periods of normal precipitation.
- The Palmer Drought Severity Index for the region shows an increasing trend toward more severe drought conditions over the past two decades.

These changes have significant implications for water supply planning, agricultural production, and wildfire risk management throughout the county. Water conservation measures, improved monitoring systems, and diversified water supplies are critical adaptation strategies for maintaining resilience to these changing drought patterns.

6.13 Severe Weather (SW)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to dam failures have been issued for Emery County since the last plan update in 2018. Also, this section provides detailed information on severe weather hazards in Emery County. The probability and magnitude assessments presented here follow the definitions established in section 6.5.2 and are consistent with the hazard rankings presented in section 6.5.5.

6.13.1 Overview and Profile

Severe storms can include thunderstorms, lightning, hailstorms, heavy snow or rain, extreme cold and avalanche. These storms are generally related to high precipitation events during the summer and winter months and can happen anywhere in the region. Damage can be extensive especially for agriculture, farming, and transportation systems; they can also disrupt business due to power outages.

Table 6.13.1.1 - Severe Weather Hazard Profile

Changes since 2016	In recent years, winds in excess of 100 mph toppled thousands of trees and tore roofs and siding off of hundreds of buildings. Significant winter storms have also continued to draw attention to the need to prepare for potential hazard events.				
Potential Magnitude		Catastrophic (>50%)	**Probability**		Highly Likely
		Critical (25-50%)		X	Likely (for overall severe weather)*
	X	Limited (10-25%)			Possible

		Negligible (<10%)			Unlikely
Location	Occur in localized areas throughout the region. Although many severe weather phenomena generally have recognizable patterns of recurrence, it is difficult to identify exactly when and where the next event will take place.				
Extent	Emery County has the potential to experience a number of severe weather events. The most likely are heavy winter storms and canyon winds.				
Prior Occurrences	NOAA has recorded about 60 different major storms in Emery County since 2016. Two of these resulted in reported deaths or injuries.				
Seasonal Pattern	Year-round				
Conditions	Varies based on latitude, elevation, aspect and landforms.				
Duration	Severe weather hazards generally last hours and can persist for days.				
Secondary Hazards	Wildfire, flooding				
Climate Change	Winter drought increases avalanche risk.				
Analysis Used	FEMA National Risk Index, National Climate Data Center, National Weather Service, Utah Avalanche Center, Utah DEM, local input, and review of historic events and scientific records.				

*** Specific Hazard Component Probabilities:**

- Lightning: Highly Likely (90-100% annual chance)
- Heat Wave: Likely (50-89% annual chance)
- Cold Wave: Likely (50-89% annual chance)
- Ice Storm: Possible (10-49% annual chance)
- Tornado: Unlikely (less than 10% annual chance)
- Hail: Likely (50-89% annual chance)
- Strong Wind: Highly Likely (90-100% annual chance)
- Winter Weather: Highly Likely (90-100% annual chance)

Table 6.13.1.2 - Overall National Risk Index Score for Severe Weather

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	—	—
	Cold Wave	Not rated	Not rated
	Hail Storm	16.90	Very Low
	Heat Wave	87.50	Relatively High

	Ice Storm	42.50	Relatively Low
	Lightning	98.50	Very High
	Strong Wind	50.00	Relatively Low
	Tornado	17.60	Very Low
	Winter Weather	80.80	Relatively Moderate
976300	Castle Dale, Orangeville, Unincorporated County	—	—
	Cold Wave	Not rated	Not rated
	Hail Storm	11.50	Very Low
	Heat Wave	81.20	Relatively High
	Ice Storm	32.40	Very Low
	Lightning	92.90	Relatively High
	Strong Wind	31.80	Relatively Low
	Tornado	10.00	Very Low
	Winter Weather	69.90	Relatively Moderate
976500	Clawson Town, Emery Town, Ferron Town, Green River City, Unincorporated County	—	—
	Cold Wave	Not rated	Not rated
	Hail Storm	42.20	Very Low
	Heat Wave	86.90	Relatively High
	Ice Storm	40.30	Relatively Low
	Lightning	96.30	Very High
	Strong Wind	37.30	Relatively Low
	Tornado	11.00	Very Low
	Winter Weather	72.10	Relatively Moderate

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024

Table 6.13.1.3 - Summary of Significant Severe Weather Events (2016-2024)

Date	Event Type	Location	Impacts	Deaths/Injuries
3/28/1996	High Wind	Countywide	51kts, $17,000 in property damage	0/0
12/16/1996	High Wind	Countywide	96kts, $100,000 in property damage	0/6
1/11/1997	Blizzard	Countywide	$40,000 in property damage	3/50
8/12/1997	Thunderstorm/Wind	Green River	61kts, $10,000 in property damage	0/1
9/19/1997	Thunderstorm/Wind	Green River	61kts, $8,000 in property damage	0/0
10/15/1998	Winter Storm	Countywide	$100,000 in property damage	0/0
11/8/1998	Winter Storm	Countywide	$500,000 in property damage	0/10
12/19/1998	Winter Storm	Countywide	$100,000 in property damage	0/10
12/21/1998	Extreme Cold	Countywide	$20,000 in property damage	0/0
4/15/2002	High Wind	Countywide	75kts, $2M in property damage, $100k crop loss	0/10

6.13.2 Locations & Extent

Severe weather events affect all jurisdictions within Emery County, with varying intensities and impacts based on elevation, topography, and geographic location. The anticipated range of intensities for severe weather phenomena in Emery County include:

Temperature Extremes:

- **Heat Events**: Emery County experiences heat waves with temperatures ranging from 95°F to over 105°F. According to the Heat Risk Index developed by the National Weather Service, the county typically experiences Level 2 (Moderate Risk) heat events annually, with occasional Level 3 (High Risk) events. Heat Risk Index levels range from 0 (Little to No Risk) to 4 (Extreme Risk).
- **Cold Events**: Winter temperatures range from normal seasonal lows around 5-15°F to extreme cold wave conditions reaching -15°F to -30°F. Wind Chill Index values during extreme events can reach dangerous levels of -25°F to -45°F, creating life-threatening conditions within 30 minutes of exposure.

Precipitation and Winter Weather:

- **Regional Snowfall Index (RSI)**: Emery County winter storms typically range from RSI Category 1 (Notable) with 4-10 inches of snowfall, to RSI Category 3 (Significant) events producing 15-25 inches. Extreme events may reach RSI Category 4 (Major) with over 25 inches in mountainous areas.
- **Hail**: Using the TORRO Hail Storm Intensity Scale, Emery County experiences hail events ranging from H0 (pea-sized, 5mm) to H4 (walnut-sized, 20mm), with rare occurrences of H5-H6 (golf ball to tennis ball sized, 25-50mm) hail that can cause significant property damage.

Wind Events:

- **Beaufort Wind Scale**: Emery County experiences wind events ranging from Force 6 (Strong Breeze, 25-31 mph) during typical weather events to Force 9-10 (Strong Gale, 47-61 mph) during severe wind storms. Canyon areas may experience enhanced wind effects due to topographic channeling.

Lightning:

- **Lightning Activity Levels (LAL)**: Emery County experiences LAL 1-2 (Little to Moderate lightning activity) during typical thunderstorms, escalating to LAL 4-5 (High to Very High activity) during severe thunderstorm events, significantly increasing wildfire ignition risk.

These intensity ranges are based on historical weather data, National Weather Service records, and climate monitoring from 1990-2024. Higher elevation areas of the county typically experience more extreme conditions within these ranges.

6.13.3 Vulnerability Assessment

The historical record indicates Emery County experiences a wide variety of severe weather from thunderstorms with heavy rainfall and lightning, tornadoes, dense fog, hail, and heavy snowfall. The heavy rains impact the transportation system with road flooding causing road damage and road closures in Emery County. Also, unimproved roads become impassable.

6.13.3.1 Jurisdictional Vulnerability - Severe Weather

Each jurisdiction in Emery County faces different severe weather vulnerabilities:

- Higher elevation communities experience greater snowfall and winter weather impacts, affecting transportation, utilities, and emergency services. Communities like Huntington experience an average of 15 days annually where snow accumulation exceeds 6 inches, potentially isolating vulnerable populations including approximately 150 elderly residents.
- Communities in canyon areas face increased risk from high winds, particularly along canyon mouths where wind speeds can exceed 100 mph during severe events. Historical wind events have caused power outages affecting up to 1,500 residents and structural damage to exposed buildings.
- All jurisdictions face lightning risk, which can affect power infrastructure, cause wildfires, and pose direct threats to public safety.
- Green River's location along the I-70 corridor creates unique vulnerabilities during severe weather events that impact regional transportation. Severe weather-related closures of I-70 can strand travelers in the city, requiring emergency sheltering capabilities for up to 200 individuals.
- Critical facilities operated by special service districts, including water treatment plants, communications infrastructure, and emergency response centers, require specific severe weather mitigation measures to maintain essential services during events. Extended power outages during

severe weather events could compromise water treatment operations, communications systems, and heating/cooling at emergency shelters.

Jurisdiction-specific severe weather mitigation strategies are outlined in Section 7, addressing the particular vulnerabilities of each community.

Table 6.13.3.2 - Expected Annual Loss from Severe Weather (FEMA NRI)

Census Tract	Communities in Census Tract	Expected Annual Loss - Score	Expected Annual Loss - Amount	Rating
976200	Cleveland Town, Elmo Town, Huntington City, Unincorporated County	—	—	—
	Cold Wave	Not rated	$0	Not rated
	Hail Storm	18.10	$103	Very Low
	Heat Wave	88.90	$62,000	Relatively High
	Ice Storm	43.20	$1,800	Relatively Low
	Lightning	99.00	$59,000	Very High
	Strong Wind	50.50	$9,400	Relatively Low
	Tornado	19.80	$6,700	Very Low
	Winter Weather	81.20	$6,600	Relatively Moderate
976300	Castle Dale, Orangeville, Unincorporated County	—	—	—
	Cold Wave	Not rated	$0	Not rated
	Hail Storm	13.70	$66	Very Low
	Heat Wave	84.70	$47,000	Relatively High
	Ice Storm	36.30	$1,400	Relatively Low
	Lightning	95.60	$34,000	Very High
	Strong Wind	34.60	$3,800	Relatively Low
	Tornado	13.20	$4,400	Very Low
	Winter Weather	72.50	$4,100	Relatively Moderate
976500	Clawson Town, Emery Town, Ferron Town, Green River City,	—	—	—

	Unincorporated County			
	Cold Wave	43.00	$0	Very Low
	Hail Storm	11.40	$52	Very Low
	Heat Wave	86.30	$52,000	Relatively High
	Ice Storm	37.50	$1,400	Relatively Low
	Lightning	95.90	$35,000	Very High
	Strong Wind	35.90	$4,100	Relatively Low
	Tornado	11.00	$3,700	Very Low
	Winter Weather	69.60	$3,600	Relatively Moderate

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio).
Source: National Risk Index, 2024

6.13.4 Types of Severe Weather

6.13.4.1 Heat Wave or Cold Waves

Temperatures in Utah can reach the extreme ends of the thermometer. Winter months often experience temperatures below zero degrees. Summer temperatures regularly reach into the nineties with many days above 100 degrees. Drastic temperature changes also occur, even in a matter of hours. Temperature swings in such a short period of time can cause severe emotional stress in people, sometimes resulting suicide. Sub-zero temperatures occur during most winters; however, prolonged periods of extremely cold weather are infrequent. January is generally the coldest month of the year. Historically, extreme cold in the region has disrupted agriculture, farming and crops. Especially vulnerable to extreme cold are the young, elderly, homeless and animals. Wind chill can further the effects of extreme cold.

Extreme heat not only causes discomfort but can lead to heat exhaustion or heat stroke. Extreme heat also places severe strain on electrical systems due to the widespread use of evaporative coolers and air conditioners. This strain can lead to brownouts or blackouts leaving many without electrical power.

Location and Extent: Emery County experiences temperature extremes throughout all jurisdictions, with extent varying by elevation and topography. Heat waves occur county-wide with temperatures ranging from 95°F (threshold for heat wave classification) to over 105°F during extreme events.

- According to the National Weather Service Heat Risk Index, Emery County typically experiences:
    - Level 0-1 (Little to Moderate Risk): Normal summer temperatures 85-94°F
    - Level 2 (Moderate Risk): Heat wave conditions 95-99°F lasting 2-3 days
    - Level 3 (High Risk): Extreme heat events 100-105°F lasting 3+ days

    - Level 4 (Extreme Risk): Rare events exceeding 105°F with high humidity

- Cold wave events affect the entire county with temperatures ranging from normal winter lows (5-15°F) to extreme cold wave conditions (-15°F to -30°F). Wind Chill Index calculations show dangerous conditions occur when:
    - Wind Chill 0°F to -18°F: Frostbite possible in 30 minutes
    - Wind Chill -19°F to -39°F: Frostbite likely in 10-30 minutes
    - Wind Chill -40°F or below: Frostbite in 10 minutes or less
- Higher elevation areas experience more extreme conditions within these ranges, while valley areas may be moderated by topographic protection.

6.13.4.2 Heavy Precipitation

Heavy amounts of precipitation from rain or snow can result in flash flood events. Different parts of Utah have been susceptible to these types of storms because of close proximity to the mountain ranges. Major winter storms can produce five to ten times the amount of snow in the mountains than in the valley locations. Heavy snow can cause a secondary hazard in avalanches. Much of the Valley's development has occurred on old alluvial fans from the canyon mouths. During heavy rain events, water and debris collect on these same alluvial fans, damaging residential, commercial property and infrastructure.

6.13.4.3 Winter Storms

Winter storms gain energy from the collisions of two air masses. In North America, a winter storm is usually generated when a cold air mass from dry Canadian air moves south and interacts with a northward moving warm moist air mass from the Gulf of Mexico. The position where a warm and a cold air mass meet is called a front. If cold air is advancing and pushing away the warm air, the front is known as a cold front. If warm air is advancing, it will ride up over the cold air mass and the front is known as a warm front. A winter storm will typically begin under what is known as a stationary front. A stationary front is when neither air mass is advancing.

While the majority of Utah residents are no longer isolated, they are still vulnerable to the extreme conditions caused by the winter storms. Heavy snow can paralyze a City, stranding motorists, stopping the flow of supplies, disrupting emergency services, and halting classes at area schools. Heavy accumulations of snow can cause buildings to collapse and knock down trees and utility lines. The resulting danger of prolonged utility outages can become critical, during cold temperatures, which often coincide with these storms, especially to the elderly and very young. The cost of snow removal, repairing damage, and loss of business can place a large economic burden on cities. Many of the deaths due to this kind of disaster are often indirectly related, such as heart attacks from shoveling snow, and traffic accidents caused by icy roads.

6.13.4.4 Ice Storms

Ice storms are rare in Utah, but may occur when rain falls through a temperature inversion and the air near the ground is below freezing. The rain freezes on contact with everything it touches and can bring down electrical wires, telephone poles and lines, trees, and communication towers. Ice also freezes on contact with roads and highways resulting in extreme hazards to motorists and pedestrians. Bridges and overpasses are likely to freeze first. (NWS 2001.)

6.13.4.5 Heavy Snow

Heavy snow has occasionally immobilized Emery County stranding commuters, stopping the flow of commerce, disrupting emergency services, closing infrastructure and services. When heavy snow occurs with high winds, blowing snow or blizzard conditions may exist. (NWS 2001.)

6.13.4.6 Avalanche

Utah DEM defines an avalanche as a mass of snow sliding down a mountainside, driven by gravitational forces that exceed the strength of the snow grains' bonds. Four key ingredients contribute to avalanche formation: snow, a weak layer in the snow cover, a steep slope, and a trigger. Avalanches predominantly release on slopes above timberline, facing away from prevailing winds, but can also occur on smaller slopes below timberline, such as gullies, road cuts, and tree openings. While dense trees may anchor snow on steep slopes, avalanches can still occur and travel through moderately dense forests.

Avalanche victims are primarily backcountry recreationists, including snowmobilers, climbers, snowboarders, skiers, and hikers. In 90% of avalanche incidents, the victim or someone in their party triggers the avalanche.

Avalanches consist of a starting zone, track, and runout zone. Human-induced avalanches can result from activities like snowmobiling or backcountry skiing, causing ground shaking. Weather and terrain significantly influence avalanche activity, with large, frequent storms and steep slopes being primary natural factors. Other contributing factors to snowpack stability include snow accumulation rate, moisture content, snow crystal types, and wind speed/direction.

Dry-slab avalanches occur when a cohesive snow slab fractures and slides over weaker snow, usually due to sudden additional weight. Dry-slab avalanches are typically the deadliest, traveling between 60-80 miles per hour. Wet-slab avalanches, on the other hand, result from percolating water weakening the snow grains' bonds, often triggered by warm temperatures or strong sun. Wet avalanches travel slower, around 20 miles per hour.

Avalanches pose risks to communities, structures, roads, and outdoor enthusiasts. Burial of structures, vehicles, and individuals in the runout zone can lead to loss of life and economic losses. Despite mitigation efforts, avalanches remain a significant hazard in Utah's mountainous regions, causing fatalities and injuries annually.

6.13.4.7 Lightning

Lightning is the electric discharge between clouds or from a cloud to the earth. In Utah, lightning causes the highest number of weather-related fatalities (NWS 2008). Lightning casualties occur most frequently during the summer monsoonal flow in July and August. See Table 8-1 for the number of casualties caused by lightning.

Lightning is also the primary cause of wildland fires in Utah (NWS 2008), which could cause casualties or be disruptive to the economy. Between 2006 and 2015, Utah had 6 lightning caused deaths.

Deaths directly related to severe weather occur, such is the case with lightning. Over 40 million lightning strikes occur each year in the United States. Since 1950 there have been 51 deaths and 131 injuries, in Utah, due to lightning. Lightning is Utah's second deadliest natural hazard, trailing only avalanches, when comparing the figures from 1951 to the present. Most lightning strikes, in Utah, occur during the summer months of May, June, July, and August, when large consecutive storms come.

Severe Thunderstorms usually last around 30 minutes and are typically only 15 miles in diameter (NWS 1999), but all produce lightning, the "number one weather-related killer" in Utah (NWS 2008). Thunderstorms can also lead to flash flooding from heavy rainfall, strong winds, hail and tornadoes or waterspouts (NWS 1999).

There are approximately 25 million recorded lightning strikes in the US and 200,000 cloud-to-ground lightning flashes in Utah annually. Although most lightning occurs in the summer, lightning can strike at any time of year. Lightning kills an average of 47 people in the US each year and hundreds more are severely injured. Additionally, lightning causes billions of dollars in associated losses by igniting fires and disrupting utility, aviation, and transportation services.

Location and Extent: Lightning occurs throughout Emery County during thunderstorm events, with intensity measured using Lightning Activity Levels (LAL):

- LAL 1 (Little lightning): Few isolated thunderstorms, low wildfire ignition risk
- LAL 2 (Moderate lightning): Scattered thunderstorms, moderate ignition risk
- LAL 3 (Considerable lightning): Numerous thunderstorms, high ignition risk
- LAL 4 (High lightning): Continuous thunderstorms, very high ignition risk
- LAL 5 (Very High lightning): Dry thunderstorms with continuous lightning, extreme ignition risk

6.13.4.8 Tornado

Tornadoes are defined as "a violently rotating column of air extending from a thunderstorm to the ground" (NWS 2015), and is often on the edge of the updraft or next to the air coming down from the thunderstorm. A tornado's vortex is a low-pressure area and as air rushes into the vortex, its pressure lowers and cools the air.

This cooler air condenses into water vapor in the funnel cloud, known as the vortex, and does not touch the ground. The swirling winds of the tornado pick up dust, dirt, and debris from the ground, which turns the funnel cloud darker. Some tornadoes can have wind speeds greater than 250 miles per hour with a damage zone of 50 miles long and greater than 1 mile wide (NWS 2015). Most tornadoes in Utah typically have winds less than 110 miles per hour, are no wider than 60 feet, and are on the ground longer than "a few minutes" (Brough, et al. 2007).

A change in wind direction and an increase in wind speed along with increasing height create a horizontal spinning effect in the lower atmosphere form a tornado while the rising air within the thunderstorm updraft tilts the rotating air vertically resulting in what we call a tornado. The area of rotation is generally 2-6 miles wide and extends through much of the storm (NWS 2015).

Scale: Tornadoes are classified by the National Weather Service using the Fujita Scale, which relates wind speed to damage to determine tornado intensity. The scale uses numbers from 0 through 5 with the ratings based on the amount and type of wind damage (SPC 2007). This scale has recently been modified and is now referred to as the Enhanced Fujita Scale. The Enhanced Fujita Scale classifications are listed below:

Enhanced Fujita Scale

- EF-0: 65-85 mph, Light damage, downed tree branches, chimney damage
- EF-1: Winds 86-110 mph, Moderate damage, mobile home damage
- EF-2: Winds 111-135 mph, Considerable damage, mobile home demolished, trees uprooted

- EF-3: Winds 136-165 mph, severe damage, roofs and walls torn down, trains overturned, cars thrown
- EF-4: Winds 166-200 mph, Devastating damage, well-constructed walls leveled
- EF-5: Winds over 200 mph, incredible damage, homes lifted off foundation and carried, autos thrown as far as 100 feet. (SPC 2014)

Waterspouts are weak tornadoes that form over warm water, and in Utah generally occur with cold, late fall or late winter storms (Brough, et al. 2007).

Historically, atmospheric conditions have not been favorable for tornado development in Utah due to a dry climate and mountainous terrain. Utah is one of the lowest ranked in the nation for incidences of tornadoes with only one F2 or stronger tornado every seven years. Utah averages about two tornadoes per year which typically occur between May and August.

The list below shows Utah's Strongest Tornadoes. (Category based on old Fujita Scale, see below)

- F2 January 22, 1943 Young Ward
- F2 June 16, 1955 Sanpete County
- F2 June 3, 1963 Bountiful
- F2 February 9, 1965 Salt Lake City
- F2 November 2, 1967 Emery
- F2 August 14, 1968 West Weber
- F2 June 10, 1970 Grand County
- F2 May 29, 1987 Lewiston
- F3 August 11, 1993 Uinta Mountains
- F2 August 11, 1999 Salt Lake City
- F2 September 8, 2002 Manti

Location and Extent: Tornadoes are rare in Emery County but can occur. When they do occur, they are typically classified using the Enhanced Fujita Scale:

- EF0: 65-85 mph winds, light damage
- EF1: 86-110 mph winds, moderate damage
- EF2: 111-135 mph winds, considerable damage
- Historical events in the region have been primarily EF0-EF1 magnitude.

6.13.4.9 High Winds

High winds can occur with or without the presence of a storm and are unpredictable in regard to time and place. The County has experienced high trailers and railroad cars, and downed small airplanes. Emery can expect regional high wind future events.

Canyon winds can bring wind gusts greater than 100 mph through the canyon mouths into the populated areas. Winds are usually strongest near the mouths of canyons and have resulted in the loss of power and the inability to heat homes and businesses. Winds have also damaged roofs, destroyed and knocked down

large trees and fences, overturned tractor County has experienced numerous high wind episodes resulting in several million dollars of property damage.

Location and Extent: High wind events affect all areas of Emery County, measured using the Beaufort Wind Scale:

- Force 6 (Strong Breeze): 25-31 mph, large branches move, difficulty using umbrellas
- Force 7 (High Wind): 32-38 mph, whole trees in motion, effort needed to walk
- Force 8 (Fresh Gale): 39-46 mph, twigs break off trees, walking difficult
- Force 9 (Strong Gale): 47-54 mph, slight structural damage, roof shingles blown off
- Force 10 (Storm): 55-63 mph, trees uprooted, considerable structural damage
- Canyon areas experience wind channeling effects that can increase speeds by 25-50% above open terrain values.

6.13.4.10 Hail

Hail storms occur when freezing water (in thunderstorm clouds) accumulates in layers around an icy core generally during the warmer months of May through September. Hail causes damage by battering crops, structures and automobiles. When hail storms are large, damage can be extensive (especially when combined with strong wind).

Location and Extent: Hail events occur throughout Emery County during thunderstorms, typically May through September. Hail intensity is measured using the TORRO Hail Storm Intensity Scale:

- H0: Pea-sized (5mm), minimal damage
- H1: Marble-sized (5-9mm), slight damage to crops/vegetation
- H2: Walnut-sized (10-15mm), damage to crops, minor property damage
- H3: Chestnut-sized (16-20mm), moderate property damage
- H4: Golf ball-sized (21-30mm), significant property damage
- H5: Tennis ball-sized (31-40mm), severe property damage
- H6: Cricket ball-sized (41-50mm), extensive property damage
- Emery County typically experiences H0-H4 events, with H5-H6 occurrences being rare but possible.

6.13.5 Secondary Hazards

Severe weather events can trigger various secondary hazards, including but not limited to:

6.13.5.1 Flooding

Heavy precipitation from severe storms can lead to flash flooding, riverine flooding, and urban flooding. Rapid snowmelt following heavy snow events can also contribute to flooding conditions, particularly in spring months.

6.13.5.2 Power Outages

High winds, ice accumulation, lightning strikes, and heavy snow can damage power infrastructure, leading to widespread outages. These outages can impact critical facilities, disrupt communications, and pose risks to vulnerable populations, particularly during temperature extremes.

6.13.5.3 Transportation Disruptions

Severe weather can make roads impassable due to snow, ice, flooding, or debris, disrupting transportation networks and emergency services. These conditions can isolate communities, particularly in rural areas of Emery County.

6.13.5.4 Infrastructure Damage

Hail, high winds, and heavy snow loads can damage buildings, utilities, and other infrastructure. This damage can range from minor roof issues to structural failure in extreme cases.

6.13.5.5 Wildfire Ignition

Lightning from thunderstorms is a significant natural cause of wildfire ignition, particularly during dry conditions. Wind events can also contribute to rapid wildfire spread once ignition occurs.

6.13.5.6 Agricultural Impacts

Severe weather can damage crops, harm livestock, and disrupt agricultural operations through direct impacts like hail damage or indirect impacts like delayed planting due to wet field conditions.

6.13.5.7 Public Health Concerns

Extreme temperatures associated with severe weather can lead to heat-related illnesses or cold exposure injuries. Poor air quality from dust storms or wildfire smoke can exacerbate respiratory conditions.

6.13.6 Natural Resource Protection

Natural resources in Emery County can both mitigate severe weather impacts and require protection from these events. Key considerations include:

1. **Windbreak Preservation**: Natural tree stands and shrub communities serve as windbreaks, reducing wind speeds and associated damage. The County should encourage preservation of these natural barriers, particularly in agricultural areas and around vulnerable infrastructure.
2. **Erosion Control Vegetation**: Native plant communities stabilize soils against erosion during heavy precipitation events. Maintaining and restoring native vegetation, especially on slopes and in drainage areas, reduces sediment loading in streams and reservoirs.
3. **Heat Island Mitigation**: Natural vegetation moderates heat waves through shade and evapotranspiration. The County should promote preservation and expansion of tree canopy in developed areas to reduce heat stress during heat wave events.
4. **Snow Capture Vegetation**: Strategic preservation of vegetation in upland areas enhances snow capture and gradual meltwater release. Coordination with forest managers to maintain healthy forest stands in the Wasatch Plateau optimizes water storage in the snowpack.

5. **Stormwater Infiltration Areas**: Natural depressions and permeable surfaces allow precipitation to infiltrate rather than contribute to flash flooding. The County should identify and protect natural drainage features that provide this service throughout developed areas.

6.13.7 Climate Change Considerations

Climate change is projected to alter severe weather patterns in Emery County in several ways:

- **Heat Waves**: Models project an increase in frequency, intensity, and duration of extreme heat events, with potential for 5-10 additional days above 95°F annually by mid-century.
- **Cold Waves**: While average winter temperatures are expected to increase, climate variability may still produce cold wave events, potentially with greater impacts due to reduced community preparedness.
- **Lightning**: Research suggests a potential 12% increase in lightning strikes per 1°C of warming, which could increase wildfire ignition risk.
- **Strong Winds**: Changes in atmospheric circulation patterns may alter wind patterns and potentially increase the frequency of high wind events.
- **Precipitation Intensity**: Warmer air holds more moisture, potentially leading to more intense precipitation events when storms do occur, despite overall drier conditions.

County emergency management planning should prepare for these changing risk profiles, particularly the increased likelihood of extreme heat events and more variable precipitation patterns.

6.14 Infestation (I)

Note: This plan update includes hazard events through October 2024. No federal or state disaster declarations specific to infestation have been issued for Emery County since the last plan update in 2018.

6.14.1 Overview & Profile

INFESTATION (I): Infestation of noxious weeds and trees, insects, and invasive plant species can impact the health, safety, and welfare of the county and its residents. Emery County is particularly concerned with tamarisk (salt cedar) invasion along waterways, Mormon cricket populations in agricultural areas, and bark beetle impacts in forested regions.

Table 6.14.1.1 - Infestation Hazard Profile

Potential Magnitude		Catastrophic (>50%)	**Probability**	X	Highly Likely*
		Critical (25-50%)			Likely
		Limited (10-25%)			Possible
	X	Negligible (<10%)			Unlikely
	**Based on historical occurrences and current environmental conditions, infestations in Emery County have a "Likely" probability (50-89% chance) of occurring annually. Agricultural areas, riparian corridors, and forested regions are particularly susceptible*				

Location	Agricultural lands, riparian corridors along the Green River and San Rafael River, forested areas in the Manti-La Sal National Forest, areas of extreme drought, countywide.
Extent	There are numerous dam locations in the county.
Seasonal Pattern	Spring and summer months, especially related to drought conditions.
Duration	Months to years.
Analysis Used	Reviewed information provided by UGS, DEM, AGRC, Utah Forestry Fire and State Lands, Utah Forest Service, Utah State University Extension Service, Emery County Weed and Mosquito Department, and local input.

6.14.2 Location & Extent

Emery County participates in the Castle Country Cooperative Weed Management Area (CCWMA), a partnership of landowners, government agencies, and other stakeholders working to identify, prioritize, and implement weed management projects throughout the county. The CCWMA operates under guidance from the Utah Weed Control Association (UWCA), implementing best weed management practices available with current technology.

The county's Weed and Mosquito Department actively monitors and treats infestations, with particular focus on tamarisk removal along waterways. This non-native species uses large amounts of water and chokes out native vegetation, spreading rapidly throughout riparian areas. The department has developed specific projects to control this species and other noxious weeds identified in the state's noxious weed list.

Forest health management in Emery County falls under the USDA Forest Service Region 4, which provides:

- Detection and evaluation of disease and insect situations.
- Management guidance through field visits, publications, and training.
- Participation in forest planning and forest plan implementation.
- Technical expertise for interdisciplinary teams.
- Technical and financial assistance for insect and disease suppression, prevention, and restoration projects.
- Development and application of modern technology for the management of forest insects and diseases.

6.14.2.1 Hazard History

While no formal disaster declarations have been made for infestations in Emery County during the 2018-2024 period, the county has experienced:

- Ongoing tamarisk (salt cedar) infestation along the Green River and San Rafael River corridors, requiring continuous mitigation efforts.

- Mormon cricket populations affecting agricultural areas in 2019-2021, managed through county agricultural extension programs.
- Bark beetle activity in the Manti-La Sal National Forest, particularly affecting pine and spruce populations.
- Noxious weed proliferation, especially in areas recovering from the 2012 Seeley Fire and 2018 Trail Mountain Fire.

6.14.3 Vulnerability Assessment

Potential loss estimates for infestations are difficult to calculate due to the unpredictable nature of such occurrences. The county relies on monitoring and early detection systems through partnerships with state and federal agencies to identify emerging threats before they reach critical levels. The County Weed and Mosquito Department manages infestation response countywide, with primary concerns including tamarisk along waterways, Mormon crickets in agricultural areas, and bark beetles in forested regions.

Infestation impacts vary across Emery County jurisdictions. The potential impacts include:

- Damage to vegetation affecting parks, landscapes, and natural areas. Parks and recreational areas in multiple jurisdictions require approximately $50,000 annually in treatment and vegetation replacement costs.
- Increased wildfire risk due to tree mortality in forested areas, particularly concerning given recent wildfire history.
- Economic losses in agricultural areas, especially for hay and alfalfa production. A severe Mormon cricket infestation can reduce crop yields by 40-60%, representing potential losses of $1.5 million countywide.
- Water resource depletion from invasive species like tamarisk that consume large quantities of water. Tamarisk infestations along the Green River and San Rafael River corridors can reduce water availability by up to 200 acre-feet annually through excessive transpiration.
- Impacts on watershed health and water quality, particularly following wildfire events.
- Costs for treatment and management of affected areas.
- Ecological disruption affecting wildlife habitats and biodiversity in the San Rafael Swell and other natural areas. The treatment costs and environmental impacts of managing these infestations represent a significant ongoing burden for the county and its municipalities.

Jurisdiction-specific impacts and mitigation approaches are detailed in Section 7.

Table 6.14.3.1 - Trees Killed and Acres Affected by Bark Beetles in Emery County (2022 Survey)

Tree Type	Number of Trees	Number of Acres
Mountain Pine Beetle	120 Trees	45 Acres
Douglas Fir Beetle	85 Trees	30 Acres
Spruce Beetle	210 Trees	70 Acres
Pinon Engraver	40 Trees	15 Acres

Tree Type	Number of Trees	Number of Acres
Fir Engraver Beetle	30 Trees	10 Acres
Subalpine Fir	950 Trees	320 Acres

Table 6.14.3.2 - Number of Acres Impacted by Defoliators and Other Agents (2022)

Cause	Number of Acres
Western Spruce Budworm	215 Acres
Aspen Decline	180 Acres
Tamarisk Infestation	410 Acres

***Source**: Utah Forest Insect and Disease Conditions Report 2022, State of Utah Department of Natural Resources, Division of Forestry, Fire, and State Lands*

6.14.4 Secondary Hazards

Infestations can trigger or exacerbate several secondary hazards:

- **Increased Wildfire Risk**: Dead or dying trees from beetle infestations create additional fuel loads in forested areas, potentially increasing wildfire intensity and spread rates.
- **Water Quality Impacts**: Heavy infestations near waterways can lead to increased erosion, sedimentation, and changes in water chemistry when plants decompose.
- **Economic Disruption**: Severe agricultural infestations can impact local economies dependent on farming and ranching activities.
- **Wildlife Displacement**: Changes in vegetation due to invasive species can disrupt wildlife habitat and migration patterns.

6.14.5 Natural Resource Protection

Protecting natural resources from infestation requires a multifaceted approach:

1. **Early Detection and Rapid Response**: Implementing monitoring systems to identify new invasions quickly and respond before they become established.
2. **Habitat Restoration**: Restoring native plant communities in areas affected by wildfire or previous infestations to promote resilience against invasive species.
3. **Biological Controls**: Utilizing natural predators or pathogens that specifically target invasive species where appropriate.
4. **Watershed Management**: Protecting riparian areas through coordinated vegetation management strategies.
5. **Collaborative Management**: Partnering with adjacent landowners, including federal agencies, to ensure consistent treatment across jurisdictional boundaries.

6.14.6 Development Changes and Countywide Vulnerability Trends

Since the 2018 plan, development patterns across Emery County have generally followed three main trends that have affected hazard vulnerability:

1. **Infrastructure Resilience Improvements**: Significant investments in water system upgrades, stormwater management facilities, and transportation infrastructure have collectively DECREASED vulnerability to flooding, drought, and severe weather hazards in most jurisdictions. These improvements include upgraded culverts, enhanced water storage capacity, and hardened electrical distribution systems.
2. **Minimal Expansion into High-Hazard Areas**: Limited population growth has resulted in development primarily occurring as infill within existing community boundaries rather than expansion into identified hazard zones. This pattern has maintained existing vulnerability levels without significant increases in exposure to hazards like wildfire, landslide, or flooding.
3. **Building Code Implementation**: Newer structures built to current seismic and flood-resistant standards have incrementally DECREASED vulnerability in the built environment, though the effect is modest given the limited amount of new construction relative to existing structures.

The cumulative effect of these development trends has been a slight overall decrease in vulnerability to primary hazards across most jurisdictions, with specific variations noted in each community's profile in Section 7.

6.14.7 Climate Change Considerations

Climate change is projected to significantly influence infestation patterns in Emery County through several mechanisms:

1. Warmer winter temperatures may reduce natural die-off of pest populations, leading to larger spring populations.
2. Extended growing seasons may allow for additional pest reproduction cycles each year.
3. Increased drought frequency and intensity may stress native vegetation, making them more susceptible to insect damage and disease.
4. Changes in precipitation patterns may favor invasive plant species that outcompete native vegetation.
5. Shifting temperature zones may allow new invasive species to establish in the region.

The county's agricultural extension offices have already reported earlier seasonal emergence of certain pest species and more rapid spread of invasive plants in drought-affected areas, consistent with warming trends. Future mitigation efforts will incorporate enhanced monitoring programs to identify emerging infestation threats as climate conditions continue to change.

7.0 Community Sections

7.1 Emery County

Each of the various jurisdictions identified hazards and created a list of mitigative actions to be completed to help aid in their defense of disasters.

Each jurisdiction's section includes a clear identification of the specific hazards that affect that community (Section 7.X.5), mitigation strategies that directly address those hazards (Section 7.X.9), and explicit justification for any county-level hazards that do not have jurisdiction-specific mitigation actions (Section 7.X.9.X "Justification for Hazards Not Included"). This approach ensures transparency in how each jurisdiction is addressing its unique hazard vulnerabilities.

7.1.1 Geographic & Physiographic Background

Emery County is located in the east-central part of Utah, United States. As of the 2022 United States Census, the population was 10,099. Its county seat is Castle Dale, and the largest city is Huntington.

Emery County is situated in the geologically diverse region of the Colorado Plateau, known for its distinctive landforms and scenic landscapes. The county is bordered by natural landmarks such as the Wasatch Plateau to the west, which offers picturesque mountain ranges and scenic vistas. The county also encompasses the expansive San Rafael Swell, a significant geological feature characterized by dramatic canyons, mesas, and unique rock formations.

The area is renowned for its breathtaking geology, with formations like the San Rafael Reef displaying mesmerizing multicolored sandstone cliffs and canyons. The topography of Emery County features a mix of rugged mountains, deep canyons, and rolling plains, providing diverse terrain for both residents and visitors.

7.1.2 Floodplains

Emery County contains several significant floodplains that are subject to periodic flooding due to the region's topography and hydrological characteristics. The most notable floodplains are along the San Rafael River and Green River, which meander through the county. These floodplains are characterized by relatively flat terrain that allows water to spread out during periods of high precipitation or snowmelt.

While these floodplains are not as extensive as in some other regions due to the county's predominantly mountainous terrain, they still present potential flood hazards in certain low-lying areas. The floodplains along these rivers are relatively narrow and primarily found in sections where the rivers flow through broader valley floors.

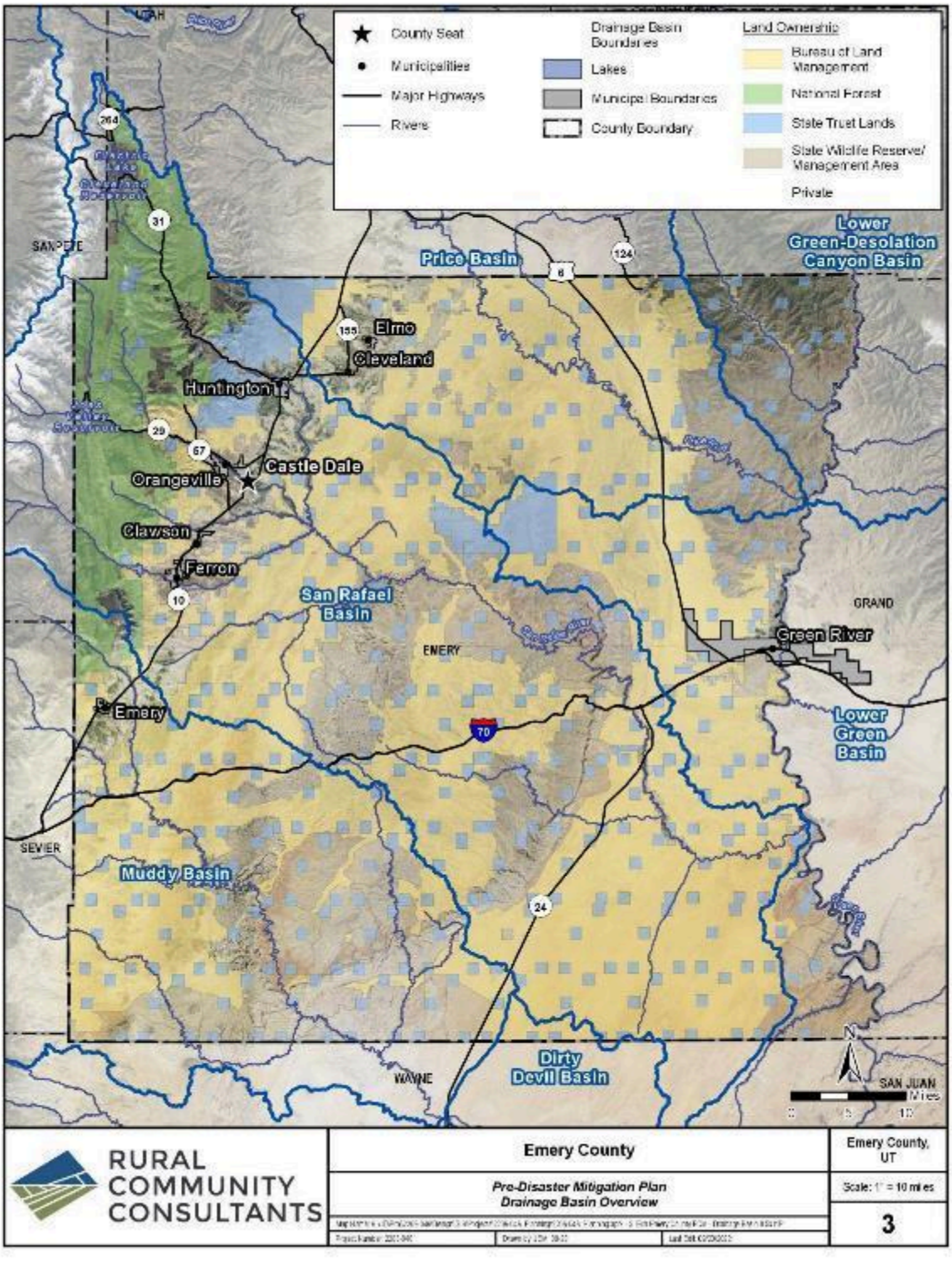
These floodplain areas serve as vital ecological and hydrological features, supporting diverse riparian vegetation and wildlife habitats while providing critical water storage capacity during flood events. However, they can also pose risks to infrastructure and development in affected areas.

7.1.3 Major Rivers

Emery County contains several diverse waterways and rivers. Here is a brief summary of the major features:

1. Green River: The Green River is one of the largest rivers in Utah and passes through the northern part of Emery County. It is a tributary of the Colorado River and offers opportunities for rafting, fishing, and scenic exploration.
2. San Rafael River: The San Rafael River flows through the heart of Emery County. It is a picturesque river known for its rugged canyons and stunning red rock formations. It provides opportunities for boating, fishing, and hiking.
3. Ferron Creek: Ferron Creek is a tributary of the Muddy Creek and runs through Emery County. It offers excellent fishing opportunities, particularly for brown and rainbow trout.
4. Muddy Creek: Muddy Creek is another significant waterway in Emery County. It meanders through remote canyons and is popular for its challenging whitewater rapids. It is a favorite among experienced kayakers and canyoneers.
5. Huntington Creek: Huntington Creek is a smaller waterway that flows through Huntington Canyon in Emery County. It is a popular spot for fly fishing, particularly for brown and rainbow trout.

These rivers and waterways in Emery County provide a range of recreational activities and contribute to the natural beauty and economy of the region.



Map illustrating drainage basins in the Emery County area (click here for original).

7.1.4 Geographic Constraints

Emery County faces various geographic constraints that shape its landscape and development patterns. The county is characterized by rugged and mountainous terrain, with the Wasatch Plateau and the San Rafael Swell prominently impacting its geography. These physical features present challenges for infrastructure development, including the construction of roads, utilities, and other necessary facilities.

The county's arid climate and limited water resources pose constraints on water availability for residential, industrial, and agricultural uses. Careful management of these resources is essential for sustainable development and ecological balance.

Additionally, the presence of extensive public lands managed by federal agencies imposes restrictions on development and resource extraction, requiring coordination between local, state, and federal authorities for land use planning and management.

7.1.5 Wetlands

While Emery County is predominantly characterized by arid and semi-arid environments, wetlands can be found in various locations throughout the county. Notable wetland areas exist along the riparian corridors of the Green River and San Rafael River, where marshes and riparian habitats provide a conducive environment for wetland vegetation and wildlife.

Additionally, wetlands can be observed around reservoirs, springs, and natural water bodies that are scattered throughout the county. These wetland areas serve as important ecosystems, supporting a variety of plant and animal species, including waterfowl, amphibians, and wetland-dependent flora.

Although the extent of wetlands in Emery County may not be as extensive as in more water-rich regions, their presence adds ecological diversity and contributes to the overall natural resources and biodiversity of the area.

7.1.6 Farmlands

Farmland in Emery County varies in type, quality, and viability due to the region's diverse geography and soil composition. The United States Department of Agriculture (USDA) designates certain areas in the county as prime agricultural land, which signifies their suitability for sustained and productive farming. However, much of Emery County's agricultural land faces challenges due to limited water availability, arid conditions, and soil characteristics that may include higher salinity levels.

The Natural Resources Conservation Service (NRCS) measures soil quality in Emery County using various parameters such as organic matter content, nutrient availability, compaction, and erosion potential. These measurements provide valuable information for farmers to understand soil health and make informed decisions regarding crop selection, irrigation practices, and soil conservation measures.

Employment in agricultural activities in Emery County is an essential component of the local economy. Farming, ranching, and related agricultural enterprises provide job opportunities and contribute to the county's economic foundation. The agricultural sector in Emery County plays a vital role in sustaining rural livelihoods and maintaining the traditional character of communities throughout the region.

7.1.7 Open Spaces

Emery County is known for its vast open spaces, which encompass a significant portion of the county's landscape. The region is home to substantial areas of public lands managed by various federal and state agencies. The Bureau of Land Management (BLM) oversees a significant portion of public lands in Emery County, including areas like the San Rafael Swell, a geological feature known for its spectacular canyons, mesas, and arches.

The U.S. Forest Service manages portions of the Manti-La Sal National Forest, which extends into the western part of Emery County. This forest area provides diverse recreational opportunities, wildlife habitat, and watershed protection. Additionally, state-managed lands contribute to the open space resources within the county.

These public lands provide residents and visitors with numerous recreational opportunities, including hiking, camping, off-road vehicle use, hunting, and wildlife viewing. They also contribute to the preservation of natural ecosystems, cultural resources, and the scenic beauty that characterizes Emery County.

7.1.8 Sensitive Species

Emery County, Utah, is home to several sensitive species of plants and animals, many of which are adapted to the unique and diverse habitats found within the County. These sensitive species often require special conservation efforts due to their rarity, vulnerability, or importance in maintaining ecosystem balance. Some notable sensitive species found in Emery County include:

Plants	Animals	Protected Areas
Graham's beardtongue (Penstemon grahamii)	Greater sage-grouse (Centrocercus urophasianus)	San Rafael Swell Wilderness (BLM)
Ferron lace cactus (Echinocereus coccineus var. rosei)	Colorado pikeminnow (Ptychocheilus lucius)	Manti-La Sal National Forest
San Rafael cactus (Pediocactus despainii)	Mexican spotted owl (Strix occidentalis lucida)	Muddy Creek Wilderness Study Area (BLM)
Wright fishhook cactus (Sclerocactus wrightiae)	Southwestern willow flycatcher (Empidonax traillii extimus)	Little Wild Horse Canyon Wilderness Study Area (BLM)
		Goblin Valley State Park

7.1.9 Hazardous Waste Sites

Emery County has a few hazardous waste sites, or contaminant sources. Most of these sources are in close proximity to industrial areas. Construction through potential contaminant sources may add health and safety concerns and affect construction budget expenditures. The impact of these sites on transportation facilities will need to be addressed during the design and construction phase of each highway project.

There are potentially five types of contaminant sources: underground storage tanks, Title 3 sites, Toxic Release Inventory (TRI) 1990 sites, Resource Conservation and Recovery Act (RCRA) sites, and Comprehensive Environmental Response Compensation and Liability Act (CERCLA) sites.

The Comprehensive Environmental Response, Compensation and Liability Inventory System (CERCLIS) database documents hazardous waste sites where a release or potential threatened release has been investigated. These sites are further defined as a location that has been reported to the Environmental Protection Agency and where it is probable that some environmentally hazardous materials are present.

Also, the State of Utah Division of Solid and Hazardous Waste maintains databases for underground storage tank facilities, Leaking Underground Storage Tank (LUST) sites, and RCRA facilities.

7.1.10 Groundwater

Groundwater in Emery County plays a vital role in supporting various water needs within the region. The primary sources of groundwater in the county are underground aquifers, which are naturally replenished through precipitation and runoff from the surrounding mountains. These groundwater resources are critical for sustaining both natural ecosystems and human activities throughout the county.

In terms of water quality, some areas of Emery County face challenges related to naturally occurring contaminants, such as high levels of dissolved minerals or elevated concentrations of salts. These water quality issues can affect the suitability of groundwater for certain uses, including drinking water and irrigation, necessitating appropriate treatment and management approaches.

Regarding water quantity, the county's groundwater resources are subject to fluctuations due to climatic conditions, particularly during drought periods. Sustainable management practices, including monitoring of groundwater levels and implementation of conservation measures, are essential to ensure the long-term availability and quality of this vital resource for current and future generations.

7.1.11 Demographic Profile and Employment

7.1.11.1 Employment Trends

Over the last five years, Emery County has experienced notable employment trends influenced by various factors in the regional economy. The county's economy was historically built on and remains founded today on agriculture, livestock production, coal mining, and coal-fired electric power generation. There are two coal-fired electric power plants in the county: the Huntington Power Plant located at the mouth of Huntington Canyon and the Hunter Plant located south of Castle Dale off Highway 10.

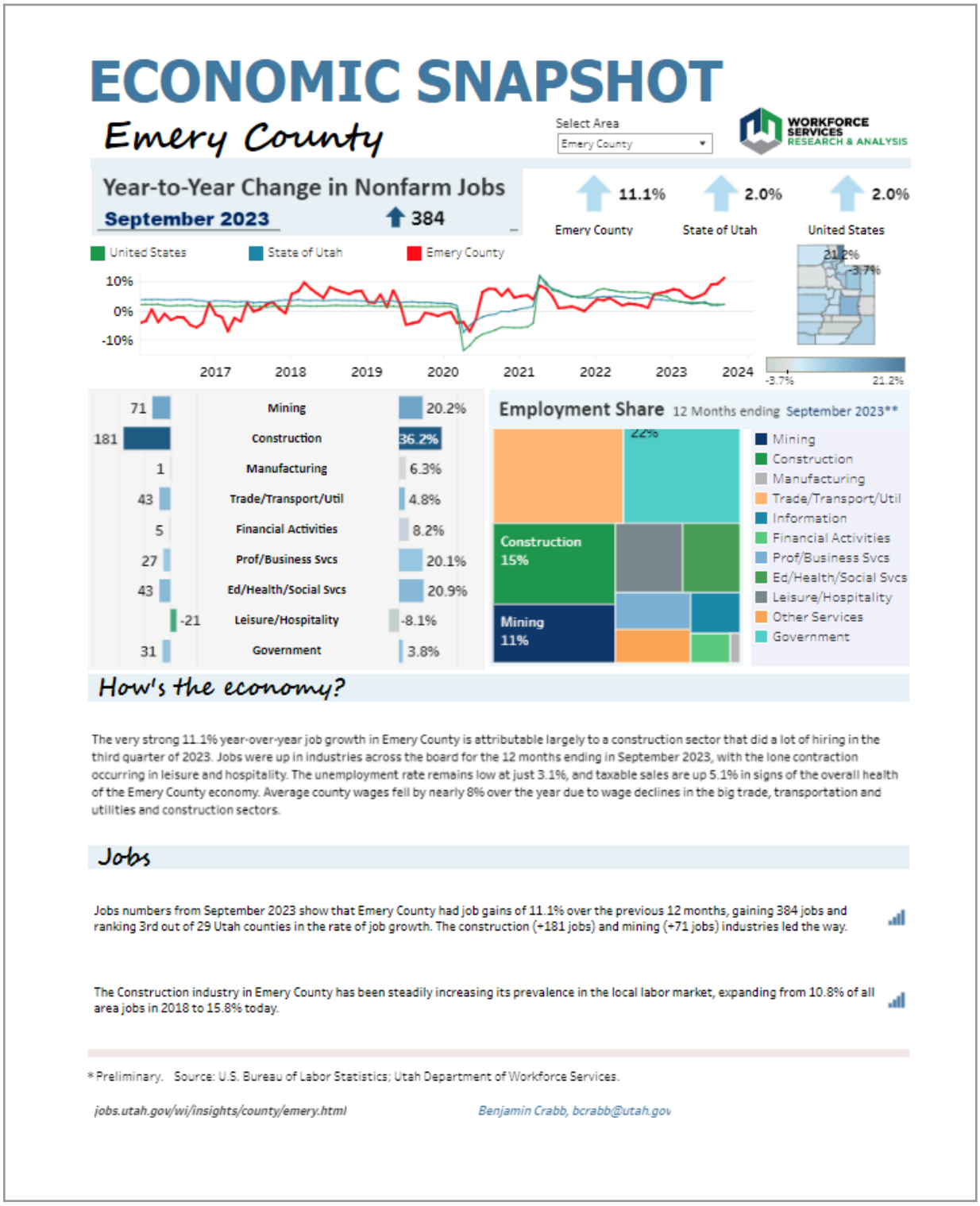
One significant factor affecting employment has been the gradual transition in the energy sector, with changes in the coal industry impacting job opportunities and economic stability. Despite these challenges, the county has shown resilience through diversification efforts and the exploration of new economic opportunities.

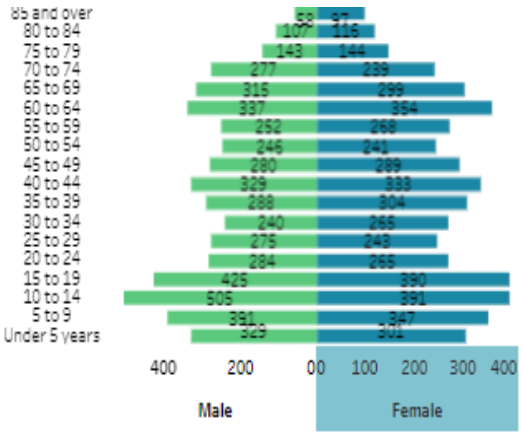
Emery County is home to regionally important transmission lines that create potential for renewable energy development. However, there is concern that if the existing power plants in the county were to close or convert to different fuel sources, it could have a potentially high negative impact on local employment and the broader community economy.

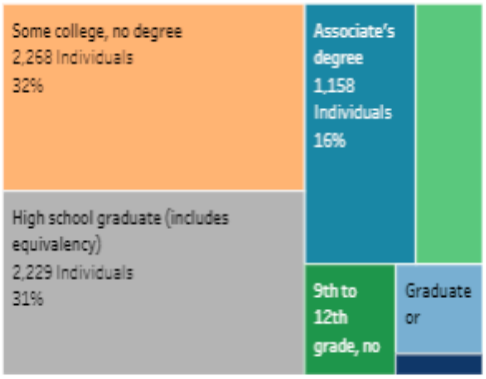
Recognizing the significance of this situation, Emery County has been actively collaborating with utility companies and other stakeholders to influence decisions regarding the future of energy production in the

region, working diligently to advocate for solutions that preserve jobs, sustain the local economy, and minimize adverse effects on the community.

Figure 7.1.11.2 - Emery County, Utah Snapshot of Jobs (2023)







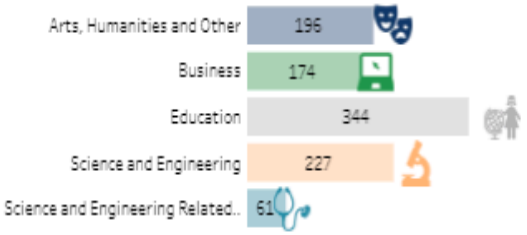
Components of Population Change

	2020	2021
Population	10,147	9,967
Births	121	114
Deaths	101	101
Natural Increase	20	13
Net Migration	67	118

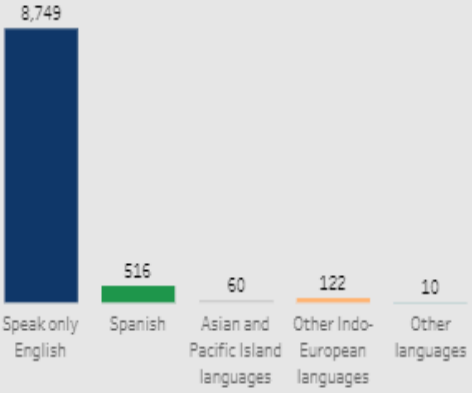
School Enrollment *2016-2020*

	Individuals	% of Total
Nursery school, preschool	306	10%
Kindergarten	209	7%
Elementary: grade 1 to grade 4	673	23%
Elementary: grade 5 to grade 8	735	25%
High school: grade 9 to grade 12	695	24%
College, undergraduate	275	9%
Graduate, professional school	44	1%

First Major of College Graduates *2016-2020*



Language Spoken at Home** *2016-2020*



Veterans Educational Attainment *2016-2020*

	Individuals	% of Total
Bachelor's degree or higher	65	12%
High school graduate (includes equivalency)	189	34%
Less than high school graduate	14	3%
Some college or associate's degree	284	51%

* Persons 25 years and older.
** Persons 5 years and older
Source: U.S. Census Bureau: Population Estimates, American Community Survey.

Source: Utah Department of Workforce Services, 2024. https://jobs.utah.gov/wi/data/library/demographic.

7.1.11.3 Household Size

The trends in household size in Emery County have shown some notable changes in recent years based on census data. According to the most recent figures, there has been a gradual decrease in average household size in the county. This trend reflects broader demographic shifts, including an aging population, changing family structures, and evolving housing preferences.

Factors contributing to this change include younger residents establishing independent households, economic considerations influencing living arrangements, and shifts in cultural preferences regarding family size and housing. While the average household size has decreased, Emery County continues to maintain strong family ties and community connections that have traditionally characterized the region.

7.1.11.4 Technology

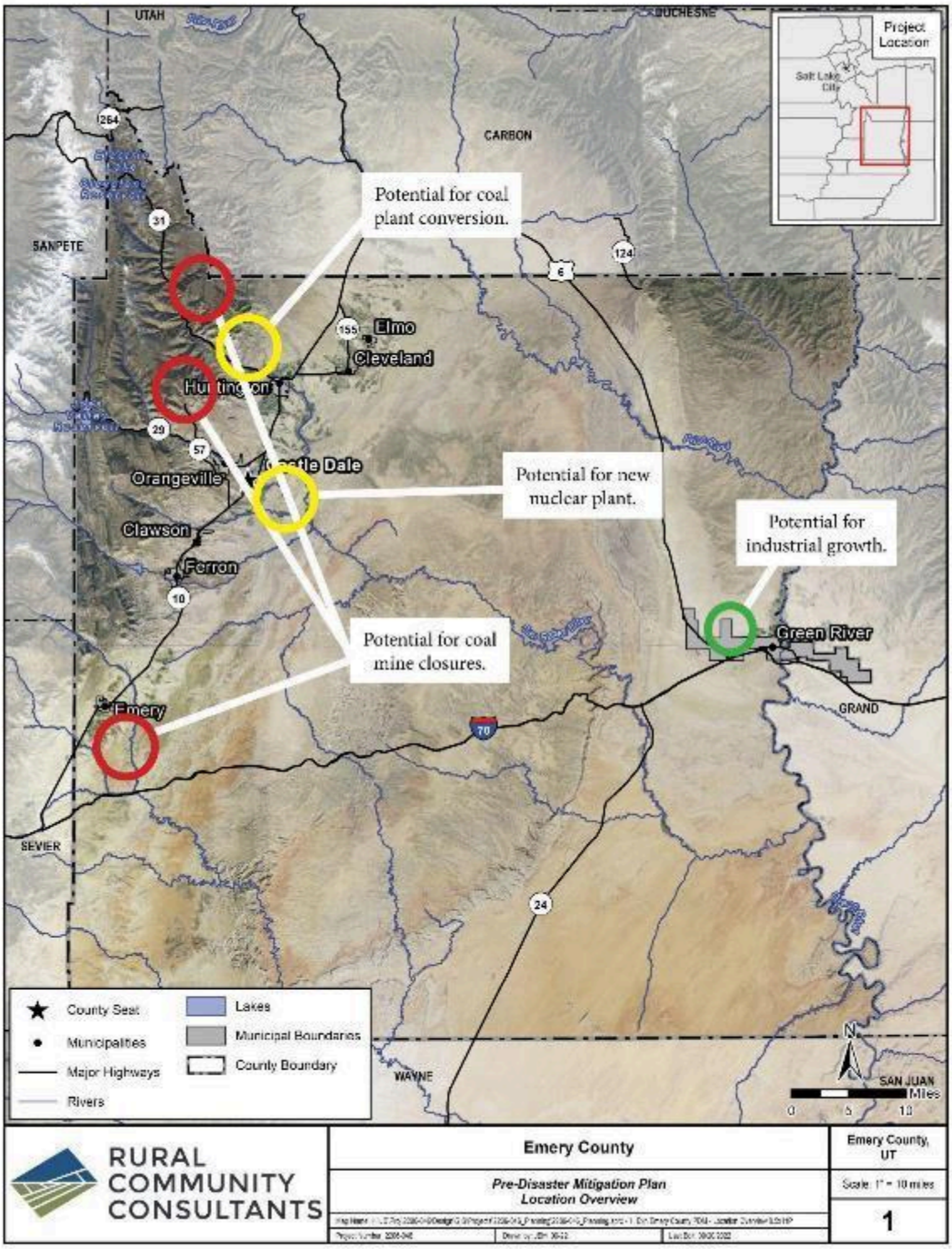
As technology develops, its influence on community development touches every aspect dramatically. Technological influences are significant. This report will only very briefly mention a few. Technology advances in communications have made it possible for telecommuting, reduced the requirement of a daily commute to a workplace; increased availability of reliable public transportation has changed where people live and work; advances in agriculture have allowed more food to be produced on less land; and technological advances allow developments on marginal sites.

7.1.12 Development Trends and Vulnerability Changes

7.1.12.1 Economic Growth and Vulnerability Impacts

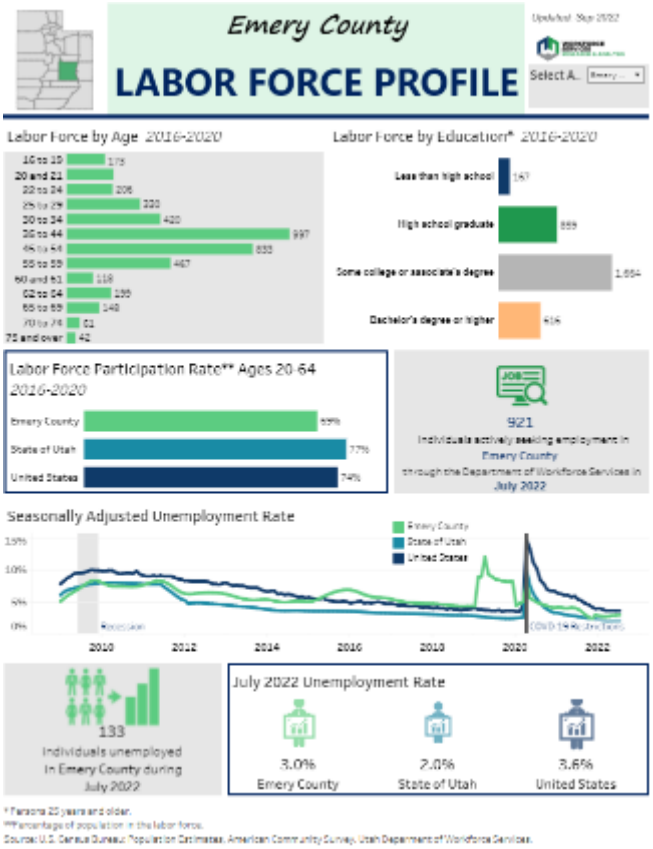
Over the past five years, Emery County has experienced significant development trends closely tied to its local economy, particularly the energy sector. These developments have affected hazard vulnerability in several ways:

1. **Energy Transition Projects**: The development of renewable energy facilities to diversify from traditional coal operations has DECREASED vulnerability to economic disruption from single-industry dependence, while maintaining neutral impacts on natural hazard vulnerability.
2. **Tourism Infrastructure Development**: Investment in recreation and tourism facilities near the San Rafael Swell has slightly INCREASED vulnerability to wildfire hazards due to greater human presence in wildland areas, though these facilities were constructed with enhanced fire protection measures.
3. **Commercial Corridor Improvements**: Infrastructure upgrades along major transportation corridors have generally DECREASED vulnerability to flooding through improved drainage systems and stormwater management.
4. **Residential Development Patterns**: New residential construction has primarily occurred through infill development within existing municipal boundaries rather than expansion into hazard-prone areas, maintaining existing vulnerability levels while avoiding increases in wildfire or flooding exposure.



Areas of expected change in Emery County 2023-2028 (click here for original).

Figure 7.1.12.3 - Emery County, Utah Labor Force Profile and Largest Employers (2022)



7.1.12.3 Reclamation of Industrial Lands

In recent years, Emery County has undertaken significant efforts to reclaim and revitalize formerly industrial land. Recognizing the importance of sustainable development and environmental stewardship, various initiatives have been implemented to restore former industrial and mining sites to their natural state or repurpose them for alternative uses.

These reclamation projects involve comprehensive activities such as soil remediation, reseeding with native vegetation, and restoring habitats for wildlife. The county has collaborated extensively with local stakeholders, government agencies, and environmental organizations to secure funding and support for these important reclamation efforts.

Through these initiatives, Emery County is working to not only address the environmental impacts of past industrial activities but also to create new opportunities for land use that will benefit current and future generations while preserving the region's natural heritage.

7.1.13 Developmental Constraints

Influences on development are many and interrelated. A few are geographic, historic layout, transportation, household size, technology, employment trends and public policy. Development influences can encourage and/or discourage growth. For example, floodplains, wetlands, slopes and faults, sensitive species and transportation influences both attract and detract development.

7.1.13.1 Historical Development Layout

The historical development layout of communities in Emery County reflects the influence of its unique geography and resource-based industries. Many of the towns and settlements in the county were initially established around mining operations and agricultural activities, with street patterns and community designs that facilitated access to these economic resources.

Communities often featured a central main street with commercial establishments, residential areas radiating outward, and civic buildings such as schools, churches, and government offices forming the core of social and administrative functions. This traditional layout can still be observed in many of the county's municipalities, including Castle Dale, Huntington, and Ferron.

Over time, communities expanded and evolved with additional residential areas, agricultural lands, and support services developing around these initial settlements. The development patterns typically followed natural topography, with communities nestled in valleys or along waterways, surrounded by agricultural lands and the vast open spaces that characterize much of Emery County.

7.1.13.2 Transportation

The transportation network in Emery County consists of a combination of state-owned highways and off-road routes. State highways, such as Utah State Route 10 (SR-10), are critical arteries connecting various communities within the County. SR-10 is the primary east-west route that traverses Emery County, connecting towns like Castle Dale, Ferron, and Huntington. This highway serves as a vital lifeline for residents and businesses, facilitating the movement of goods, services, and people.

While the transportation network in Emery County is essential for the local economy, there is a potential risk due to the reliance on a single main highway. The limited connectivity and the absence of alternative major routes can make the County vulnerable to disruptions caused by accidents, natural disasters, or road closures. Any interruption along the main highway can significantly impact transportation efficiency, emergency services, and economic activities throughout the region.

It is worth noting that off-road routes and dirt roads also play a role in the transportation network, particularly for recreational activities and access to remote areas. These routes provide opportunities for outdoor enthusiasts, such as off-road vehicles, hikers, and bikers.

Efforts to address the risk associated with the County's transportation network are crucial. Enhancing infrastructure resilience, diversifying transportation options, and promoting alternative routes can help mitigate potential disruptions and ensure the continued flow of commerce and connectivity in the region.

Significant facilities include the following:

- I-70 intersects the southern part of Emery County. Huntington is 48 miles north of I-70. Green River is located 1/2 mile from I-70 - the main corridor between California and Colorado. Emery County is crisscrossed by State Highways 6, 10, 24, 29, 31, 57, and 155.
- Green River has railroad access within the city limits. The railroad runs east to Grand Junction, Colorado or north to Salt Lake City. The other access point is located in Carbon County, approximately 38 miles away.
- There are two airports located in Emery County. Huntington Municipal Airport – 69V located 3 miles north of Huntington at 1930 North SR 10
  Aircraft Reference Code (ARC): A-1

(Small Single & Multi Engine Aircraft - 12,500 lbs single axle max.)
Paved Runway 7/25: 4048' x 60'

- Green River Aviation - U34 located 5 miles south of Green River at
1651 Airport Road - Aircraft Reference Code (ARC): B-2
(Small Single, Turbo Prop & Small Jet Aircraft - 12,000 lb single wheel)
Paved Runway 13/31: 5600' x 75'

7.1.13.3 Economic Constraints

Emery County faces several economic constraints that influence development patterns and opportunities:

- **Economic Dependence**: The county's historically heavy reliance on the energy sector, particularly coal mining and power generation, poses a constraint to future development. The changing energy landscape requires the county to diversify its economy and explore alternative industries to reduce vulnerability to economic downturns in any single sector.
- **Limited Water Resources**: The arid climate and limited water availability present significant constraints for development. Balancing water needs for residential, agricultural, and industrial uses while ensuring sustainability requires careful planning and management of this precious resource.
- **Geographic Constraints**: Emery County's mountainous terrain, remote location, and transportation limitations impose challenges for development. These physical constraints affect infrastructure costs, connectivity to markets, and the feasibility of certain types of economic activities.

7.1.14 Economic Opportunities

Despite facing various constraints, Emery County also possesses significant economic opportunities:

- **Outdoor Recreation and Tourism**: The county's natural beauty, extensive public lands, and diverse landscapes offer substantial opportunities for expanding outdoor recreation and tourism. With attractions like the San Rafael Swell, Green River, and Goblin Valley State Park, there is potential to develop a robust recreation-based economy that capitalizes on growing interest in outdoor activities.
- **Renewable Energy Development**: The county's abundant open space, existing energy infrastructure, and capacity present opportunities for renewable energy development, including solar and wind projects that could leverage existing skills in the energy workforce while creating new economic activity.
- **Agricultural Innovation:** With a strong agricultural tradition, there are opportunities to explore value-added processing, specialty crops, and sustainable farming practices that could enhance the economic viability of the agricultural sector while adapting to water constraints and changing markets.

7.1.15 Community Buildings and Infrastructure Status

As the County continues to maintain and improve its infrastructure, attention has focused on ensuring the resilience and safety of critical facilities. The County maintains the utmost standards of public safety along with current construction methods and seismically sound structures. At the time of construction, all county buildings were designed to meet the building, fire, and seismic codes in effect at that time.

The goals of the County moving forward demonstrate a commitment to maintaining essential infrastructure and ensuring the safety of its residents well into the future. See Appendix F for a complete list of critical facilities.

7.1.16 Emery County Vulnerable Populations

Vulnerable populations are inherently more susceptible to potential disaster hazards. The interactions between these populations and the natural hazards posing the highest potential risk to Emery County are listed below with suggestions for specific mitigation actions.

Per the 2020 United States Census, there were 10,099 people, 4,099 households, and 3,450 families in the County. The racial makeup of the County was 95.9% White, 0.5% Black or African American, 1.4% Native American, 0.5% Asian, 0.1% Native Hawaiian or Pacific Islander, and 1.7% from two or more races. 6.8% of the population were Hispanic or Latino of any race. 7.5% of households indicated that they primarily used a language other than English at home.

There were 4,099 households, with people under the age of 18 making up 28.3% of the population. Meanwhile, 18.0% of people living in Emery County were 65 years old or older. The average household size was 2.83 persons.

The hazards identified in this plan will affect all persons living within Emery County; however, traditionally underserved populations are more likely to face hardships and difficulties when faced with the impacts of a disaster. Below are some examples of how specific hazards may disproportionately impact vulnerable populations:

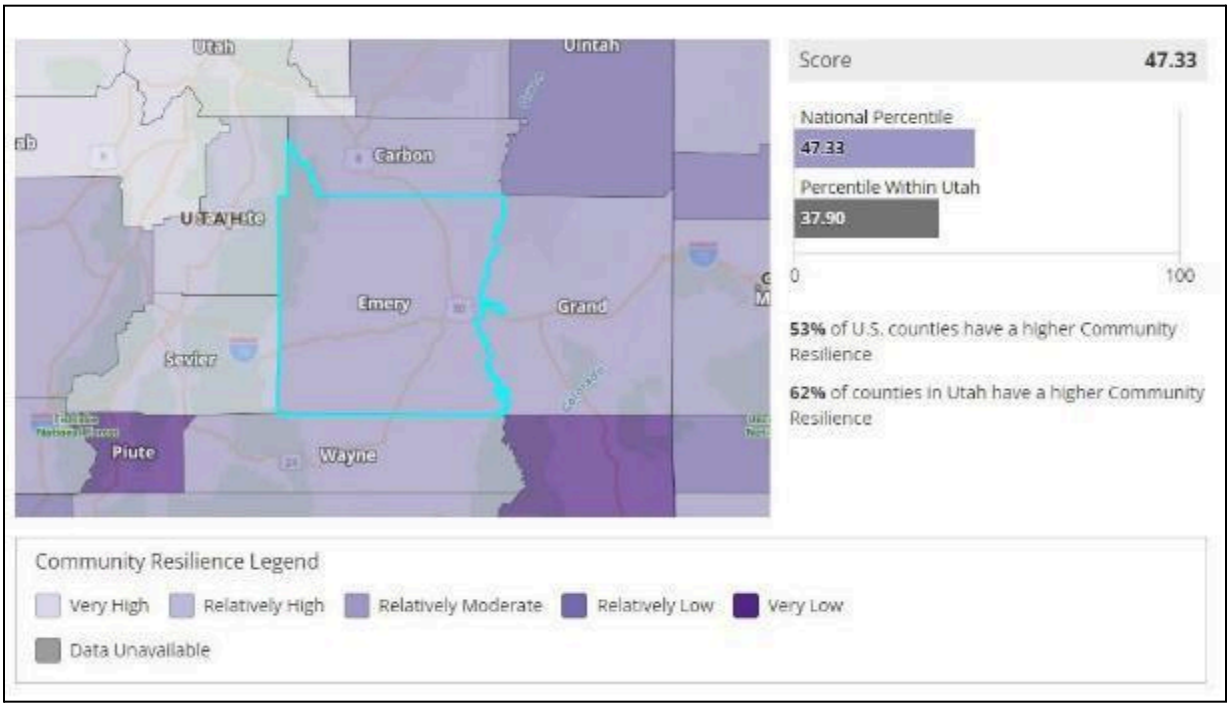
1. Earthquake:
    - Populations Vulnerable: People over 65 years old and people with disabilities are particularly vulnerable during earthquakes due to mobility issues and potential difficulties in evacuating.
    - Mitigation Actions: Retrofitting homes and buildings to withstand seismic activity, implementing early warning systems, and conducting targeted outreach and education programs.
2. Flood:
    - Populations Vulnerable: People living in flood-prone areas, including those with lower incomes paying more than 30% of their household income for housing expenses.
    - Mitigation Actions: Implementing floodplain management measures, providing financial assistance for property protection, and developing community-based flood preparedness plans.
3. Landslide:
    - Populations Vulnerable: People living in areas with steep slopes or unstable terrain, including individuals with disabilities who may face challenges evacuating quickly.
    - Mitigation Actions: Conducting geotechnical assessments, establishing early warning systems, and providing resources for home retrofitting.
4. Severe Weather:

- Populations Vulnerable: Elderly residents, people with disabilities, and those without adequate transportation options.
- Mitigation Actions: Establishing accessible emergency shelters, developing targeted communication systems, and conducting outreach on severe weather preparedness.

7.1.16.1 Community Resilience

Communities in Emery County, UT have a Relatively Moderate ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S. The data states that 47% of U.S. counties have higher Community Resilience and 38% of counties in Utah have higher Community Resilience.

Figure 7.1.16.2 - Community Resilience for Emery County



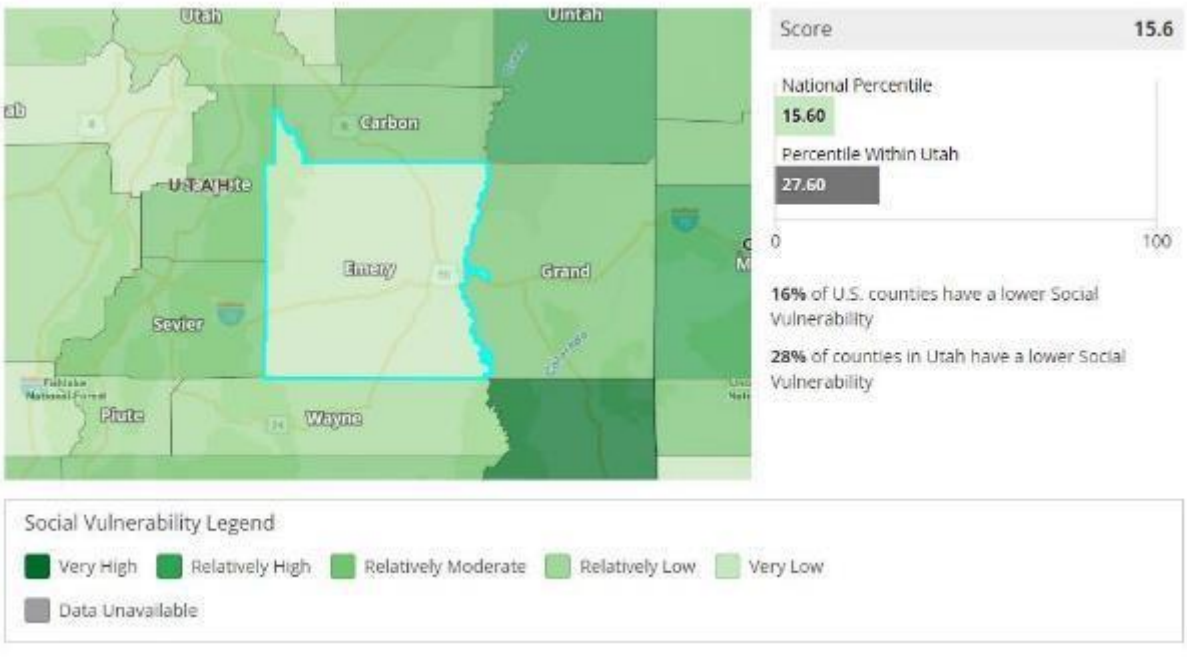
Community Resilience for Emery County, UT is Relatively Moderate.
Source: FEMA's National Risk Index 2024.

7.1.16.3 Social Vulnerability

Social vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. The data from the FEMA database shows that social groups in Emery County, UT have a very low susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S. The data states that 15.6% of U.S. Counties have a lower Social Vulnerability index score. However, 27.6% of counties in Utah have a lower Social Vulnerability index score, indicating a slight need to ensure greater social risk mitigation to vulnerable populations.

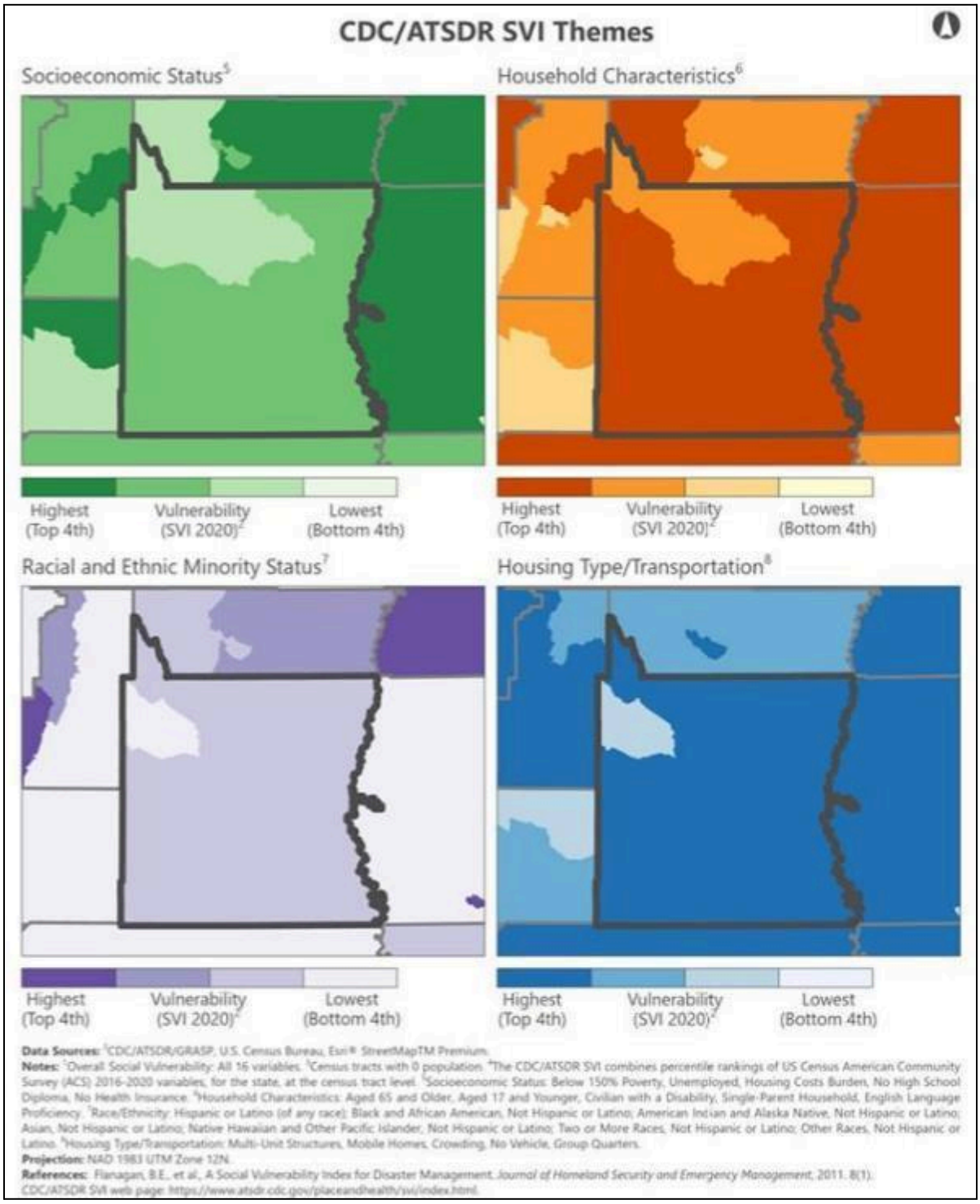
By considering the intersectionality of hazards and vulnerable populations, and implementing targeted mitigation actions, cities can reduce risk and build resilience for all residents, including historically underserved communities.

Figure 7.1.16.4 - Social Vulnerability for Emery County



Social Vulnerability for Emery County, UT is Very Low.
Source: FEMA's National Risk Index 2024

Figure 7.1.16.5 - CDC/ATSDR Social Vulnerability Index



These social vulnerability indices refer to the area's capacity to prepare for and respond to the stress of hazardous events. Data is presented in groups o fsixteen census-derived factors into four themes. (Source: CDC/ATSDR).

7.1.17 Changes Since 2018 Plan

Emery County has experienced changes in population trends, economic conditions, development patterns, and hazard experiences directly influenced revisions to this plan update. Specifically:

1. The county's mitigation strategies now place greater emphasis on water system resilience and drought mitigation actions in response to extended drought conditions experienced since 2018.
2. Earthquake mitigation actions have been expanded and prioritized due to increased awareness of seismic vulnerability following updated facility assessments and regional earthquake events.
3. The plan now includes more robust wildfire mitigation measures in response to increasing wildfire risk exacerbated by climate change and prolonged drought conditions.
4. Economic transitions in the energy sector have prompted greater focus on infrastructure resilience and power supply continuity to support critical facilities during disasters.
5. Communication system improvements have been prioritized based on lessons learned from recent emergency response experiences and identified gaps in coordination.

7.1.18 Status of 2018 Mitigation Actions - Emery County

The 2018 Pre-Disaster Mitigation Plan took a primarily county-level approach, with most actions designated as 'Countywide' rather than assigned to specific jurisdictions. The following tables document the status of each 2018 action and identify which jurisdictions were ultimately involved in implementation:

Dam Failure Actions			
2018 Action	**Lead Jurisdiction(s)**	**Current Status**	**Explanation**
DF1: Install Early Remote Warning System	Emery County	Modified	Partnership with Bureau of Reclamation in progress. Project requested.
DF2: Work with water managers on reservoir roads	Emery County	Ongoing	Annual maintenance with B&C Road funds.
DF3: Complete Emergency Action Plans	Various	Modified	Carried forward to 2024-2028 timeline.
DF4: Construct protective infrastructure	Castle Valley	Deferred	Carried forward to 2024-2028 timeline.
Flood Actions			
F1: Build catch pond on Cardinal Wash	Castle Dale	Modified	Design updated based on new studies.
F2: Technical analysis on irrigation canals	Emery County	Modified	Part of the clean-out project completed.
F3: Build dissipation basin for Westwood	Emery County	Deferred	Waiting for funding.

F4: Improve Horn Silver Gulch	Green River	Completed	Completed in 2022.
F5: Enlarge culvert at Pine Street	Cleveland	Modified	Carried forward with updated scope.
F6: Promote flood insurance	All Jurisdictions	Ongoing	Continuous public education.
F7: Secure up-to-date flood mapping	Emery County	Ongoing	Part of stormwater management.
F8: Adopt policies to reduce stormwater runoff	All Jurisdictions	Modified	Carried forward to 2024 plan.
Wildland FIre Actions			
WF1: Remove dead trees in WUI areas	All Jurisdictions	Ongoing	Annual funding continues.
WF2: Secure up-to-date property mapping	Emery County	Completed	Maps accessible through GIS portal.
WF3: Build interface zone roads	All Jurisdictions	Modified	Carried forward with updates.
WF4: Fuel reduction below Millsite	Emery County	Completed	Project completed in 2022.
WF5: Review building codes	All Jurisdictions	Ongoing	Regular 3-year review cycle.
Problem Soils Actions			
PS1: Increase width of slope adjacent to roadways	Emery County	Ongoing	Continuous work during maintenance.
PS2: Provide soil hazard fact sheets	Emery County	Ongoing	Distribution through building dept.
PS3: Monitor and control water on alkali soils	Emery County	Modified	Updated approach through NRCS.
Drought Actions			
D1: Promote water conservation	All Jurisdictions	Ongoing	Continued public education.
D2: Design silt control structures	Castle Valley Special Service District	Deferred	Pending further studies.
D3: Build water storage facilities	Emery County	Modified	Currently in the study phase.
Severe Weather Actions			
SW1: StormReady program participation	Emery County	Completed	Certification achieved in 2023.
SW2: Encourage avalanche preparedness	Emery County	Ongoing	Annual recreation training.

SW3: Install Doppler Radar on Cedar Mountain	Emery County	Deferred	Funding not yet secured.
SW4: Install/relocate generators	Emery County, Green River	Modified	Partially completed.
Landslide Actions			
L1: Dislodge rocks along Highway 6	Emery County	Ongoing	Regular maintenance activity.

7.1.19 Emery County Mitigation Strategy

7.1.19.1 Mitigation Strategy Overview

Emery County employs a comprehensive, multi-faceted approach to hazard mitigation that addresses the diverse natural hazards affecting the region. The county's strategy balances structural and non-structural measures, emphasizing both pre-disaster preparedness and post-disaster resilience. Key components include infrastructure hardening, emergency response system enhancement, public education, natural resource protection, and regulatory measures. The county prioritizes actions that provide multiple benefits across various hazard types while leveraging available funding sources and partnerships with state and federal agencies. This integrated approach reflects the county's commitment to protecting life, property, and critical infrastructure while maintaining essential services during hazard events. The strategy is regularly evaluated and updated to address changing conditions and emerging risks.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Emery County employs a comprehensive mitigation strategy that includes:

- Infrastructure Projects:
    - Generator installations for critical facilities.
    - Road and bridge improvements.
    - Communication system upgrades.
- Planning & Regulations:
    - Updated building codes and zoning.
    - Stormwater management policies.
    - Emergency response procedures.
- Natural Systems:
    - Watershed protection.
    - Wildfire fuel reduction.
    - Erosion control measures.
- Education/Awareness:

- Public emergency preparedness.
- Flood insurance promotion.
- Wildfire safety programs.

Note 1: Prior to selecting the mitigation actions presented in this section, the jurisdiction considered a comprehensive range of potential mitigation actions. Appendix M provides a full overview of the types of actions considered during this planning process. The actions selected above represent those deemed most appropriate, feasible, and effective for the jurisdiction based on their risk assessment, capabilities, and priorities.

7.1.19.2 Multi-Hazard Action Definition

Actions designated as "Multi-hazard" in this plan address multiple identified hazards simultaneously. This term is used when an action genuinely mitigates several hazards, not as a general category. **Throughout this plan**, any action labeled as "Multi-hazard" specifically addresses the following hazards:

- Earthquake/Severe Shaking
- Severe Weather (including winter storms, high winds, and heat/cold waves)
- Power Outage/Utility Disruption
- Access Limitation

Each multi-hazard action is further explained in its description to clarify which specific hazards it addresses.

7.1.19.3 Earthquake Mitigation Actions

1. **Work with County Building Inspectors to ensure new construction meets current building code standards**
    - **Description**: Coordinate with building inspectors to verify compliance with seismic standards in new construction and attend planning and zoning meetings regularly
    - **Responsible Party**: Emery County Building Department (lead)
    - **Potential Funding Source**: County general funds
    - **Estimated Cost**: $5,000 annually
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Building codes represent the primary defense against earthquake damage for new structures; enforcement ensures compliance and reduces future vulnerability
    - **Status**: Ongoing
2. **Educate the public on earthquake preparedness**
    - **Description**: Utilize the Be Ready Utah Campaign, attend fairs and public events, distribute educational material, and encourage participation in the "Great Shakeout"
    - **Responsible Party**: Emery County Emergency Management Services (lead)
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, County Emergency Management; County general funds

- **Estimated Cost**: $5,000 annually
- **Timeframe**: Ongoing
- **Priority Level**: Medium
- **Justification**: Public awareness and preparedness significantly reduce injuries and improve response during earthquake events
- **Status**: Ongoing

7.1.19.3 Flood Mitigation Actions

1. **Establish and upgrade structural control measures**
    - **Description**: Build catch ponds on identified critical waterways to control flood waters
    - **Responsible Party**: Emery County Engineering Department (Lead); Emery County Road Department (supporting)
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance (FMA) Program; Local municipal budget
    - **Estimated Cost**: $750,000
    - **Timeframe**: Ongoing
    - **Priority Level**: High
    - **Justification**: Strategic water control structures reduce downstream flooding impacts in vulnerable areas identified in flood hazard mapping
    - **Status**: Ongoing
2. **Promote flood insurance and review flood studies**
    - **Description**: Encourage residents in flood-prone areas to purchase flood insurance and periodically update flood risk assessments
    - **Responsible Party**: Emery County Planning Department (Lead); Emery County Emergency Management Services (supporting)
    - **Potential Funding Source**: FEMA Emergency Management Performance Grants, County Emergency Management; County general funds
    - **Estimated Cost**: $5,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Flood insurance provides financial protection for property owners, while updated studies ensure accurate hazard identification
    - **Status**: Ongoing
3. **Build dissipation basins to protect vulnerable subdivisions**

- **Description**: Construct water detention and flow reduction facilities for identified vulnerable residential areas
- **Responsible Party**: Emery County Engineering Department (lead)
- **Potential Funding Source**: FEMA Flood Mitigation Assistance (FMA) Program; Utah Division of Water Resources
- **Estimated Cost**: $500,000
- **Timeframe**: 2024-2028
- **Priority Level**: High
- **Justification**: Dissipation basins reduce flash flood impacts in developed areas by controlling water volume and velocity
- **Status**: Waiting for funding

4. **Address lands along rivers in flood zones**
    - **Description**: Assess and implement mitigation measures for properties in 100-year and 500-year flood zones and potential flooding in foothills drainages
    - **Responsible Party**: Emery County Planning Department (Lead); Emery County Engineering Department (supporting)
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance (FMA) Program
    - **Estimated Cost**: $40,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: Medium
    - **Justification**: Targeted assessment and mitigation of flood-prone properties reduces repetitive losses and protects critical infrastructure
    - **Status**: Waiting for funding
5. **Adopt policies to reduce stormwater runoff**
    - **Description**: Update subdivision ordinance and development standards to address stormwater management
    - **Responsible Party**: Emery County Planning Department (lead)
    - **Potential Funding Source**: FEMA Emergency Management Performance Grants, County Emergency Management; Local municipal budget
    - **Estimated Cost**: $14,000
    - **Timeframe**: 2024
    - **Priority Level**: High
    - **Justification**: Updated development standards help minimize flood risk from new development by managing runoff at the source

- **Status**: Underway

7.1.19.4 Landslide Mitigation Actions

1. **Dislodge large rocks along highways**
    - **Description**: Proactively remove unstable rocks that could fall onto roadways during natural events
    - **Responsible Party**: Emery County Engineering Department (Lead); Utah Department of Transportation (supporting)
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP); Utah Department of Transportation
    - **Estimated Cost**: $100,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Preventive rock removal reduces transportation disruption and potential injuries from rockfall events
    - **Status**: Ongoing
2. **Conduct slope stability assessment of high-risk areas**
    - **Description**: Evaluate landslide susceptibility near developed areas, particularly along Highway 6 and residential developments, and implement appropriate stabilization measures
    - **Responsible Party**: Emery County Engineering Department (Lead); Utah Department of Transportation (supporting)
    - **Potential Funding Source**: Emery County Public Works Budget; Utah Department of Transportation
    - **Estimated Cost**: $175,000 for assessment, $500,000+ for stabilization
    - **Timeframe**: 2026-2028
    - **Priority Level**: Medium
    - **Justification**: Comprehensive assessment allows for prioritized stabilization efforts in areas presenting greatest risk to populations and infrastructure
    - **Status**: Planned

7.1.19.5 Wildfire Mitigation Actions

1. **Remove dead and diseased trees in Wildland Urban Interface areas**
    - **Description**: Reduce fuel loads by removing hazardous vegetation in WUI zones, maintaining adequate fire breaks between wildfire zones and residences

- **Responsible Party**: Emery County Fire Department (Lead); Utah Division of Forestry, Fire, and State Lands (supporting)
- **Potential Funding Source**: Fire Management Assistance Grant; Utah Division of Forestry, Fire, and State Lands
- **Estimated Cost**: $90,000 annually
- **Timeframe**: Ongoing
- **Priority Level**: High
- **Justification**: Fuel reduction is the most effective preventive measure to reduce wildfire intensity and spread in areas where development meets wildlands
- **Status**: Ongoing

2. **Secure up-to-date property mapping**
    - **Description**: Maintain current GIS data and maps of properties and infrastructure for emergency planning and response
    - **Responsible Party**: Emery County GIS Department (lead)
    - **Potential Funding Source**: Utah State and local funds
    - **Estimated Cost**: $100,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Accurate mapping improves emergency response efficacy during wildfire events and supports evacuation planning
    - **Status**: Ongoing
3. **Build roads between fire interface zones and residential areas**
    - **Description**: Construct access routes to serve as firebreaks and facilitate emergency response
    - **Responsible Party**: Emery County Road Department (Lead); Emery County Fire Department (supporting)
    - **Potential Funding Source**: Fire Management Assistance Grant; County funds
    - **Estimated Cost**: $750,000 per mile of road
    - **Timeframe**: Ongoing
    - **Priority Level**: High
    - **Justification**: Strategic road placement creates defensible space while improving emergency access and potential evacuation routes
    - **Status**: Ongoing
4. **Review building codes on established cycle**

- **Description**: Participate in the 3-year state building code review cycle to ensure fire safety standards remain current
- **Responsible Party**: Emery County Building Department (Lead); Emery County Emergency Management Services (supporting)
- **Potential Funding Source**: County and local funds
- **Estimated Cost**: $3,000-$12,000 per city every 3 years
- **Timeframe**: Ongoing
- **Priority Level**: Medium
- **Justification**: Regular code updates ensure buildings incorporate latest fire-resistant construction techniques and materials
- **Status**: Ongoing

7.1.19.6 Problem Soils Mitigation Actions

1. **Increase width of slope adjacent to roadways**
    - **Description**: Expand roadway shoulder areas to create buffer zones against soil instability
    - **Responsible Party**: Emery County Road Department (Lead); Emery County Engineering Department (supporting)
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP); Utah Department of Transportation
    - **Estimated Cost**: $1,500,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Expanded shoulders compensate for soil instability issues that could undermine road infrastructure
    - **Status**: Ongoing
2. **Provide problem soil fact sheets to homeowners**
    - **Description**: Distribute educational materials to property owners describing local soil risks and mitigation techniques
    - **Responsible Party**: Emery County Building Department (Lead); Emery County Planning Department (supporting)
    - **Potential Funding Source**: Local municipal budget
    - **Estimated Cost**: $3,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Low

- **Justification**: Public awareness of soil hazards encourages appropriate construction techniques and mitigation measures
- **Status**: Ongoing

3. **Monitor and control water on alkali soils**
    - **Description**: Implement water management practices, transition from flood to sprinkler irrigation, and participate in NRCS desalination projects
    - **Responsible Party**: Emery County Engineering Department (Lead); Natural Resources Conservation Service (supporting)
    - **Potential Funding Source**: USDA Environmental Quality Incentives Program (EQIP); Natural Resources Conservation Service
    - **Estimated Cost**: $30,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Proper water management prevents exacerbation of problem soil conditions and protects agricultural productivity
    - **Status**: Ongoing

7.1.19.7 Dam Failure Mitigation Actions

1. **Work with water managers on reservoir roads maintenance**
    - **Description**: Collaborate on maintenance of access roads around reservoirs and access routes within the county
    - **Responsible Party**: Emery County Road Department (lead)
    - **Potential Funding Source**: B and C Road Funds; Utah Department of Transportation
    - **Estimated Cost**: $10,000 annually
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Maintained access routes are critical for emergency response during potential dam incidents
    - **Status**: Ongoing
2. **Install Early Remote Warning System**
    - **Description**: Implement monitoring and notification technology to provide early warning of potential dam failures
    - **Responsible Party**: Emery County Emergency Management Services (Lead); Emery County Engineering Department
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP)

- **Estimated Cost**: $500,000
- **Timeframe**: 2024-2027
- **Priority Level**: High
- **Justification**: Early warning systems provide critical time for evacuation and emergency response in dam inundation zones
- **Status**: Upcoming

3. **Critical Infrastructure Protection in Dam Inundation Zones**
    - **Description:** Implement permanent protective measures for county facilities and infrastructure within dam inundation zones, including elevated utilities at the County Courthouse complex, flood-resistant modifications to emergency services buildings, reinforced structures for critical county operations, and land use policies restricting new critical infrastructure development in high-risk inundation areas. These permanent modifications reduce long-term vulnerability of county assets and ensure continued governmental operations following dam failure events.
    - **Responsible Party:** Emery County Engineering Department (Lead), County Emergency Management (supporting)
    - **Potential Funding Source:** FEMA Hazard Mitigation Grant Program (HMGP), FEMA Building Resilient Infrastructure and Communities (BRIC)
    - **Estimated Cost**: $250,000
    - **Timeframe:** 2025-2028
    - **Priority Level:** High
    - **Justification:** Chapter 6.11 identifies significant county assets in dam inundation zones, including the Castle Dale Courthouse complex and emergency services facilities. Permanent protective measures reduce long-term vulnerability and ensure continuity of governmental operations.
    - **Status**: Planned

7.1.19.8 Drought Mitigation Actions

1. **Complete culinary water treatment plant improvements**
    - **Description**: Upgrade water treatment facilities and develop redundant water sources
    - **Responsible Party**: Emery County Engineering Department (Lead); Castle Valley Special Service District (supporting)
    - **Potential Funding Source**: Utah Division of Water Resources; FEMA Building Resilient Infrastructure and Communities (BRIC) Program
    - **Estimated Cost**: $3,500,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: High

- **Justification**: Treatment plant improvements ensure continued access to safe drinking water during drought conditions
- **Status**: Ongoing

2. **Promote water conservation**
    - **Description**: Implement education programs and water recycling initiatives for secondary water sources
    - **Responsible Party**: Emery County Water Conservancy District (Lead); Emery County Emergency Management Services (supporting)
    - **Potential Funding Source**: Utah Division of Water Resources; Local municipal budget
    - **Estimated Cost**: $25,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Conservation education and practices extend limited water supplies during drought periods
    - **Status**: Ongoing
3. **Develop additional water storage facilities**
    - **Description**: Construct new storage capacity to meet current and future water requirements
    - **Responsible Party**: Emery County Engineering Department (Lead); Utah Division of Water Resources (supporting)
    - **Potential Funding Source**: USDA Water and Environmental Programs; FEMA Building Resilient Infrastructure and Communities (BRIC) Program
    - **Estimated Cost**: $10,000,000
    - **Timeframe**: 2025-2030
    - **Priority Level**: High
    - **Justification**: Increased storage capacity improves drought resilience by capturing water during wet periods
    - **Status**: Upcoming

7.1.19.9 Severe Weather Mitigation Actions

1. **Encourage avalanche preparedness**
    - **Description**: Provide instructor and training for backcountry users through Emery County Recreation
    - **Responsible Party**: Emery County Recreation Department (Lead); Emery County Emergency Management Services (supporting)

- **Potential Funding Source**: County general funds
- **Estimated Cost**: $5,000
- **Timeframe**: Ongoing
- **Priority Level**: Medium
- **Justification**: Education reduces risk for recreational users in avalanche-prone areas of the county
- **Status**: Ongoing

2. **Install and relocate generators**
    - **Description**: Provide emergency power to critical facilities in Emery County and Green River City
    - **Responsible Party**: Emery County Emergency Management Services (Lead); Emery County Facilities Management (supporting)
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program; County and local funds
    - **Estimated Cost**: $112,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: High
    - **Justification**: Backup power ensures continuity of critical services during severe weather events that disrupt utility infrastructure
    - **Status**: Planned
3. **Install Doppler Radar on Cedar Mountain**
    - **Description**: Establish real-time weather monitoring capabilities for the region
    - **Responsible Party**: Emery County Emergency Management Services (Lead); National Weather Service, Climavision (supporting)
    - **Potential Funding Source**: National Weather Service; FEMA Hazard Mitigation Grant Program (HMGP)
    - **Estimated Cost**: $1,500,000
    - **Timeframe**: 2025-2028
    - **Priority Level**: Medium
    - **Justification**: Enhanced weather monitoring improves forecasting accuracy and warning times for severe events
    - **Status**: Upcoming

7.1.19.10 Infestation Mitigation Actions

1. **Implement comprehensive tamarisk control program**

- **Description**: Expand the County Weed and Mosquito Department's efforts to control tamarisk (salt cedar) along waterways through targeted removal and treatment
- **Responsible Party**: Emery County Weed and Mosquito Department
- **Potential Funding Source**: Utah Department of Agriculture; USDA Invasive Species Grant Program
- **Estimated Cost**: $75,000 annually
- **Timeframe**: Ongoing
- **Priority Level**: High
- **Justification**: Tamarisk depletes water resources and displaces native vegetation, exacerbating drought conditions and increasing wildfire fuel loads
- **Status**: Ongoing

2. **Establish early detection and rapid response system for invasive species**
    - **Description**: Develop a coordinated monitoring and response protocol for detecting and addressing emerging invasive species threats
    - **Responsible Party**: Emery County Weed and Mosquito Department (Lead); Utah State University Extension (supporting)
    - **Potential Funding Source**: Utah Department of Agriculture; USDA Forest Service
    - **Estimated Cost**: $40,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Early detection significantly reduces control costs and ecological impacts of invasive species
    - **Status**: Planned
3. **Conduct public education campaign on invasive species identification and prevention**
    - **Description**: Develop and distribute informational materials to increase public awareness about invasive species identification, reporting, and prevention
    - **Responsible Party**: Emery County Weed and Mosquito Department (Lead); Emery County Extension Office (supporting)
    - **Potential Funding Source**: Utah Division of Wildlife Resources; County general funds
    - **Estimated Cost**: $15,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium
    - **Justification**: Public awareness and participation enhances detection capabilities and reduces unintentional spread of invasive species

- **Status**: Upcoming

7.1.19.11 Multi-Hazard Mitigation Actions

1. **Complete Phase 1 radio system improvements**
    - **Description**: Enhance communication capacity for emergency responders and service providers
    - **Responsible Party**: Emery County Emergency Management Services
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP)
    - **Estimated Cost**: $1,900,000
    - **Timeframe**: 2027
    - **Priority Level**: High
    - **Justification**: Reliable communications are essential for coordinated emergency response during all hazard events
    - **Status**: Ongoing

7.1.20 Integration of the 2018 Plan

Past Integration (2018-2023): From 2018-2023, Emery County integrated elements of the previous hazard mitigation plan in the following ways:

1. Emergency Operations Plan Updates:
    - Incorporated hazard-specific response protocols drawn directly from the hazard profiles in Section 6 of the mitigation plan.
    - Updated evacuation routes based on identified hazard areas contained in the mitigation plan maps.
2. Resource Management Plan:
    - Referenced hazard areas identified in the mitigation plan within development guidelines sections.
    - Incorporated wildfire mitigation strategies from Section 6.9 into resource protection policies.
3. Building Code Updates:
    - Enhanced requirements for development in hazard-prone areas based on vulnerability assessments in the mitigation plan.
    - Updated flood protection standards in accordance with mitigation strategies identified in the plan.

Current Integration: The County will incorporate relevant elements of this updated plan into its:

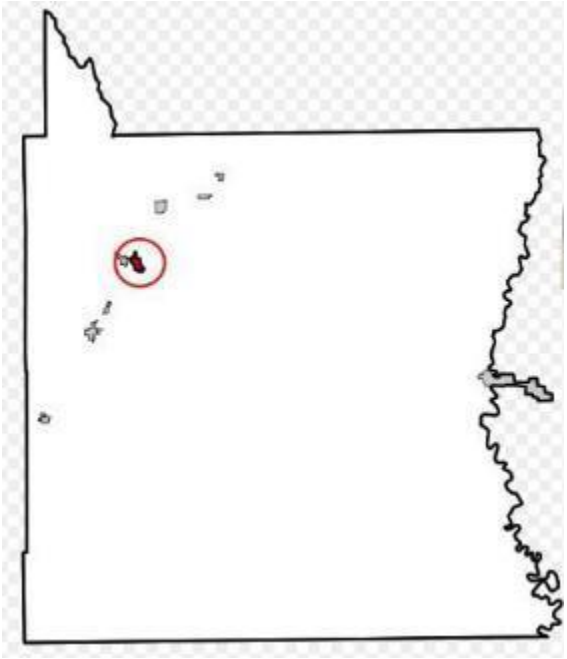
- General Plan updates
- Capital Improvement Program

- Building Code amendments
- Resource Management Plan updates
- Subdivision ordinance revisions

7.2 Castle Dale City

7.2.1 Background

Castle Dale City is a small city located in Emery County, Utah, United States. The population was 1,492 at the 2020 census, and a total area of 2.2 square miles. It is the County seat of Emery County.

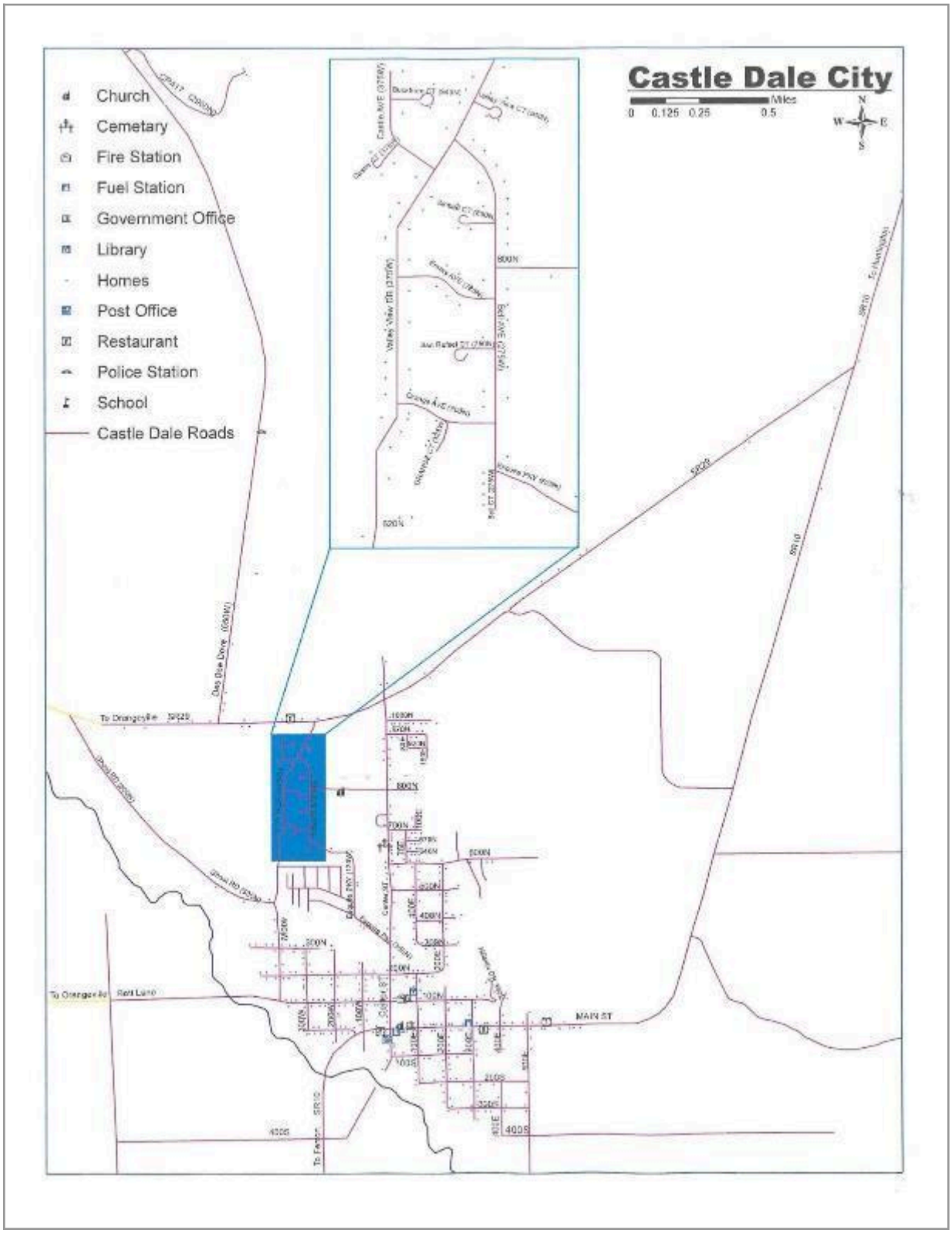


Castle Dale City's economy is primarily based on various industries such as agriculture, mining, and tourism. Agriculture plays a significant role, with farming activities focused on livestock production, including cattle, sheep, and poultry. The mining sector contributes to the local economy through the extraction of coal, uranium, and natural gas. Additionally, tourism and outdoor recreational activities, including hunting, fishing, and hiking, attract visitors to the area, providing employment and income opportunities.

7.2.2 Location & Extent

Castle Dale City is situated in central Utah, within the larger region known as the Castle Country. The city is nestled in the eastern part of the County, surrounded by picturesque landscapes characterized by rugged mountains, canyons, and the meandering Emery County Creek. Castle Dale City enjoys a semi-arid climate, with hot summers and cold winters.

Figure 7.2.2.1 - Overview Map of Castle Dale City



7.2.3 Demographic & Population Growth

In 2020, the estimated population of Emery County was around 10,135 people. Castle Dale City itself, being the County seat, has an estimated population of 1,518 in 2021 (US Census, ACS). The community is predominantly white, with a mix of various age groups and a focus on family-oriented living. More information is provided in the figure below.

7.2.4 Vulnerable Populations

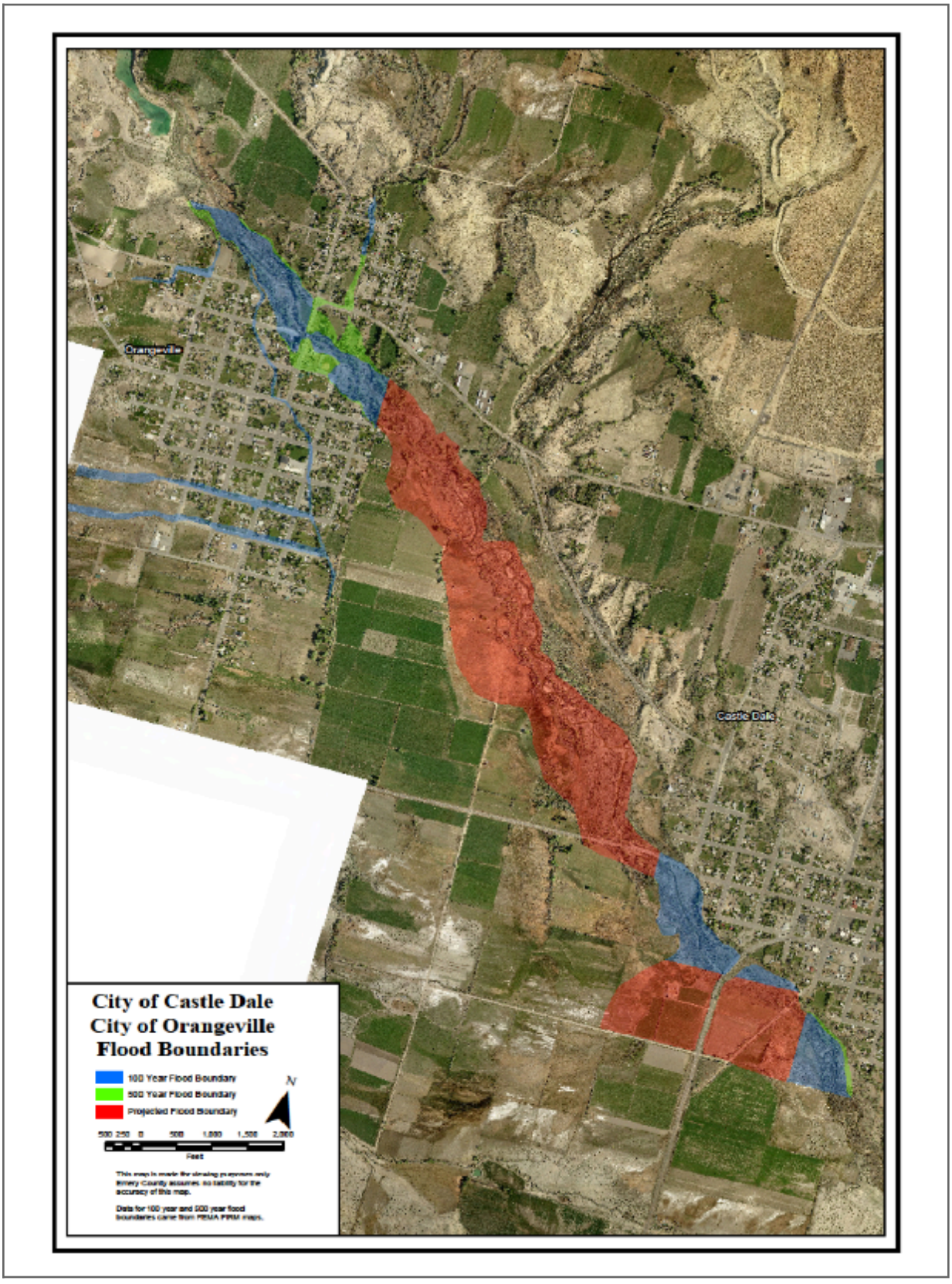
CASTLE DALE - POPULATIONS AT RISK (2021)	
Population under 5	5.30%
Population over 65	22.80%
Population Non-White (all other races)	1.80%
Population Hispanic	2.60%
Population without a High School Diploma	7.40%
Population that speak English "Not Well"	1.80%
Population in "Deep Poverty"	1.50%
Families Below Poverty	17.80%
Families that are Single Mother Households and Below Poverty	3.40%
Households Receiving Food Stamps (SNAP)	19.80%
Population that "Did Not Work"	41.40%
Rentals where Gross Rent Exceeds 30% of Household Income	61.20%
Housing that are Mobile Homes	14.70%
Households that are Single Female with Children under 18	5.90%
Households with No Car	2.40%
Population over 65 and Living Alone	18.70%
Population with Disabilities	20.70%
Population without Health Insurance	4.90%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.2.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **LANDSLIDE (L):** There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

Figure 7.2.5.1 - Map of Flood Boundaries - Castle Dale



7.2.6 Changes Since 2018 Plan

Since the 2018 plan, Castle Dale City has experienced several changes affecting hazard vulnerability:

1. Population and Demographics:
    - The population has remained relatively stable with minimal changes in overall numbers.
    - Aging population trend with increasing percentage of residents over 65.
    - Slight changes in economic conditions affecting vulnerable populations.
2. Land Use Changes:
    - Limited new development, primarily focused on infill projects.
    - No significant changes in development patterns in hazard-prone areas.
3. Infrastructure and Services:
    - Ongoing maintenance of municipal water systems affecting drought resilience.
    - Limited enhancements to stormwater management systems.
4. Policy Updates:
    - Adoption of updated building codes affecting seismic safety.
    - Maintenance of existing regulatory frameworks for development.

These changes directly influenced how this plan was revised for Castle Dale City. Specifically:

1. Water system projects received higher priority in the mitigation strategy due to aging infrastructure challenges revealed during drought conditions and facility assessments.
2. Flood mitigation actions now focus more on specific at-risk areas identified through stormwater incidents since the previous plan.
3. Emergency notification system improvements were added based on communication challenges experienced during recent emergency events.
4. Building code enforcement actions were strengthened to address seismic concerns identified through vulnerability assessments of aging structures.
5. Actions specific to vulnerable populations were expanded in response to demographic shifts and identified service gaps during recent weather events.

7.2.7 Development in Hazard Prone Areas - Castle Dale City

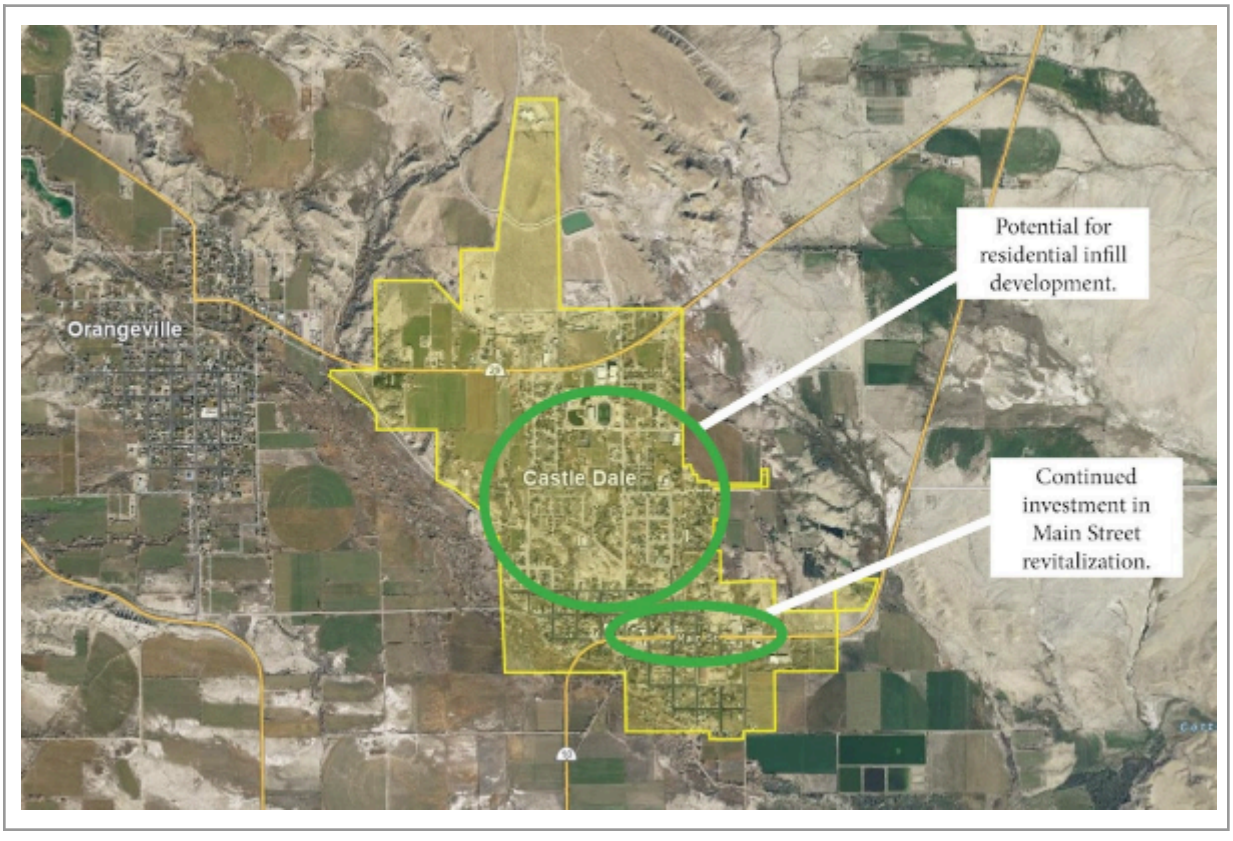
Castle Dale City's economy is primarily based on various industries such as agriculture, mining, and tourism. Agriculture plays a significant role, with farming activities focused on livestock production, including cattle, sheep, and poultry. The mining sector contributes to the local economy through the extraction of coal, and natural gas. Additionally, tourism and outdoor recreational activities, including hunting, fishing, and hiking, attract visitors to the area, providing employment and income opportunities.

Since the 2018 plan, development in Castle Dale has primarily consisted of:

1. **Stormwater Infrastructure Improvements**: The city completed drainage upgrades along Main Street and in the northwestern residential area, DECREASING vulnerability to flooding by improving water conveyance capacity during heavy precipitation events.
2. **Residential Infill Development**: Limited new home construction occurred primarily as infill in established neighborhoods outside of identified flood zones, maintaining the city's overall flood vulnerability level.
3. **Public Facility Upgrades**: The renovation of two municipal buildings included seismic reinforcements, DECREASING vulnerability to earthquake hazards for critical government functions.
4. **Commercial Development**: New commercial structures along Highway 10 were constructed to current building codes with improved drainage requirements, slightly DECREASING vulnerability to flood and seismic hazards.

These development changes, while modest in scale, have generally decreased Castle Dale's vulnerability to identified hazards, particularly flooding and earthquakes, through improved infrastructure and adherence to current building standards. No significant development has occurred in high-hazard zones that would increase community vulnerability.

Figure 7.2.7.1 - Illustration of Potential Development Areas



7.2.8 Status of 2018 Mitigation Actions

While the 2018 plan primarily took a countywide approach, Castle Dale City participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
Drought: Install needed water storage tanks (D1)	Lead	Not started	Project still pending due to funding constraints
Earthquake: Planning and Zoning Departments adjust building codes (E3)	Participant	Completed	County now provides building inspection services
Flooding: Improve Castle Dale South Spur (F2)	Participant	Ongoing	Regular maintenance continues through public works
Severe Weather: Adopt building codes (SW5)	Participant	In Progress	Currently updating local codes to match state-mandated standards

7.2.9 Castle Dale Mitigation Strategy

7.2.9.1 Castle Dale Strategy Overview

Castle Dale City employs a comprehensive mitigation strategy addressing the city's priority hazards as identified through the risk assessment process. Each action has been developed to address specific vulnerabilities while considering implementation feasibility, cost-effectiveness, and alignment with broader community goals. Actions include structural projects, planning initiatives, education programs, and natural systems protection measures, creating a multi-faceted approach to hazard risk reduction.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Castle Dale City employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water storage tank installation and improvements.
    - Drainage system maintenance and upgrades.
    - Public facility retrofitting and reinforcement.
- **Planning & Regulations**:
    - Updated building codes and zoning ordinances.
    - Stormwater management policies.
    - Subdivision standards improvements.
- **Natural Systems**:
    - Erosion control measures.

    - Channel and waterway maintenance.
    - Sediment management in drainage systems.
- **Education/Awareness**:
    - Community hazard preparedness programs.
    - Flood insurance promotion.
    - Drought awareness initiatives.

Note: *Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible. (See Appendix M).*

7.2.9.2 Earthquake Mitigation Actions

1. **Conduct Seismic Assessment and Retrofit of Critical Public Buildings**
    - **Description:** Conduct professional seismic vulnerability assessments for priority public buildings, followed by seismic retrofitting for structures identified as high risk.
    - **Responsible Party:** Castle Dale Building Department (Lead); Emery County Engineering Department
    - **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC) Program
    - **Estimated Cost:** $75,000 for assessment; $250,000-500,000 for retrofitting
    - **Timeframe:** 2025-2027
    - **Priority Level:** High
    - **Justification:** Castle Dale has several pre-1970s buildings in the downtown district constructed before modern seismic codes, including critical facilities. Retrofitting would significantly reduce potential damage and ensure continuity of essential services during seismic events.
    - **Status:** Planned
2. **Develop and Implement Public Education Program on Earthquake Preparedness**
    - **Description:** Create and distribute educational materials on earthquake safety, conduct community workshops, and promote participation in the Great Utah ShakeOut.
    - **Responsible Party:** Castle Dale Emergency Management Coordinator (Lead); Emery County Emergency Management
    - **Potential Funding Source:** FEMA Emergency Management Performance Grants, County Emergency Management; City general fund
    - **Estimated Cost:** $10,000 annually
    - **Timeframe:** 2024-2028 (ongoing)
    - **Priority Level:** Medium

- **Justification:** Public education on earthquake preparedness will help reduce injuries and enable faster recovery by ensuring residents know appropriate actions before, during, and after an earthquake.
- **Status:** Ongoing

7.2.9.3 Flood Mitigation Actions

1. **Improve Cardinal Wash Drainage Infrastructure**
    - **Description:** Design and construct a catch pond and associated drainage improvements to manage stormwater from Cardinal Wash during heavy precipitation events.
    - **Responsible Party:** Castle Dale Public Works Department (Lead); Emery County Engineering Department
    - **Potential Funding Source:** FEMA Flood Mitigation Assistance Program; Utah Community Impact Board
    - **Estimated Cost:** $350,000
    - **Timeframe:** 2024-2026
    - **Priority Level:** High
    - **Justification:** Cardinal Wash has historically caused flooding in adjacent residential areas during heavy rainfall events. This infrastructure will reduce flood risk by capturing and controlling stormwater before it reaches developed areas.
    - **Status:** Design phase in progress
2. **Update Stormwater Management Standards and Regulation**
    - **Description:** Revise subdivision ordinance and development standards to incorporate enhanced stormwater management requirements for new development and redevelopment.
    - **Responsible Party:** Castle Dale Planning Department (Lead); City Council
    - **Potential Funding Source:** Utah Division of Water Quality; City general fund
    - **Estimated Cost:** $15,000
    - **Timeframe:** 2024-2025
    - **Priority Level:** Medium
    - **Justification:** Updated stormwater management standards will ensure future development incorporates appropriate drainage and detention facilities, reducing cumulative flood impacts throughout the city.
    - **Status:** Underway
3. **Promote Flood Insurance Participation**
    - **Description:** Implement a public outreach campaign to educate property owners about flood risks and encourage participation in the National Flood Insurance Program.

- **Responsible Party:** Castle Dale Planning Department (Lead); Emery County Floodplain Administrator
- **Potential Funding Source:** City general fund; FEMA Emergency Management Performance Grants, County Emergency Management
- **Estimated Cost:** $5,000 annually
- **Timeframe:** 2024-2028 (ongoing)
- **Priority Level:** Medium
- **Justification:** Despite the identified flood risk in parts of Castle Dale, flood insurance participation remains low. Increased participation will improve community resilience through financial protection for property owners.
- **Status:** Ongoing

7.2.9.4 Drought Mitigation Actions

1. **Install Secondary Water Storage Tank**
    - **Description:** Construct an additional water storage tank to increase capacity and reliability of the municipal water system during drought conditions.
    - **Responsible Party:** Castle Dale Public Works Department (Lead); Castle Valley Special Service District
    - **Potential Funding Source:** Utah Division of Water Resources; Utah Community Impact Board; USDA Rural Development
    - **Estimated Cost:** $3,500,000
    - **Timeframe:** 2025-2027
    - **Priority Level:** High
    - **Justification:** The Hunter Power Plant requires a constant water supply, and residential demand increases during drought periods. Additional storage capacity will ensure continuity of service during extended dry periods.
    - **Status:** Planning phase
2. **Implement Water Conservation Program**
    - **Description:** Develop a comprehensive water conservation program including public education, water-efficient fixture rebates, and revised municipal landscaping standards.
    - **Responsible Party:** Castle Dale Public Works Department (Lead); City Council
    - **Potential Funding Source:** Utah Division of Water Resources; City water utility funds
    - **Estimated Cost:** $25,000 initially, $10,000 annually thereafter
    - **Timeframe:** 2024-2028
    - **Priority Level:** Medium

- **Justification:** Proactive water conservation measures will extend existing water supplies during drought conditions and reduce strain on municipal water infrastructure.
- **Status:** Initial planning

7.2.9.5 Dam Failure Mitigation Actions

1. **Public Education and Inundation Zone Mapping Program**
    - **Description:** Develop and implement a comprehensive public education program for residents and businesses within the Joe's Valley Dam inundation zone. Create detailed inundation mapping with clearly marked evacuation routes, safe zones, and assembly areas. Distribute educational materials showing property-specific inundation depths, expected warning times, and emergency procedures. Install permanent signage at key locations throughout the inundation zone indicating evacuation routes and distances to high ground. These permanent measures reduce long-term vulnerability by ensuring residents understand their risk and know how to respond.
    - **Responsible Party:** Castle Dale City Administration (Lead), County Emergency Management
    - **Potential Funding Source:** FEMA Hazard Mitigation Grant Program (HMGP), State Division of Emergency Management
    - **Estimated Cost:** $45,000
    - **Timeframe:** 2025-2026
    - **Priority Level:** High
    - **Justification:** With approximately 1,200 residents potentially affected by Joe's Valley Dam failure, public awareness and preparedness are critical first-line defenses. Clear understanding of inundation zones and evacuation procedures can significantly reduce casualties and property losses in a rapid-onset event.
    - **Status:** Planned
2. **Critical Infrastructure Protection and Redundancy Planning**
    - **Description:** Implement protective measures for critical infrastructure within the dam inundation zone, prioritizing the wastewater treatment plant and other essential facilities. Install flood-resistant barriers, elevated equipment platforms, automatic shutdown systems triggered by dam failure warnings, and backup power systems above projected inundation levels. Develop redundant service pathways and temporary operational capabilities outside the inundation zone to maintain essential services during and after a dam failure event. Coordinate with Bureau of Reclamation on early warning system integration.
    - **Responsible Party:** Castle Dale Public Works Department (Lead), City Administration
    - **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC), Utah Community Impact Board
    - **Estimated Cost:** $185,000

- **Timeframe:** 2025-2028
- **Priority Level:** High
- **Justification:** The wastewater treatment plant is located within the inundation zone and its failure would create long-term recovery challenges and public health hazards. Protecting this and other critical infrastructure reduces both immediate disaster impacts and long-term community recovery time.
- **Status:** Planned

7.2.9.6 Severe Weather Mitigation Actions

1. **Install Emergency Generators at Critical Facilities**
    - **Description:** Acquire and install permanent emergency generators at City Hall, public safety buildings, and water pumping facilities.
    - **Responsible Party:** Castle Dale Public Works Department (Lead); Emery County Emergency Management
    - **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC) Program; Utah Community Impact Board
    - **Estimated Cost:** $175,000
    - **Timeframe:** 2025-2026
    - **Priority Level:** High
    - **Justification:** Power outages from severe weather events could compromise critical municipal functions. Backup generation will ensure continuity of essential services during extended outages.
    - **Status:** Planned
2. **Develop Heat Wave / Cold Wave Response Plan**
    - **Description:** Create a comprehensive plan for responding to heat wave and/or cold wave events, including cooling/warming center protocols and vulnerable population support strategies.
    - **Responsible Party:** Castle Dale Emergency Management Coordinator (Lead); Emery County Health Department
    - **Potential Funding Source:** FEMA Emergency Management Performance Grants, County Emergency Management; City general fund
    - **Estimated Cost:** $8,000
    - **Timeframe:** 2024-2025
    - **Priority Level:** Medium

- **Justification:** Castle Dale has significant vulnerable populations, including elderly residents and those with limited resources. An extreme temperature response plan will reduce health impacts during severe heat or cold events.
- **Status:** Planned

3. **Enhance Tree Management Program**
    - **Description:** Implement a proactive tree trimming and management program for city-owned trees and establish standards for utility companies to maintain clearance from power lines.
    - **Responsible Party:** Castle Dale Public Works Department (Lead); Parks Division
    - **Potential Funding Source:** City general fund; Utah Division of Forestry, Fire and State Lands
    - **Estimated Cost:** $20,000 annually
    - **Timeframe:** 2024-2028 (ongoing)
    - **Priority Level:** Medium
    - **Justification:** Falling limbs and trees during high wind events are a primary cause of power outages and property damage. A proactive management program will reduce these risks.
    - **Status:** Initial planning
4. **Structural Wind Mitigation Program**
    - **Description:** Implement building code updates requiring enhanced wind-resistant construction standards for new development and substantial improvements. Establish standards for roof attachment, window protection, and structural bracing to reduce wind damage vulnerability.
    - **Responsible Party:** Castle Dale Building Department (Lead), City Council
    - **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC), City development fees
    - **Estimated Cost:** $12,000 for code development, ongoing through permit fees
    - **Timeframe:** 2025-2026
    - **Priority Level:** Medium
    - **Justification:** Enhanced building standards reduce long-term vulnerability to wind damage, protecting property and reducing future disaster costs.

7.2.9.7 Justification for Hazards Not Included

- **Landslide:** Castle Dale's primary landslide vulnerability is concentrated near canyon mouths on the city's periphery where development approaches steeper terrain. However, the city's core development area sits on relatively flat valley terrain with minimal direct landslide exposure. Historical landslide activity has been limited to areas outside current city boundaries. The city addresses potential landslide risks to its periphery through: (1) coordination with Emery County on

slope monitoring in unincorporated canyon areas that could affect city access routes, (2) review of development proposals near canyon approaches to ensure adequate setbacks from unstable slopes, and (3) participation in the County's multi-hazard mapping initiative. If future development extends toward identified landslide-prone areas, the city will require site-specific geotechnical assessments and implement appropriate mitigation measures through the development review process.

- **Problem Soils:** While expansive soils exist in parts of Emery County, geotechnical evaluations indicate Castle Dale's development areas are not significantly affected by problem soil conditions that require specialized mitigation strategies.
- **Wildfire:** While Castle Dale's central development area benefits from agricultural valley location with substantial fire breaks, the city faces elevated wildfire risk along its interface with vegetated foothills and canyons, particularly on the western edge. Approximately 350 structures countywide (including structures in Castle Dale, Orangeville, Ferron, and Huntington) are located in high or moderate wildfire hazard areas. The city's wildfire mitigation approach focuses on: (1) maintaining defensible space around critical facilities through the city's ongoing vegetation management program, (2) coordinating with Emery County Fire Department and the Utah Division of Forestry, Fire & State Lands on wildland-urban interface (WUI) fuel reduction projects, (3) ensuring adequate water supply for firefighting operations through the water system improvements identified in Section 7.2.9.4, and (4) public education on home ignition zones for residents in or near WUI areas. The city determined that these ongoing programmatic approaches provide more effective wildfire risk reduction than stand-alone mitigation actions given Castle Dale's specific risk profile and available resources.
- **Infestation:** The urban nature of Castle Dale and limited agricultural operations within city boundaries result in minimal economic vulnerability to large-scale infestations compared to other hazards and other jurisdictions in the county.

7.2.10 Information Integration

Past Integration (2018-2023): Castle Dale City was a stakeholder of the previous plan, but the city hasn't updated its general plan since 2018. The city did not formally integrate the previous plan into other planning mechanisms during this period.

Current Integration: Castle Dale City will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Future general plan update
- Infrastructure planning decisions regarding flood control and water systems

7.3 Clawson Town

7.3.1 Background

Clawson Town is a small municipality (population estimated at 162). It is surrounded by scenic landscapes of rugged mountains and canyons. Agriculture, focused on livestock production like cattle, sheep, and poultry, plays a significant role in the local economy. Mining, including the extraction of coal and natural gas, contributes significantly to the town's economic activities. These industries provide employment and income opportunities for Clawson Town's residents.

7.3.2 Location & Extent

Clawson Town is situated in central Utah, within the larger region known as the Castle Country. It is located in Emery County, which covers an area of approximately 4,456 square miles (11,530 square kilometers). The city is nestled in the eastern part of the County, surrounded by rural landscapes characterized by desert mountains and canyons. Clawson Town enjoys a semi-arid climate, with hot summers and cold winters.

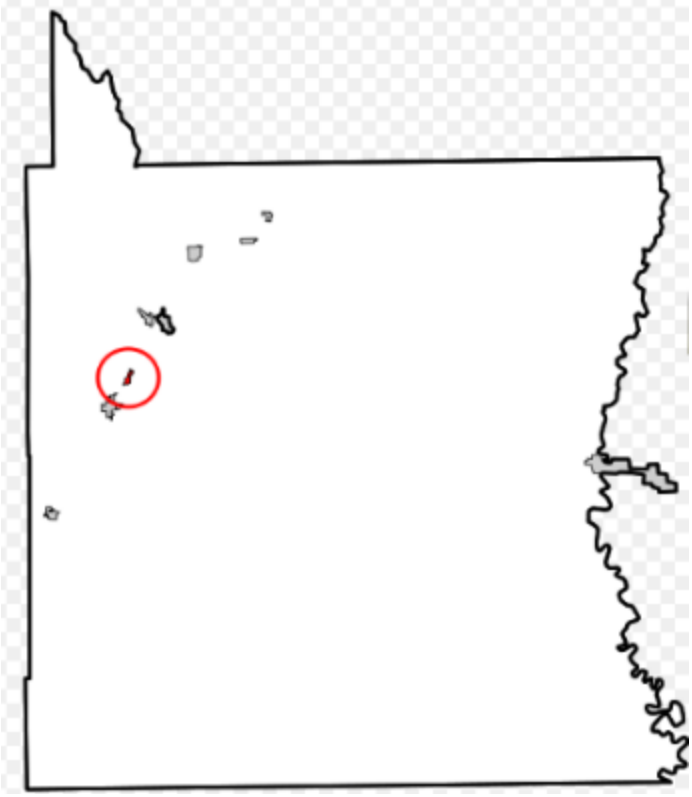
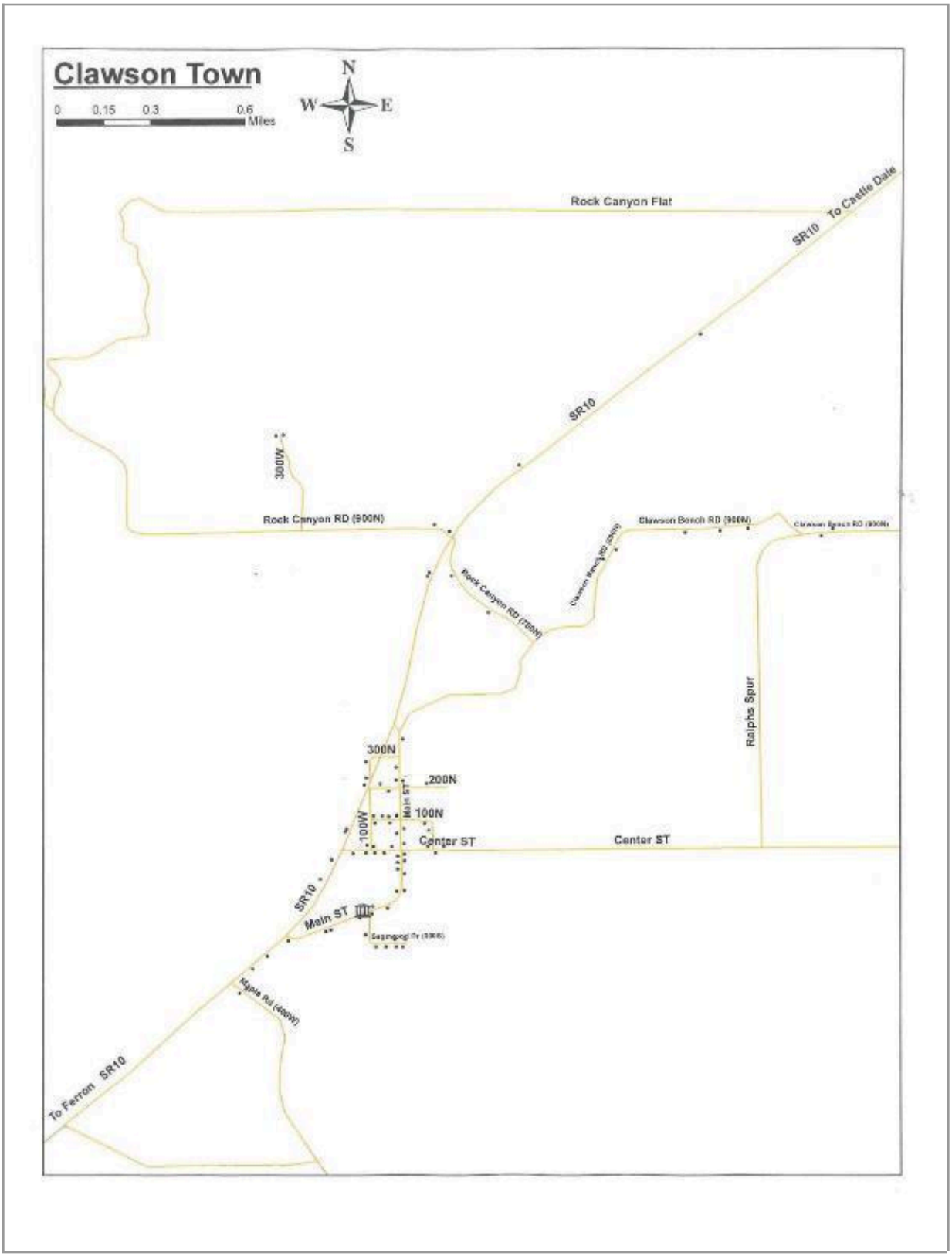


Figure 7.3.2.1 - Overview Map of Clawson Town



7.3.3 Demographic & Population Growth

In 2020, Clawson Town had an estimated population of 162 (US Census, ACS). The community is predominantly white, with a mix of various age groups and a focus on family-oriented living. More information is provided in the figure below.

7.3.4 Vulnerable Populations

CLAWSON TOWN - POPULATIONS AT RISK (2021)	
Population under 5	0.00%
Population over 65	69.10%
Population Non-White (all other races)	0.00%
Population Hispanic	0.00%
Population without a High School Diploma	0.00%
Population that speak English "Not Well"	0.00%
Population in "Deep Poverty"	0.00%
Families Below Poverty	0.00%
Families that are Single Mother Households and Below Poverty	0.00%
Households Receiving Food Stamps (SNAP)	11.40%
Population that "Did Not Work"	11.80%
Rentals where Gross Rent Exceeds 30% of Household Income	0.00%
Housing that are Mobile Homes	11.40%
Households that are Single Female with Children under 18	0.00%
Households with No Car	0.00%
Population over 65 and Living Alone	40.00%
Population with Disabilities	14.50%
Population without Health Insurance	0.00%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.3.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

7.3.6 Changes Since 2018 Plan

Clawson Town has experienced several notable changes affecting hazard vulnerability:

1. Population and Demographics:
    - Population has remained relatively stable with only minor fluctuations since 2018.
    - The aging population trend has continued, with nearly 70% of residents now over 65.
    - Limited economic diversification opportunities have affected residents' financial resilience.
2. Infrastructure Changes:
    - Maintenance improvements to town water infrastructure have enhanced drought resilience.
    - County-coordinated infrastructure projects have improved emergency response capability.
    - Road infrastructure improvements have enhanced evacuation routes.
3. Land Use Patterns:
    - Minimal new development has occurred, maintaining a similar vulnerability profile.
    - Agricultural land use patterns remain dominant in the surrounding areas.
    - No significant changes to commercial or industrial land use have occurred.
4. Emergency Services:
    - Enhanced coordination with County emergency services has improved response capabilities.
    - New communication systems implementation has improved emergency notification processes.
    - Strengthened mutual aid agreements with neighboring communities have enhanced disaster preparedness.

These changes directly influenced how this plan was revised for Clawson Town. Specifically:

1. Water conservation actions were incorporated into the drought mitigation strategy based on the town's experience with water supply challenges during recent drought conditions.

2. Stormwater management policy updates were prioritized due to localized flooding issues identified since the previous plan.
3. Emergency notification improvements were added to address communication gaps revealed during recent severe weather events, particularly for the town's increasing elderly population.
4. Seismic vulnerability assessment for the community center was included following growing awareness of unreinforced masonry risks in similar small town facilities.
5. The multi-hazard actions now emphasize comprehensive emergency operations planning to address the town's limited emergency response capabilities identified during recent incidents.

7.3.7 Development in Hazard Prone Areas - Clawson Town

In the years since the previous hazard plan, most of the development in Clawson Town was infill and redevelopment. This development hasn't significantly changed the community's overall vulnerability.

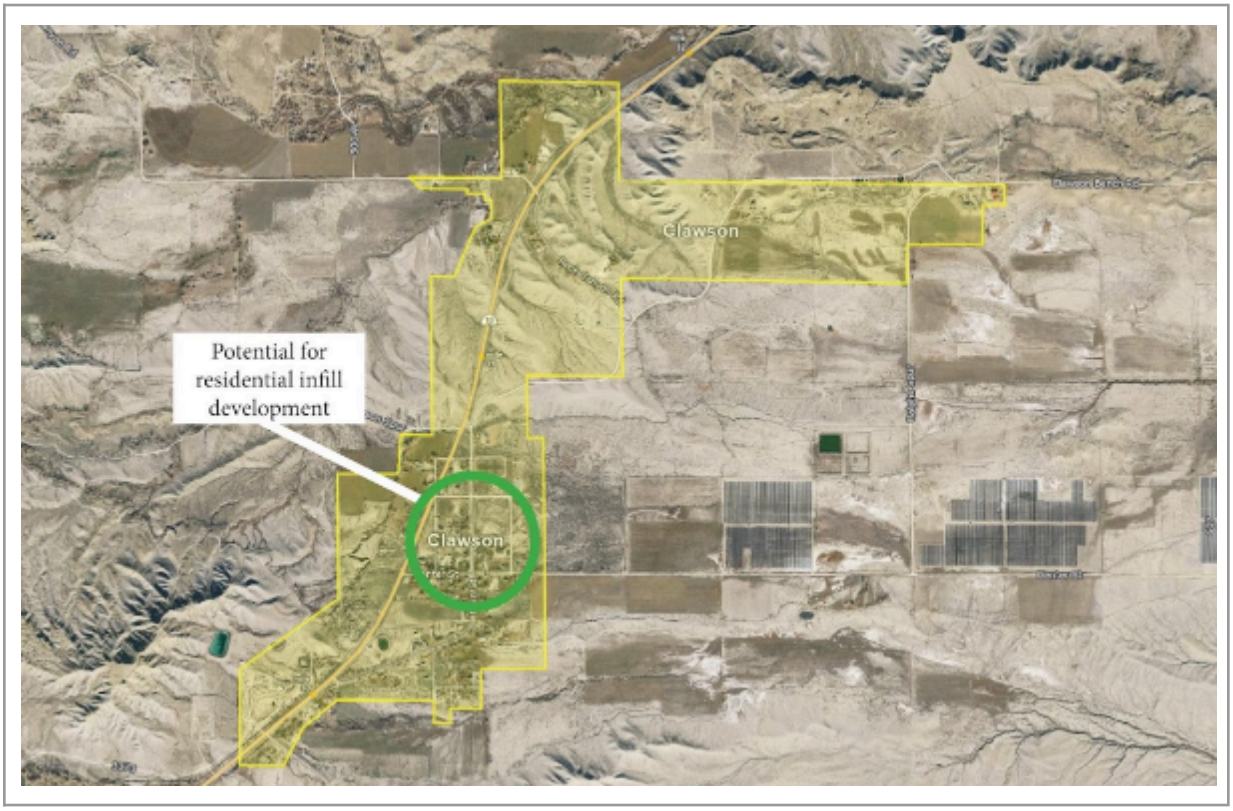
Clawson is not expecting future development that would increase the community's overall vulnerability. Areas of expected growth are primarily focused on infill development within the existing town boundaries.

Since 2018, the following specific development changes have affected hazard vulnerability:

1. **Water Infrastructure Improvements**: Upgrades to the municipal water system have DECREASED vulnerability to drought by improving water delivery efficiency and reducing system losses.
2. **Residential Infill Development**: The limited new residential construction has occurred outside mapped flood zones and has been built to current building codes, maintaining the town's current vulnerability level without introducing new risks.
3. **Community Center Renovations**: Structural improvements to the town's community center, while modest, have slightly DECREASED vulnerability to seismic events by improving the structural integrity of this critical community facility.
4. **Road Maintenance Projects**: Targeted improvements to drainage along key roadways have slightly DECREASED vulnerability to localized flooding during heavy precipitation events.

These development changes, while limited in scope due to Clawson's small size and modest growth, have generally maintained or slightly decreased the town's vulnerability to identified hazards through strategic infrastructure improvements and adherence to current building standards.

Figure 7.3.7.1 - Illustration of Potential Development Areas



7.3.8 Status of 2018 Mitigation Actions - Clawson Town

While the 2018 plan primarily took a countywide approach, Clawson Town participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
D2: Improve the irrigation canal systems	Participant	Ongoing	Coordination continues with local irrigation companies
E3: Planning and Zoning Departments adjust building codes	Participant	Completed	County now provides building inspection services
WF1: Remove dead trees in WUI areas	Participant	Ongoing	Annual coordination with the County
WF5: Review building codes	Participant	Ongoing	Regular 3-year review cycle

7.3.9 Clawson Town Mitigation Strategy

7.3.9.1 Clawson Strategy Overview

Clawson Town employs a comprehensive approach to hazard mitigation that balances infrastructure improvements, planning and regulatory measures, natural systems protection, and public education initiatives. Given the town's small size and limited resources, Clawson prioritizes actions that provide the greatest benefit to residents with feasible implementation costs. The town coordinates closely with Emery County on many mitigation efforts, leveraging county resources and expertise while focusing local efforts on town-specific vulnerabilities. This strategy addresses multiple hazards concurrently where possible and emphasizes cost-effective solutions that enhance community resilience while preserving Clawson's rural character and quality of life.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Clawson Town employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water system infrastructure improvements.
    - Town facility upgrades to meet current building standards.
    - Road and drainage system enhancements.
- **Planning & Regulations**:
    - Updated building codes and enforcement procedures.
    - Subdivision standards that address natural hazards.
    - Coordination with County emergency management planning.
- **Natural Systems**:
    - Watershed protection measures.
    - Cooperation with conservation agencies on natural resources management.
    - Coordination with forest management authorities on wildfire protection.
- **Education/Awareness**:
    - Public emergency preparedness programs.
    - Hazard-specific informational materials distribution.
    - Participation in County-wide emergency management exercises.

Note: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible.

7.3.9.2 Earthquake Mitigation Actions

1. **Adopt current building codes**
    - **Description**: Adopt the International Building Code (IBC) and International Residential Code (IRC) into local land use code to ensure new construction meets current seismic standards.
    - **Responsible Party**: Clawson Town Administration

- **Potential Funding Source**: N/A (staff time)
- **Estimated Cost**: Staff time
- **Timeframe**: 2025
- **Priority Level**: Low
- **Justification**: Clawson is located in a seismically active region. Updated building codes ensure new structures can withstand moderate earthquake events.
- **Status**: Planned for 2025

2. **Seismic vulnerability assessment of critical facilities**
    - **Description**: Conduct assessment of town-owned facilities to identify structural vulnerabilities to seismic events and prioritize retrofits.
    - **Responsible Party**: Clawson Town Administration (Lead), Emery County Emergency Management
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), State
    - **Estimated Cost**: $15,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Clawson's community center and other public facilities may have seismic vulnerabilities that require identification and remediation.
    - **Status**: Planned for 2025-2027

7.3.9.3 Flooding Mitigation Actions

1. **Stormwater management policy update**
    - **Description**: Adopt policies to reduce stormwater runoff by updating the subdivision ordinance and development standards.
    - **Responsible Party**: Clawson Town Administration
    - **Potential Funding Source**: State
    - **Estimated Cost**: $14,000
    - **Timeframe**: 2024-5
    - **Priority Level**: High
    - **Justification**: Proper stormwater management reduces flood risk to existing and future development, particularly during intense precipitation events.
    - **Status**: Underway for 2025 completion
2. **Drainage system improvement**

- **Description**: Identify and improve inadequate drainage infrastructure in flood-prone areas of town.
- **Responsible Party**: Clawson Town Public Works
- **Potential Funding Source**: FEMA Flood Mitigation Assistance, Community Development Block Grant
- **Estimated Cost**: $75,000
- **Timeframe**: 2026-2028
- **Priority Level**: Medium
- **Justification**: Localized flooding occurs in several areas of town during heavy precipitation events due to inadequate drainage infrastructure.
- **Status**: Planned for 2026-2028

7.3.9.4 Drought Mitigation Actions

1. **Improve irrigation canal systems in coordination with other jurisdictions**
   - **Description**: Coordinate with local irrigation companies to improve efficiency of water usage in canal systems serving Clawson and surrounding areas.
   - **Responsible Party**: Clawson Town Administration (Lead); local irrigation companies
   - **Potential Funding Source**: Local funds, Utah Division of Water Resources, U.S. Bureau of Reclamation WaterSMART Grants
   - **Estimated Cost**: $500,000 (as part of larger regional project)
   - **Timeframe**: Ongoing through 2028
   - **Priority Level**: Medium
   - **Justification**: Drought is a recurring hazard affecting Clawson's agricultural base and water supply. Improving irrigation efficiency reduces water waste and enhances drought resilience.
   - **Status**: Ongoing coordination with local irrigation companies
2. **Conduct water delivery system upgrade study**
   - **Description**: Study to assess and recommend improvements to the town's existing water delivery system to improve efficiency and reduce water loss.
   - **Responsible Party**: Clawson Town Administration
   - **Potential Funding Source**: USDA Rural Development Water and Environmental Programs, Utah Division of Water Resources, Local funds
   - **Estimated Cost**: $40,000
   - **Timeframe**: 2026-2028
   - **Priority Level**: Medium

- **Justification**: The town's aging water infrastructure contributes to water loss during distribution, exacerbating drought impacts.
- **Status**: Planned for 2026-2028

7.3.9.5 Severe Weather Mitigation Actions

1. **Encourage carbon monoxide monitor installation**
    - **Description**: Encourage homeowners to install carbon monoxide monitors and alarms to prevent poisoning during power outages caused by severe weather events.
    - **Responsible Party**: Clawson Town Administration (Lead); Emery County Emergency Management
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Utah Department of Health, Local
    - **Estimated Cost**: $5,000 (for education program and possible subsidies)
    - **Timeframe**: 2025
    - **Priority Level**: Low
    - **Justification**: Winter storms and power outages increase the risk of carbon monoxide poisoning from alternative heating sources.
    - **Status**: Planned for 2025
2. **Emergency notification system enhancement**
    - **Description**: Improve the town's capability to notify residents of approaching severe weather and other emergencies.
    - **Responsible Party**: Clawson Town Administration (Lead), Emery County Emergency Management
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Local
    - **Estimated Cost**: $10,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: Clawson's small, rural community needs reliable emergency notification methods to ensure resident safety during severe weather events.
    - **Status**: Upcoming
3. **Critical Infrastructure Protection in Dam Inundation Zones**
    - **Description**: Implement permanent protective measures for county facilities and infrastructure within dam inundation zones, including elevated utilities at the County Courthouse complex, flood-resistant modifications to emergency services buildings, reinforced structures for critical county operations, and land use policies restricting new

critical infrastructure development in high-risk inundation areas. These permanent modifications reduce long-term vulnerability of county assets and ensure continued governmental operations following dam failure events.

- **Responsible Party**: Emery County Engineering Department (Lead), County Emergency Management
- **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP), FEMA Building Resilient Infrastructure and Communities (BRIC)
- **Estimated Cost**: $250,000
- **Timeframe:** 2025-2028
- **Priority Level:** High
- **Justification:** Chapter 6.11 identifies significant county assets in dam inundation zones, including the Castle Dale Courthouse complex and emergency services facilities. Permanent protective measures reduce long-term vulnerability and ensure continuity of governmental operations.
- **Status:** Planned

7.3.9.6 Multi-Hazard Mitigation Actions

1. **Update emergency operations plan**
    - **Description**: Develop a comprehensive emergency operations plan specific to Clawson Town that addresses multiple hazards.
    - **Responsible Party**: Clawson Town Administration (Lead), Emery County Emergency Management
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Local funds
    - **Estimated Cost**: $20,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: A current, local emergency operations plan will improve coordination and response capabilities for all hazard events.
    - **Status**: Planned for 2025-2026
2. **Hazard mapping project**
    - **Description**: More accurately map problem areas to educate residents about unanticipated risks.
    - **Responsible Party**: Clawson Town Administration (Lead), Emery County GIS Department
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP), Utah Geological Survey, Local funds

- **Estimated Cost**: $25,000
- **Timeframe**: 2024-2028
- **Priority Level**: Low
- **Justification**: Accurate hazard mapping allows for better planning, public education, and emergency response.
- **Status**: Upcoming

7.3.9.7 Justification for Hazards Not Included

Landslides: Clawson Town has not developed specific mitigation actions for this hazard because the town is situated on relatively flat terrain with minimal landslide risk within town boundaries. The primary landslide concerns are along transportation routes outside town limits, which fall under Emery County or UDOT jurisdiction. Clawson Town supports county-led mitigation efforts for this hazard that may affect town access, but direct town-specific actions are not warranted given the low vulnerability within town limits.

Problem Soils: Specific mitigation actions are not included because Clawson Town has limited areas with documented problem soil conditions that pose significant risk to existing development. The town addresses soil-related issues through enforcement of building codes, which require soil testing and appropriate foundation design for new construction. Given the limited risk and the existing regulatory framework, additional actions specific to problem soils are not prioritized currently.

Dam Failure: Clawson Town is not located within the direct inundation zone of any high-hazard dams based on current mapping. The primary dam risks in Emery County affect downstream communities such as Castle Dale, Ferron, and Huntington. Clawson Town has no critical facilities or significant residential areas within mapped inundation zones that would require town-specific dam failure mitigation actions.

Wildfire: Clawson Town has not developed town-specific wildfire mitigation actions because the primary wildfire risk is in wildland-urban interface zones outside town boundaries. Clawson Town supports Emery County's wildfire mitigation efforts, including the annual removal of dead trees in WUI areas and wildfire fuel reduction programs. The town will continue to participate in these county-led initiatives rather than developing separate actions.

Infestation: Although infestation is identified as a county-wide hazard, Clawson Town has determined this is addressed through existing county-wide programs. The town relies on Emery County's Weed and Mosquito Department for infestation control services rather than developing independent town-specific mitigation actions. This county-led approach provides more cost-effective and comprehensive coverage than individual municipal programs.

7.3.10 Information Integration

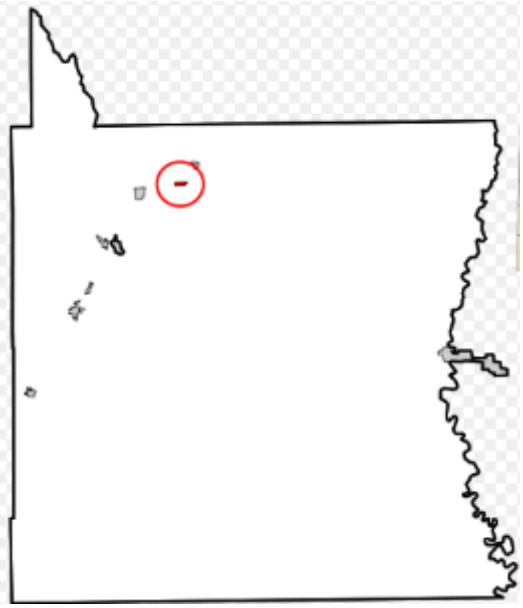
Past Integration (2018-2023): Clawson Town was a stakeholder of the previous plan. The town did not formally integrate the previous plan into other planning mechanisms during this period as no general plan or major planning document updates occurred.

Current Integration: Clawson Town will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization

- Emergency management procedures
- Future land use planning decisions

7.4 Cleveland Town



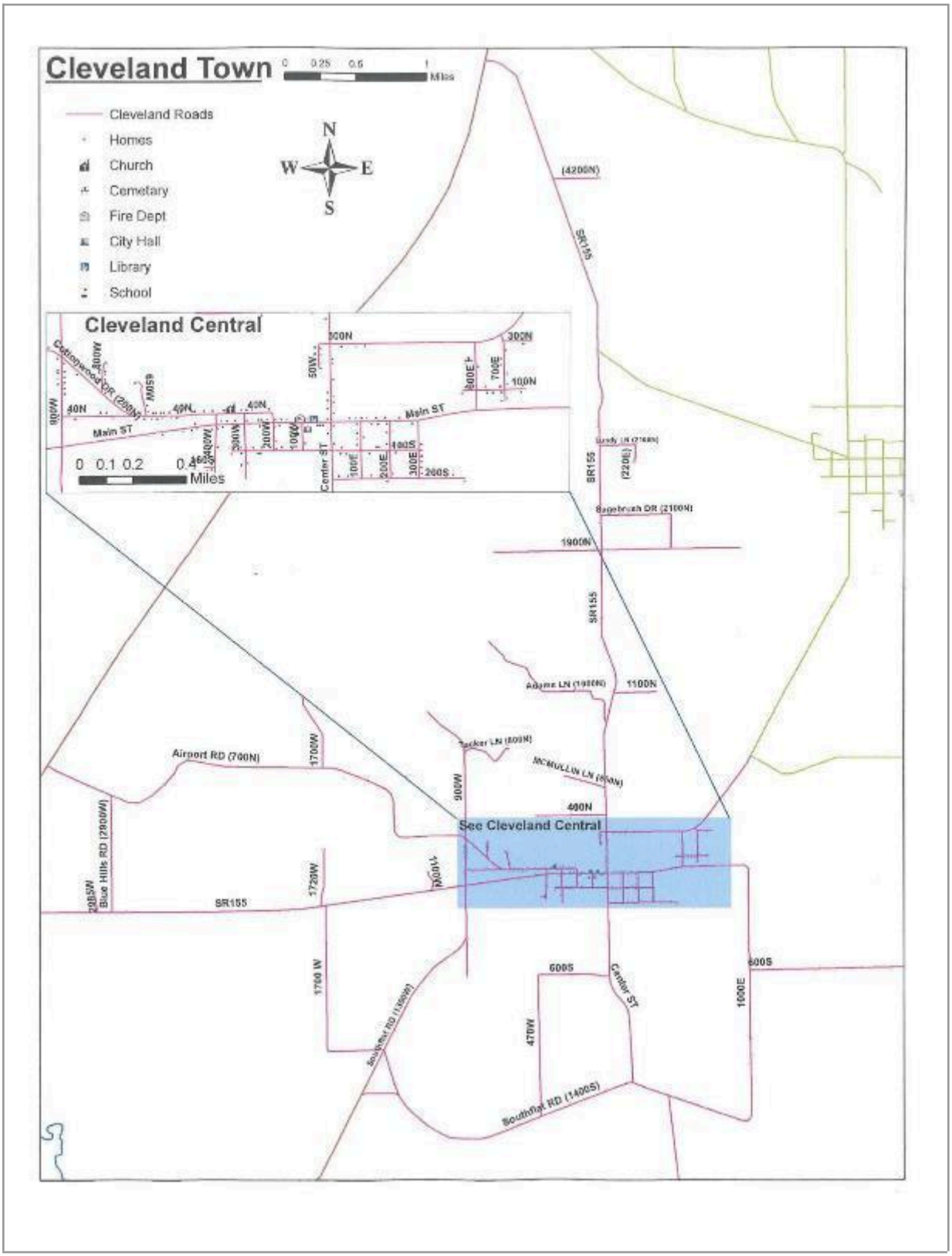
7.4.1 Background

In 2021, Cleveland Town had an estimated population of 497 residents. The primary economic drivers in Cleveland are centered around agriculture and natural resource extraction. Agriculture plays a significant role, with a focus on livestock farming, including cattle and sheep.

7.4.2 Location & Extent

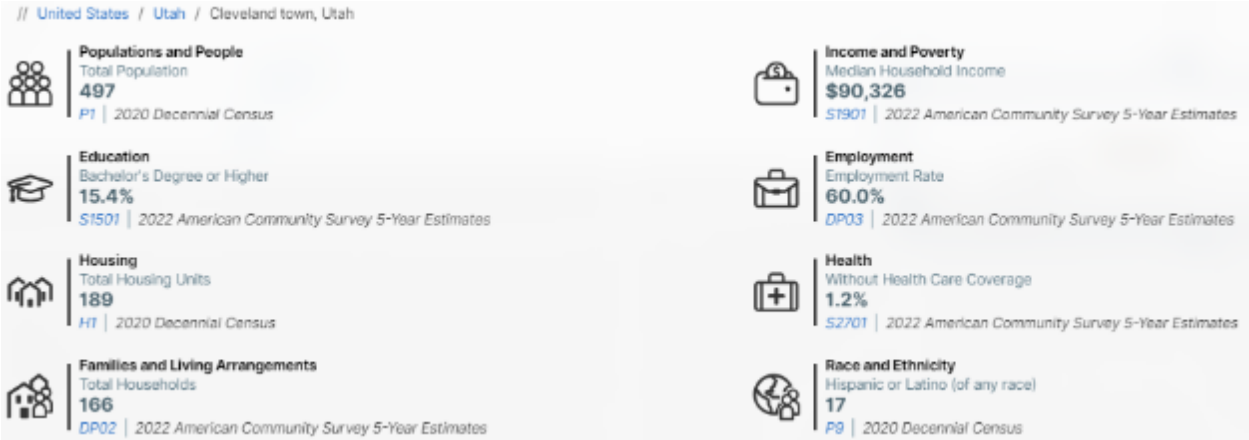
Cleveland is located in northwestern Emery County in a swale of land between the mountains and the desert. It is 7 miles (11 km) east of Huntington, 18 miles (29 km) south of Price, and 16 miles (26 km) northeast of Castle Dale, the Emery County seat. According to the United States Census Bureau, Cleveland has a total area of 0.85 square miles (2.2 km2).

Figure 7.4.2.1 - Overview Map of Cleveland Town



7.4.3 Demographic & Population Growth

As of the census of 2020, there were 497 people, 166 households, and 139 families residing in the town. The population density was 568.2 people per square mile. There were 189 housing units at an average density of 193.5 per square mile. The racial makeup of the town was 97.24% White, 0.20% Native American, 0.20% from other races, and 2.36% from two or more races. Hispanic or Latino of any race were 0.34% of the population. More information is provided in the figure below.



7.4.4 Vulnerable Populations

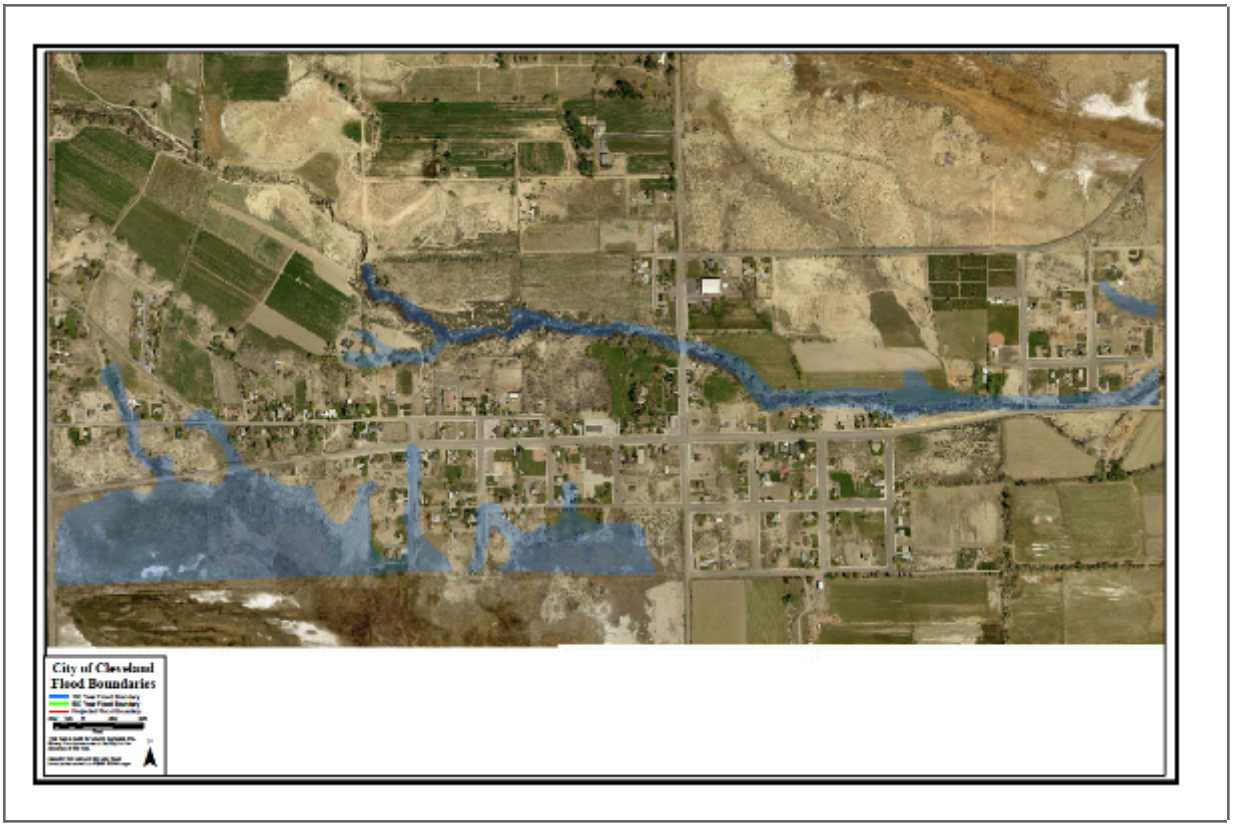
CLEVELAND TOWN - POPULATIONS AT RISK (2021)	
Population under 5	5.00%
Population over 65	13.30%
Population Non-White (all other races)	4.40%
Population Hispanic	0.00%
Population without a High School Diploma	2.10%
Population that speak English "Not Well"	0.00%
Population in "Deep Poverty"	2.00%
Families Below Poverty	8.80%
Families that are Single Mother Households and Below Poverty	3.80%
Households Receiving Food Stamps (SNAP)	10.40%
Population that "Did Not Work"	31.60%
Rentals where Gross Rent Exceeds 30% of Household Income	25.00%
Housing that are Mobile Homes	3.80%
Households that are Single Female with Children under 18	3.30%
Households with No Car	0.00%
Population over 65 and Living Alone	11.00%
Population with Disabilities	11.90%
Population without Health Insurance	0.20%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.4.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

Figure 7.4.5.1 - Map of Flood Boundaries - Cleveland



7.4.6 Changes Since 2018 Plan

Cleveland Town has experienced several notable changes affecting hazard vulnerability:

1. Population and Demographics:
    - The population has remained relatively stable with minimal fluctuations since 2018.
    - Age distribution has shifted slightly with a modest increase in residents over 65.
    - Economic conditions have remained consistent with limited diversification.
2. Infrastructure Changes:
    - Water system improvements have enhanced drought resilience.
    - Transportation infrastructure maintenance has improved emergency evacuation routes.
    - Communications systems upgrades have improved emergency notification capabilities.
3. Land Use Patterns:
    - Limited new development has occurred on previously undeveloped land.
    - Agricultural land uses continue to dominate surrounding areas.
    - No significant change to the town's development footprint that would affect hazard vulnerability.
4. Policy Updates:
    - Enhanced coordination with County emergency management services.
    - Updated emergency operation procedures implemented.
    - Improved coordination with neighboring communities on shared infrastructure.

These changes directly influenced how this plan was revised for Cleveland Town. Specifically:

1. Transportation infrastructure resilience received higher priority based on road damage experienced during recent severe weather events that temporarily isolated portions of the community.
2. Flood mitigation actions now focus on specific vulnerability points identified through engineering assessments and recent precipitation events.
3. Irrigation canal improvement actions were prioritized after multiple maintenance issues revealed increased failure risk during seasonal water flows.
4. The plan now incorporates more robust water conservation measures due to supply challenges experienced during extended drought periods.
5. Emergency operations planning was expanded to address coordination gaps identified during recent emergency response activities with county agencies.

7.4.7 Development in Hazard Prone Areas - Cleveland Town

In the years since the previous hazard plan, most of the development in Cleveland Town was infill and redevelopment. This development hasn't significantly changed the community's overall vulnerability.

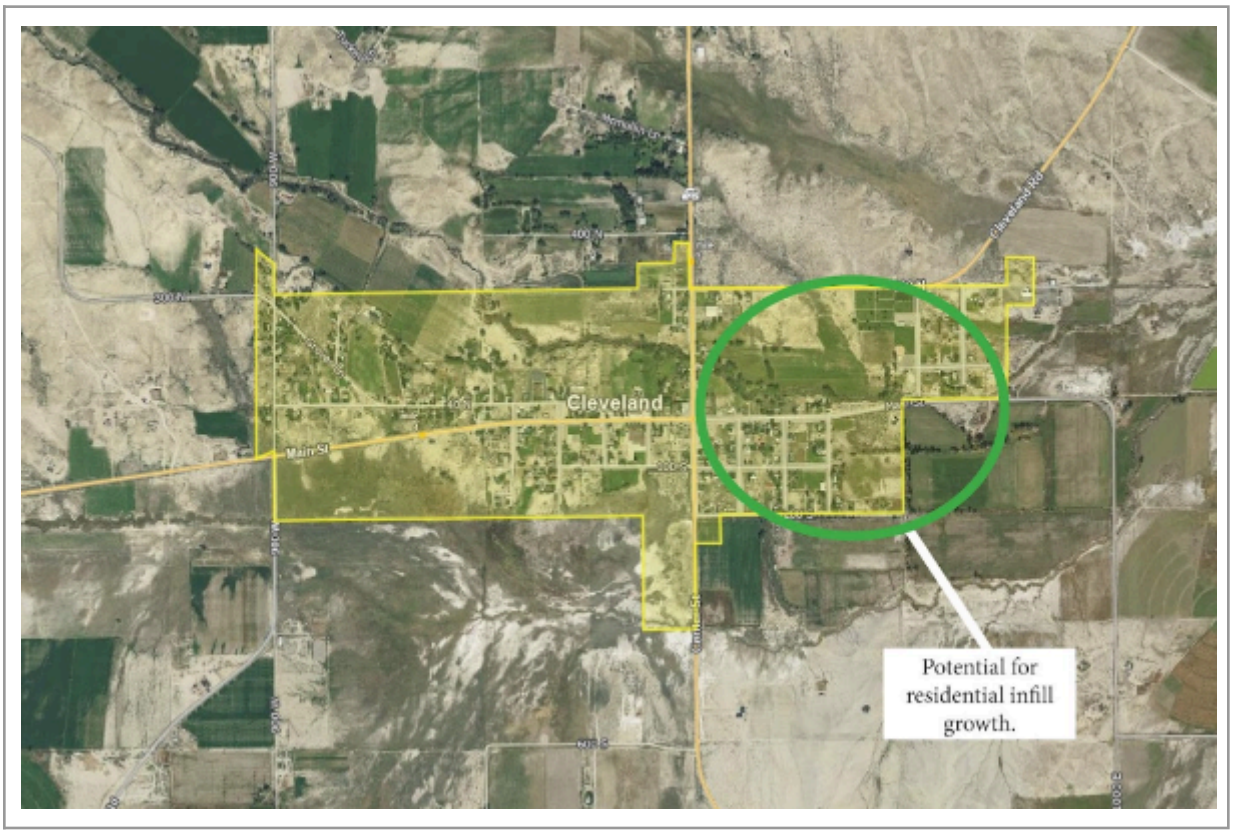
Cleveland is not expecting future development that would increase the community's overall vulnerability. Areas of expected growth are primarily within the existing town boundaries and outside identified hazard areas.

Since 2018, the following development activities have affected hazard vulnerability:

1. **Municipal Building Improvements**: Upgrades to town facilities incorporated current building standards, slightly DECREASING vulnerability to seismic events by improving structural resilience.
2. **Stormwater System Maintenance**: Routine clearing and improvement of drainage channels has DECREASED vulnerability to localized flooding during heavy precipitation events.
3. **Agricultural Land Conversion**: Limited conversion of agricultural land to residential use has occurred outside identified hazard zones, maintaining the town's overall vulnerability level.
4. **Transportation Infrastructure**: Improvements to key access routes have DECREASED vulnerability to isolation during severe weather events by ensuring more reliable emergency access.

Cleveland's modest development activity has been guided by awareness of natural hazard constraints, resulting in either maintained or slightly decreased vulnerability levels across identified hazards.

Figure 7.4.7.1 - Illustration of Potential Development Areas



7.4.8 Status of 2018 Mitigation Actions - Cleveland Town

While the 2018 plan primarily took a countywide approach, Cleveland Town participated in or led the following actions:

2018 Action	Role	Current Status	Explanation

D2: Improve the irrigation canal systems	Participant	Ongoing	Coordination continues with local irrigation companies
F2: Technical analysis on irrigation canals	Participant	Ongoing	Working to reduce the threat of floods from canal failures
F4: Improve Dinosaur Road - two locations	Lead	Deferred	Carried forward to 2024-2028 timeline due to funding constraints
E3: Planning and Zoning Departments adjust building codes	Participant	Completed	County now provides building inspection services
WF1: Remove dead trees in WUI areas	Participant	Ongoing	Annual coordination with the County
WF5: Review building codes	Participant	Ongoing	Regular 3-year review cycle

7.4.9 Cleveland Town Mitigation Strategy

7.4.9.1 Cleveland Strategy Overview

Cleveland Town employs a comprehensive approach to hazard mitigation that balances infrastructure improvements, planning mechanisms, natural systems protection, and public education. The town prioritizes actions that address its most significant hazards—flooding, drought, earthquake, and severe weather—while maintaining coordination with County agencies to leverage regional resources. Cleveland's strategy emphasizes practical, cost-effective solutions appropriate for its small size and rural character, focusing on both immediate protective measures and long-term risk reduction initiatives. The town particularly emphasizes transportation infrastructure resilience and water resource management due to its unique geographic setting between mountains and desert areas.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Cleveland Town employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water system improvements to enhance drought resilience.
    - Road infrastructure upgrades to improve emergency access.
    - Stormwater management infrastructure enhancements.
- **Planning & Regulations**:
    - Updated building codes and enforcement procedures.
    - Emergency operations planning and coordination.
    - Enhanced subdivision standards addressing natural hazards.
- **Natural Systems**:
    - Watershed protection measures.
    - Wildfire fuel reduction in coordination with county agencies.

    - Natural drainage system preservation.
- **Education/Awareness**:
    - Public emergency preparedness programs.
    - Hazard-specific information distribution.
    - Coordination with school emergency planning.

Note: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible.

7.4.9.2 Earthquake Mitigation Actions

1. **Adopt the International Building Code (IBC) and International Residential Code (IRC)**
    - **Description**: Officially adopt and implement the International Building Code and International Residential Code into local land use regulations to ensure structures meet modern seismic safety standards.
    - **Responsible Party**: Town Council (Lead), County Building Department
    - **Potential Funding Source**: Town General Fund (administrative costs only)
    - **Estimated Cost**: $2,000 (staff time)
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: Many structures in Cleveland were built before current seismic codes, creating vulnerability to earthquake damage. Updated building codes ensure new construction and significant renovations incorporate seismic safety features.
    - **Status**: Planned
2. **Conduct Seismic Assessment of Critical Facilities**
    - **Description**: Evaluate the seismic vulnerability of Cleveland's critical facilities, particularly the fire station, and develop retrofit recommendations if needed.
    - **Responsible Party**: Town Administration (Lead), County Emergency Management
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program
    - **Estimated Cost**: $18,000
    - **Timeframe**: 2026-2027
    - **Priority Level**: Medium
    - **Justification**: The fire station provides essential emergency services and must remain operational during disaster events. Identifying and addressing seismic vulnerabilities ensures continued functionality.
    - **Status**: Upcoming

7.4.9.3 Flood Mitigation Actions

1. **Improve Dinosaur Road Drainage Infrastructure**
    - **Description**: Upgrade culverts and drainage features at two identified locations on Dinosaur Road to prevent recurring flooding and road damage.
    - **Responsible Party**: Town Public Works
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance Program, Community Impact Board
    - **Estimated Cost**: $170,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: Medium
    - **Justification**: Dinosaur Road experiences repeated flooding during heavy precipitation events, causing road damage and potential access limitations. Infrastructure improvements will reduce maintenance costs and ensure continued access.
    - **Status**: Deferred to 2024-2028 due to funding constraints
2. **Technical Analysis of Irrigation Canals**
    - **Description**: Conduct technical analysis of irrigation canals within and adjacent to town boundaries to identify vulnerability to failure and implement improvements.
    - **Responsible Party**: Town Administration (Lead), Local Irrigation Companies
    - **Potential Funding Source**: Utah Division of Water Resources, USDA Natural Resources Conservation Service Environmental Quality Incentives Program (EQIP)
    - **Estimated Cost**: $75,000 (town's portion)
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Canal failures have historically caused flooding in residential areas. Technical analysis identifies vulnerable sections and informs targeted improvement projects to prevent future failures.
    - **Status**: Ongoing work to reduce flood threat from canal failures
3. **Adopt Stormwater Management Standards**
    - **Description**: Update the subdivision ordinance and development standards to incorporate modern stormwater management practices that reduce runoff and flood risk.
    - **Responsible Party**: Town Council (Lead), County Planning Department
    - **Potential Funding Source**: State Planning Assistance Grants
    - **Estimated Cost**: $14,000
    - **Timeframe**: 2024

- **Priority Level**: High
- **Justification**: Proper stormwater management is essential to reducing flood risk from heavy precipitation events, particularly as development creates more impervious surfaces.
- **Status**: Underway

7.4.9.4 Wildfire Mitigation Actions

1. **Participate in Annual Wildfire Fuel Reduction Program**
    - **Description**: Continue coordination with County wildfire mitigation efforts to remove dead trees and vegetation in Wildland-Urban Interface areas near town boundaries.
    - **Responsible Party**: Town Administration (Lead), County Fire Department, Utah Division of Forestry, Fire, and State Lands
    - **Potential Funding Source**: Fire Management Assistance Grants, Utah Division of Forestry, Fire, and State Lands
    - **Estimated Cost**: $8,000 annually (town's contribution to larger county program)
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Reducing fuel loads in areas adjacent to the community decreases wildfire intensity and spread potential, protecting structures from wildfire hazards.
    - **Status**: Ongoing annual coordination with the County
2. **Develop Wildfire Evacuation Plan**
    - **Description**: Create a town-specific wildfire evacuation plan identifying routes, procedures, and notification systems.
    - **Responsible Party**: Town Administration (Lead), County Emergency Management, County Fire Department
    - **Potential Funding Source**: Town General Fund, Utah Division of Forestry, Fire, and State Lands
    - **Estimated Cost**: $7,500
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium
    - **Justification**: A well-developed evacuation plan enhances community safety during wildfire events by ensuring orderly evacuation procedures and reducing potential confusion.
    - **Status**: Planned

7.4.9.5 Problem Soils Mitigation Actions

1. **Identify Problem Soil Areas**

- **Description**: Coordinate with County geologists to identify and map areas within town boundaries affected by problem soils that could impact development and infrastructure.
- **Responsible Party**: Town Administration (Lead), County Planning Department
- **Potential Funding Source**: Utah Geological Survey, Town General Fund
- **Estimated Cost**: $12,000
- **Timeframe**: 2025-2027
- **Priority Level**: Low
- **Justification**: Understanding the location and extent of problem soil areas allows for appropriate construction standards and infrastructure planning to mitigate potential structural damage.
- **Status**: Upcoming

7.4.9.6 Drought Mitigation Actions

1. **Improve Irrigation Canal Systems Efficiency**
    - **Description**: Coordinate with local irrigation companies to improve efficiency of water delivery through canal lining, piping, or other water conservation measures.
    - **Responsible Party**: Town Administration (Lead), Local Irrigation Companies
    - **Potential Funding Source**: Utah Division of Water Resources, USDA Rural Development, Community Impact Board
    - **Estimated Cost**: $500,000 (town's portion of larger regional project)
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: Improved irrigation efficiency directly addresses drought vulnerability by reducing water loss and extending available water supplies during dry periods.
    - **Status**: Ongoing coordination with local irrigation companies
2. **Develop and Implement Water Conservation Program**
    - **Description**: Create educational materials and incentives to promote residential and agricultural water conservation practices.
    - **Responsible Party**: Town Administration
    - **Potential Funding Source**: Utah Division of Water Resources, Town General Fund
    - **Estimated Cost**: $8,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium

- **Justification**: Community awareness and behavioral changes can significantly reduce water consumption, extending available supplies during drought conditions.
- **Status**: Planned

7.4.9.7 Severe Weather Mitigation Actions

1. **Permanent Transportation Infrastructure Hardening**
    - **Description**: Construct permanent infrastructure improvements including road base strengthening in flood-prone areas, installation of permanent culverts sized for 100-year storm events, and strategic placement of fixed snow barriers to reduce drifting on critical transportation routes. Include salt storage facility for operational support.
    - **Responsible Party**: Town Public Works
    - **Potential Funding Source**: Community Impact Board
    - **Estimated Cost**: $850,000
    - **Timeframe**: 2024
    - **Priority Level**: High
    - **Justification**: Infrastructure hardening reduces long-term vulnerability to weather-related transportation disruptions by permanently improving road resilience rather than just improving response capabilities.
    - **Status**: Ongoing
2. **Develop Heat / Cold Wave Safety Education Program**
    - **Description**: Create and distribute educational materials about extreme heat and cold dangers and protective measures for vulnerable populations.
    - **Responsible Party**: Town Administration (Lead), County Emergency Management
    - **Potential Funding Source**: Town General Fund, County Health Department
    - **Estimated Cost**: $5,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Low
    - **Justification**: Educational programs enhance individual preparedness for heat / cold wave events, particularly important for vulnerable populations including the 13.3% of residents over age 65.
    - **Status**: Upcoming

7.4.9.8 Multi-Hazard Mitigation Actions

1. **Update Emergency Operations Plan**
    - **Description**: Update the town's emergency operations plan and educate the public about risks, preparedness measures, and evacuation procedures.

- **Responsible Party**: Town Administration (Lead), County Emergency Management
- **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Town General Fund
- **Estimated Cost**: $15,000
- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: A comprehensive emergency plan is essential for coordinating response efforts across multiple hazards and ensuring effective communication with residents.
- **Status**: Ongoing

2. **Improve Emergency Communications Infrastructure**
    - **Description**: Enhance emergency notification systems to ensure all residents receive timely alerts during hazard events.
    - **Responsible Party**: Town Administration (Lead), County Emergency Management
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP), FEMA Emergency Management Performance Grant Program
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: Reliable emergency communications are critical for notifying residents about impending hazards and necessary protective actions, particularly given the town's somewhat isolated location.
    - **Status**: Planned

7.4.9.9 Justification for Hazards Not Included

Landslide: While landslides are identified as a regional hazard in Table 6.5.7, specific mitigation actions for Cleveland Town are not included because the town is situated on relatively flat terrain with minimal landslide risk. County geological assessments have not identified significant landslide-prone areas within town boundaries that would directly impact town infrastructure or residents. The town will monitor any changes in conditions along canyon approaches that might increase landslide risk to transportation routes.

Dam Failure: Cleveland Town is not located within the direct inundation zone of any high-hazard dams based on current inundation mapping. The primary dam risks in Emery County affect downstream communities such as Castle Dale, Ferron, and Huntington. Cleveland Town has no critical facilities or significant residential areas within mapped inundation zones that would require town-specific dam failure mitigation actions.

Infestation: While infestation is noted as a regional concern in Table 6.5.7, Cleveland Town defers to County-level initiatives for addressing this hazard through the Emery County Weed and Mosquito Department. Given the town's limited resources and the County's existing programs for infestation

management, Cleveland will support and participate in County-led efforts rather than implementing independent town-specific actions.

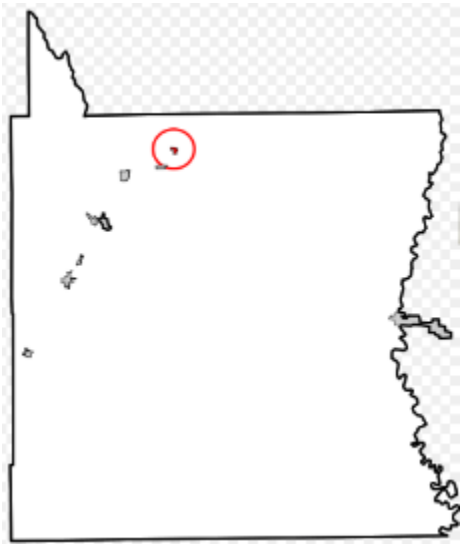
7.4.10 Information Integration

Past Integration (2018-2023): Cleveland Town was a stakeholder of the previous plan, but the town hasn't updated its general plan since 2009. The town did not formally integrate the previous plan into other planning mechanisms during this period.

Current Integration: Cleveland Town will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Future general plan update
- Infrastructure planning decisions for water and transportation systems

7.5 Elmo Town



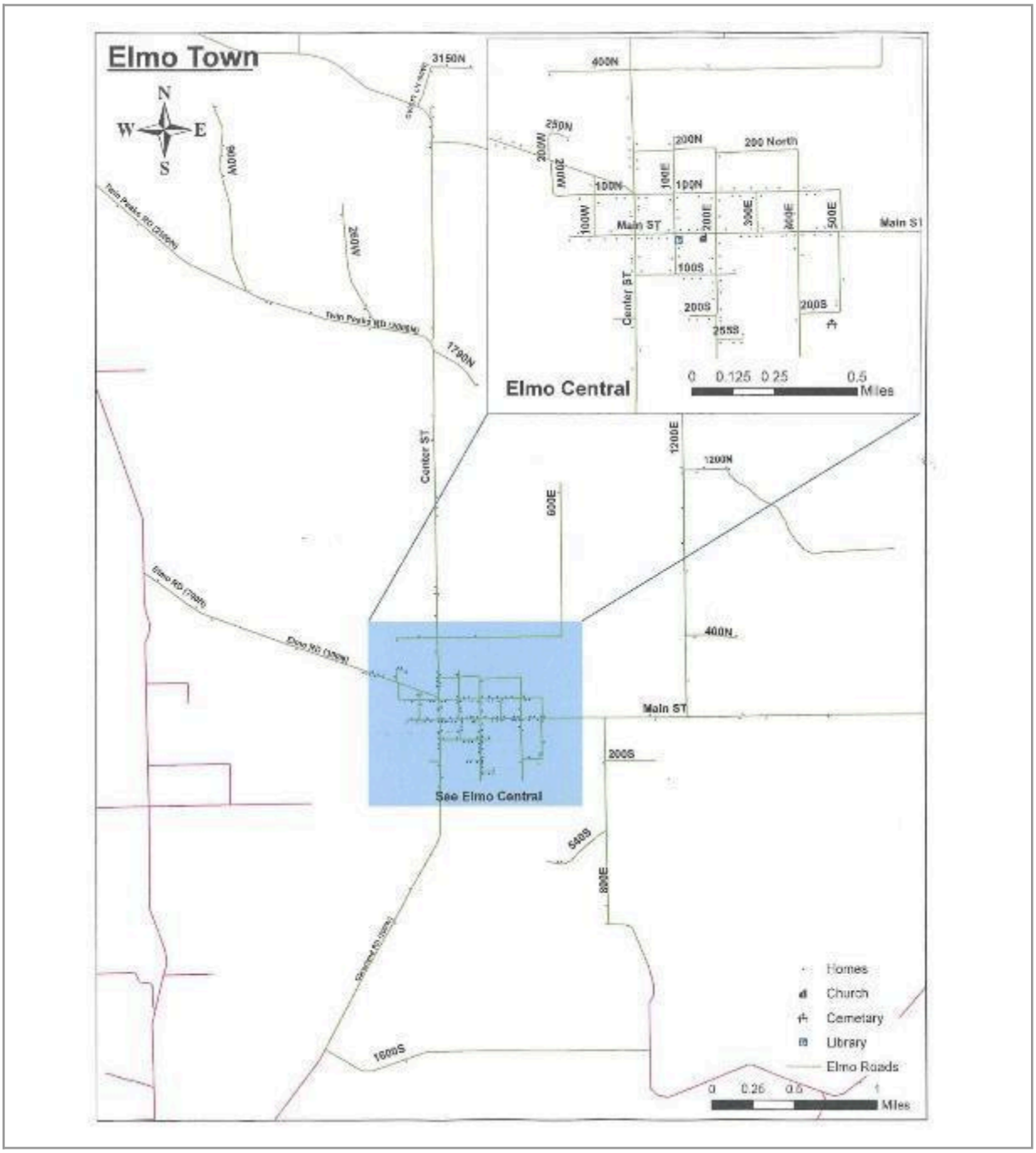
7.5.1 Background

Elmo Town is a city with a population of 405 residents. Elmo Town's economy is primarily driven by natural resource extraction. The extraction and processing of coal plays a significant role in sustaining the community.

7.5.2 Location & Extent

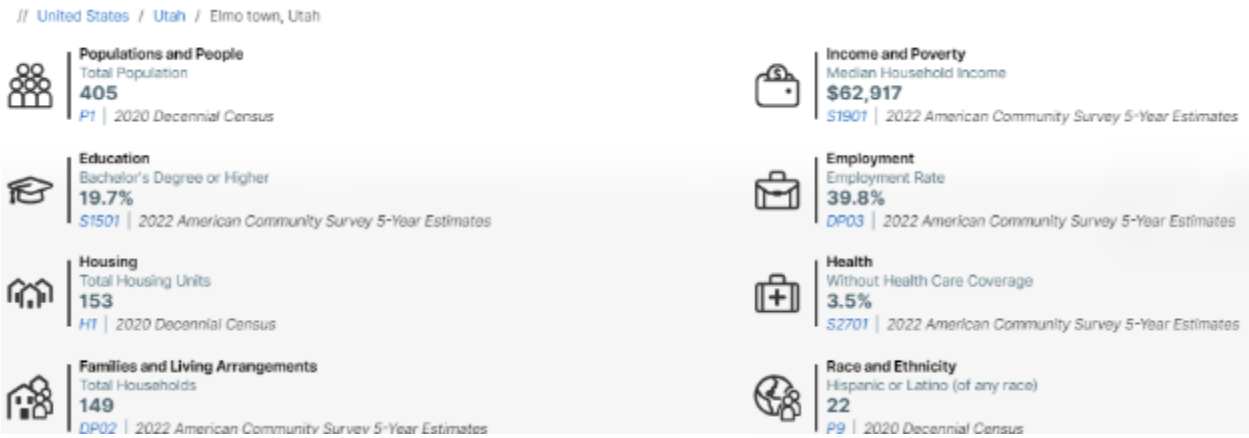
Elmo is in northern Emery County, 11 miles northeast of Huntington, and 16 miles south of Price. According to the United States Census Bureau, the town has a total area of 0.66 square miles.

Figure 7.5.2.1 - Overview Map of Elmo Town



7.5.3 Demographic & Population Growth

As of the decennial census of 2020, there were 405 people and 149 households in Elmo Town (2022 ACS). The population density was 597.9 people per square mile. There were 153 housing units at an average density of 195.0 per square mile. Hispanic or Latino of any race were 3.8% of the population.



7.5.4 Vulnerable Populations

ELMO TOWN - POPULATIONS AT RISK (2021)	
Population under 5	3.80%
Population over 65	18.80%
Population Non-White (all other races)	9.70%
Population Hispanic	3.80%
Population without a High School Diploma	5.20%
Population that speak English "Not Well"	0.00%
Population in "Deep Poverty"	3.10%
Families Below Poverty	0.00%
Families that are Single Mother Households and Below Poverty	0.00%
Households Receiving Food Stamps (SNAP)	2.90%
Population that "Did Not Work"	28.90%
Rentals where Gross Rent Exceeds 30% of Household Income	37.80%
Housing that are Mobile Homes	16.20%
Households that are Single Female with Children under 18	0.00%
Households with No Car	5.10%
Population over 65 and Living Alone	17.60%
Population with Disabilities	22.60%
Population without Health Insurance	2.40%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.5.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are

geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.

- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

7.5.6 Changes Since 2018 Plan

Elmo Town has experienced several notable changes affecting hazard vulnerability:

1. Population and Demographics:
    - Population remained relatively stable with a slight decrease since 2018.
    - Increasing percentage of elderly residents, affecting emergency response needs.
    - Growing number of residents with disabilities requiring specialized emergency services.
2. Infrastructure Changes:
    - Improvements to the culinary water system affecting drought resilience.
    - Enhancements to communication systems and emergency notification capabilities.
    - Limited upgrades to stormwater management infrastructure.
3. Economic Shifts:
    - Continued reduction in traditional mining employment affecting community resources.
    - Limited development of new commercial properties.
    - Modifications to public facility operations and emergency response protocols.
4. Environmental Changes:
    - Increased wildfire risk due to prolonged drought conditions.
    - Changes in localized flooding patterns due to altered precipitation trends.
    - Increased focus on emergency preparedness at the community level.

These changes directly influenced how this plan was revised for Elmo Town. Specifically:

1. Water storage and conservation actions were prioritized due to system vulnerabilities revealed during recent drought conditions.
2. Flood mitigation now emphasizes drainage infrastructure improvements based on specific issue areas identified during recent precipitation events.
3. The mitigation strategy includes enhanced building code implementation after assessments revealed seismic vulnerability concerns in key structures.
4. Communication system improvements were incorporated based on notification challenges experienced during recent emergency events.

5. Multi-hazard emergency planning received greater emphasis to address the town's limited emergency response capabilities and aging demographic profile.

7.5.7 Status of 2018 Mitigation Actions

While the 2018 plan primarily took a countywide approach, Elmo Town participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
Drought - Improve the irrigation canal system to increase efficiency of water usage	Participant	Ongoing	Ongoing coordination with local irrigation companies
Earthquake - Planning and Zoning Departments adjust building codes (E3)	Participant	Completed	County now provides building inspection
Drought - Install needed water storage tanks	Participant	Deferred	Pending funding, carried forward to 2024-2028 timeline

7.5.8 Development in Hazard Prone Areas - Elmo Town

In the years since the previous hazard plan, most of the development in Elmo Town was infill and redevelopment. This development has not significantly changed the community's overall vulnerability. Elmo is not expecting future development that would increase the community's overall vulnerability.

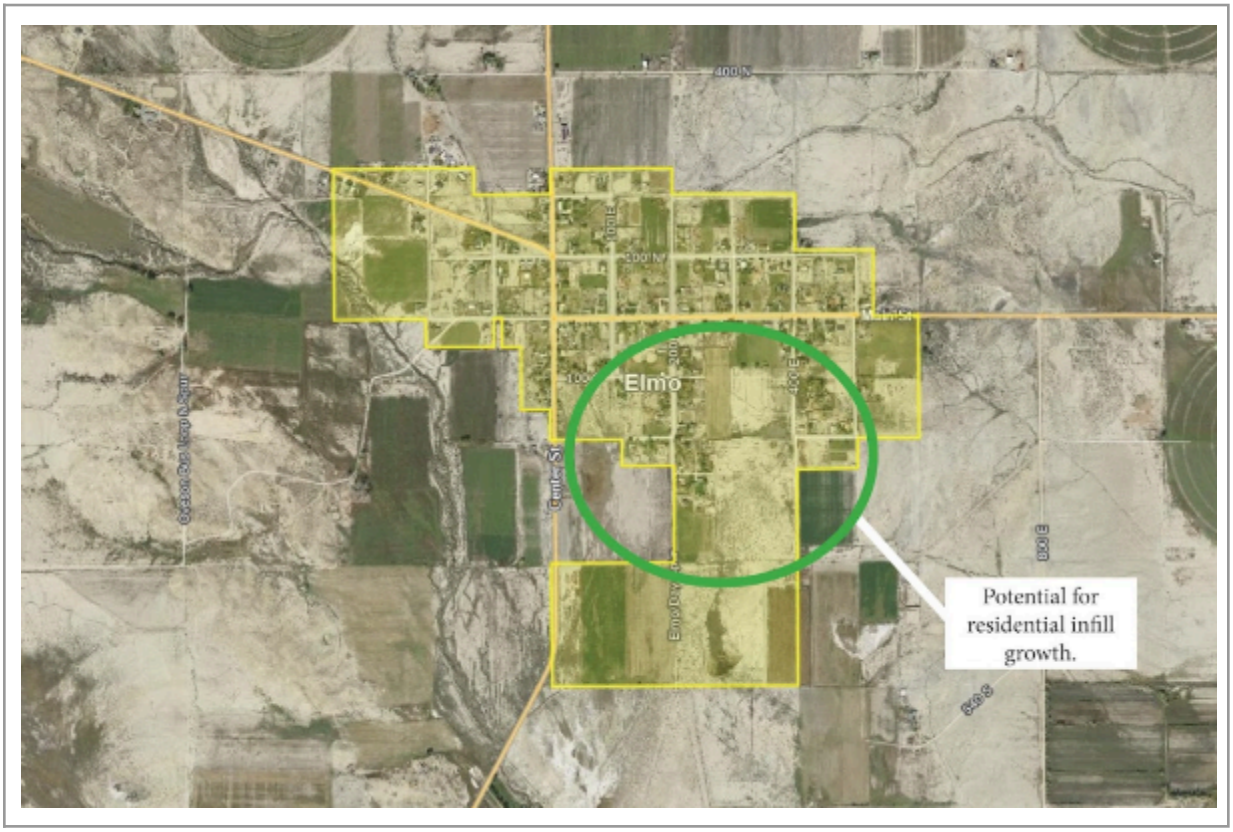
Elmo is not expecting future development that would increase the community's overall vulnerability. Areas of expected growth are illustrated below.

Since 2018, the following development changes have affected hazard vulnerability:

1. **Water System Upgrades**: Improvements to the town's water distribution system have DECREASED vulnerability to drought conditions by reducing system losses and improving delivery efficiency.
2. **Limited Residential Development**: The small number of new homes constructed since 2018 were built to current building codes outside of identified flood zones, maintaining the town's current vulnerability profile.
3. **Road and Drainage Improvements**: Targeted maintenance of roadside drainage systems has slightly DECREASED vulnerability to localized flooding during heavy rainfall events.
4. **Municipal Facilities**: Minor upgrades to town facilities have incorporated hazard-resistant features, slightly DECREASING vulnerability to various hazards, particularly seismic events.

These modest development changes reflect Elmo's limited growth while demonstrating awareness of natural hazard considerations in infrastructure maintenance and improvements.

Figure 7.5.8.1 Illustration of Potential Development Areas



7.5.9 Elmo Town Mitigation Strategy

7.5.9.1 Elmo Strategy Overview

Elmo Town employs a comprehensive approach to hazard mitigation that balances infrastructure improvements, planning mechanisms, and public education. The town focuses on enhancing resilience through water system improvements, building code enforcement, and intergovernmental coordination. With limited resources, Elmo prioritizes cost-effective solutions that address multiple hazards where possible, particularly focusing on drought resilience and severe weather preparedness as primary concerns. The town works closely with county agencies to leverage regional resources while implementing town-specific actions tailored to local vulnerabilities.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Elmo Town employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water system upgrades and storage improvements.
    - Stormwater drainage enhancements.
    - Utility infrastructure hardening.

- **Planning & Regulations**:
    - Updated subdivision ordinance focused on hazard reduction.
    - Building code enforcement in coordination with the County.
    - Emergency operations planning.
- **Natural Systems**:
    - Vegetation management to reduce wildfire risk.
    - Stream channel maintenance.
    - Erosion control measures.
- **Education/Awareness**:
    - Community emergency preparedness programs.
    - Water conservation education.
    - Hazard awareness campaigns.

Note: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible. The town prioritized actions with the greatest benefit relative to cost and implementation capacity.

7.5.9.2 Earthquake Mitigation Actions

1. **Planning and Zoning Departments adjust building codes**
    - Description: Ensure building codes are updated and enforced to address seismic considerations
    - Responsible Party: Elmo Town (Lead) in coordination with Emery County Building Department
    - Potential Funding Source: Local town budget
    - Estimated Cost: Staff time (minimal direct cost)
    - Timeframe: Completed (County now provides building inspection)
    - Priority Level: Medium
    - Justification: Unreinforced or inadequately designed structures are highly vulnerable to earthquake damage
    - Status: Completed through County coordination
2. **Adopt the International Building Code (IBC) and International Residential Code (IRC) into local land use code**
    - Description: Formally adopt current versions of building codes with seismic provisions into town regulations
    - Responsible Party: Elmo Town Council
    - Potential Funding Source: Town general fund
    - Estimated Cost: Staff time (minimal direct cost)

- Timeframe: 2026-2028
- Priority Level: Low
- Justification: Updated building codes ensure new construction meets current seismic standards
- Status: Planned

7.5.9.3 Flood Mitigation Actions

1. **Adopt policies to reduce stormwater runoff by updating the subdivision ordinance and development standards**
    - Description: Revise ordinances to include requirements for stormwater management in new developments
    - Responsible Party: Elmo Town Council (Lead) and Planning Commission
    - Potential Funding Source: State planning assistance grants
    - Estimated Cost: $14,000
    - Timeframe: 2024
    - Priority Level: High
    - Justification: Proper stormwater management reduces localized flooding during heavy precipitation events
    - Status: Underway
2. **Improve drainage infrastructure in flood-prone areas**
    - Description: Identify and upgrade inadequate culverts and drainage facilities in areas with recurring issues
    - Responsible Party: Elmo Town Public Works
    - Potential Funding Source: FEMA Flood Mitigation Assistance, CIB funding
    - Estimated Cost: $125,000
    - Timeframe: 2025-2027
    - Priority Level: Medium
    - Justification: Improved drainage infrastructure reduces property damage during flood events
    - Status: Planned

7.5.9.4 Drought Mitigation Actions

1. **Improve the irrigation canal system to increase efficiency of water usage**
    - Description: Work with irrigation companies to upgrade infrastructure and reduce water loss

- Responsible Party: Elmo Town in coordination with local irrigation companies
- Potential Funding Source: Bureau of Reclamation WaterSMART grants, CIB funding
- Estimated Cost: N/A (coordination role only)
- Timeframe: Ongoing
- Priority Level: High
- Justification: More efficient irrigation systems conserve water during drought conditions
- Status: Ongoing

2. **Install needed water storage tanks**
    - Description: Construct additional water storage capacity to ensure supply during drought periods
    - Responsible Party: Elmo Town Public Works
    - Potential Funding Source: Local funds, Utah Community Impact Board, USDA Rural Development Water and Environmental Programs
    - Estimated Cost: $3,000,000
    - Timeframe: 2024-2027
    - Priority Level: High
    - Justification: Additional storage provides water security during extended drought periods
    - Status: Funding dependent
3. **Develop and implement a water conservation education program**
    - Description: Create educational materials and outreach to promote residential water conservation
    - Responsible Party: Elmo Town administration
    - Potential Funding Source: Division of Water Resources, town budget
    - Estimated Cost: $5,000
    - Timeframe: 2024-2025
    - Priority Level: Medium
    - Justification: Public awareness and conservation efforts can significantly reduce water consumption
    - Status: Planned

7.5.9.5 Severe Weather Mitigation Actions

1. **Establish standards for all utilities regarding tree pruning around lines**
    - Description: Develop and enforce standards for vegetation management around power lines

- Responsible Party: Elmo Town administration (lead) in coordination with utility providers
- Potential Funding Source: Town general fund, utility company contributions
- Estimated Cost: Staff time (minimal direct cost)
- Timeframe: 2024-2026
- Priority Level: Low
- Justification: Proper vegetation management reduces power outages during wind and ice storms
- Status: Planned

2. **Install emergency generator at town hall for backup power**
    - Description: Purchase and install generator to maintain essential services during outages
    - Responsible Party: Elmo Town Public Works
    - Potential Funding Source: FEMA BRIC program, CIB funding
    - Estimated Cost: $35,000
    - Timeframe: 2025-2026
    - Priority Level: Medium
    - Justification: Backup power ensures continuity of government during severe weather events
    - Status: Planned

7.5.9.6 Multi-Hazard Mitigation Actions

1. **More accurately map problem areas to educate residents about unanticipated risks**
    - Description: Develop comprehensive hazard maps to identify and communicate risks to residents
    - Responsible Party: Elmo Town administration (Lead) in coordination with Emery County GIS
    - Potential Funding Source: FEMA, State Hazard Mitigation grants
    - Estimated Cost: $25,000
    - Timeframe: 2024-2028
    - Priority Level: Low
    - Justification: Accurate hazard mapping improves public awareness and guides development decisions
    - Status: Upcoming
2. **Develop comprehensive emergency operations plan**

- Description: Create town-specific emergency operations procedures coordinated with county plan
- Responsible Party: Elmo Town administration (Lead), Emery County Emergency Management
- Potential Funding Source: FEMA EMPG program
- Estimated Cost: $10,000
- Timeframe: 2024-2025
- Priority Level: Medium
- Justification: Clear emergency procedures improve response to all hazard events
- Status: Planned

7.5.9.7 Justification for Hazards Not Included

Elmo Town has been identified as being at risk for landslides, wildfire, problem soils, and dam failure according to Table 6.5.7; however, specific actions for these hazards are not included in the current mitigation strategy for the following reasons:

1. **Landslide**: Elmo Town's location on relatively flat terrain means landslide risk is primarily limited to areas outside town boundaries. The town coordinates with Emery County on landslide monitoring and awareness but does not require town-specific actions beyond those covered in multi-hazard mapping efforts.
2. **Wildfire**: While wildfire risk exists, Elmo Town's compact development pattern and distance from major wildland-urban interface areas results in relatively limited direct exposure. The town supports county-led wildfire mitigation efforts but does not require significant independent actions beyond standard fire prevention measures.
3. **Problem Soils**: Soil issues in Elmo Town are generally addressed through building code enforcement handled by Emery County. The multi-hazard mapping action will incorporate problem soil identification, which is considered sufficient given the limited extent of severe soil issues within town boundaries.
4. **Dam Failure**: Elmo Town is not in the direct inundation path of major dams based on current inundation mapping. The town has no critical facilities or significant residential areas within mapped dam inundation zones that would require specific mitigation actions beyond the multi-hazard mapping and planning efforts already identified in this plan.
5. **Infestation**: While Elmo Town is susceptible to various infestations (including invasive species like tamarisk along waterways and potential insect infestations), the town primarily depends on county-wide programs managed by the Emery County Weed and Mosquito Department for monitoring and control. Given the town's small size and limited resources, independent infestation mitigation actions are not currently prioritized. However, the town will participate in county-led initiatives and coordinate with regional agencies on early detection and response to emerging infestation threats.

In future plan updates, Elmo Town will evaluate whether changing conditions warrant specific actions for these hazards.

7.5.10 Information Integration

Past Integration (2018-2023): Elmo Town was a stakeholder of the previous plan. The town did not formally integrate the previous plan into other planning mechanisms during this period as no general plan or major planning document updates occurred.

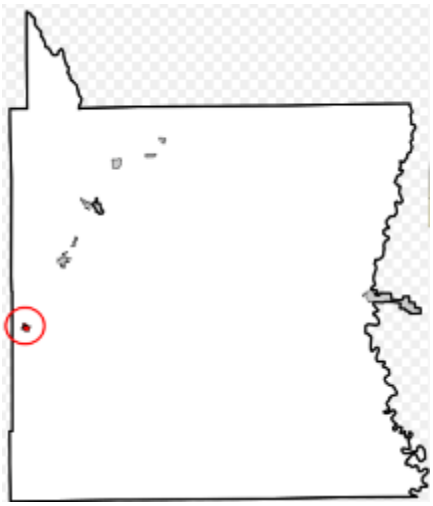
Current Integration: Elmo Town will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Infrastructure planning decisions
- Future general plan development

7.6 Emery Town

7.6.1 Background

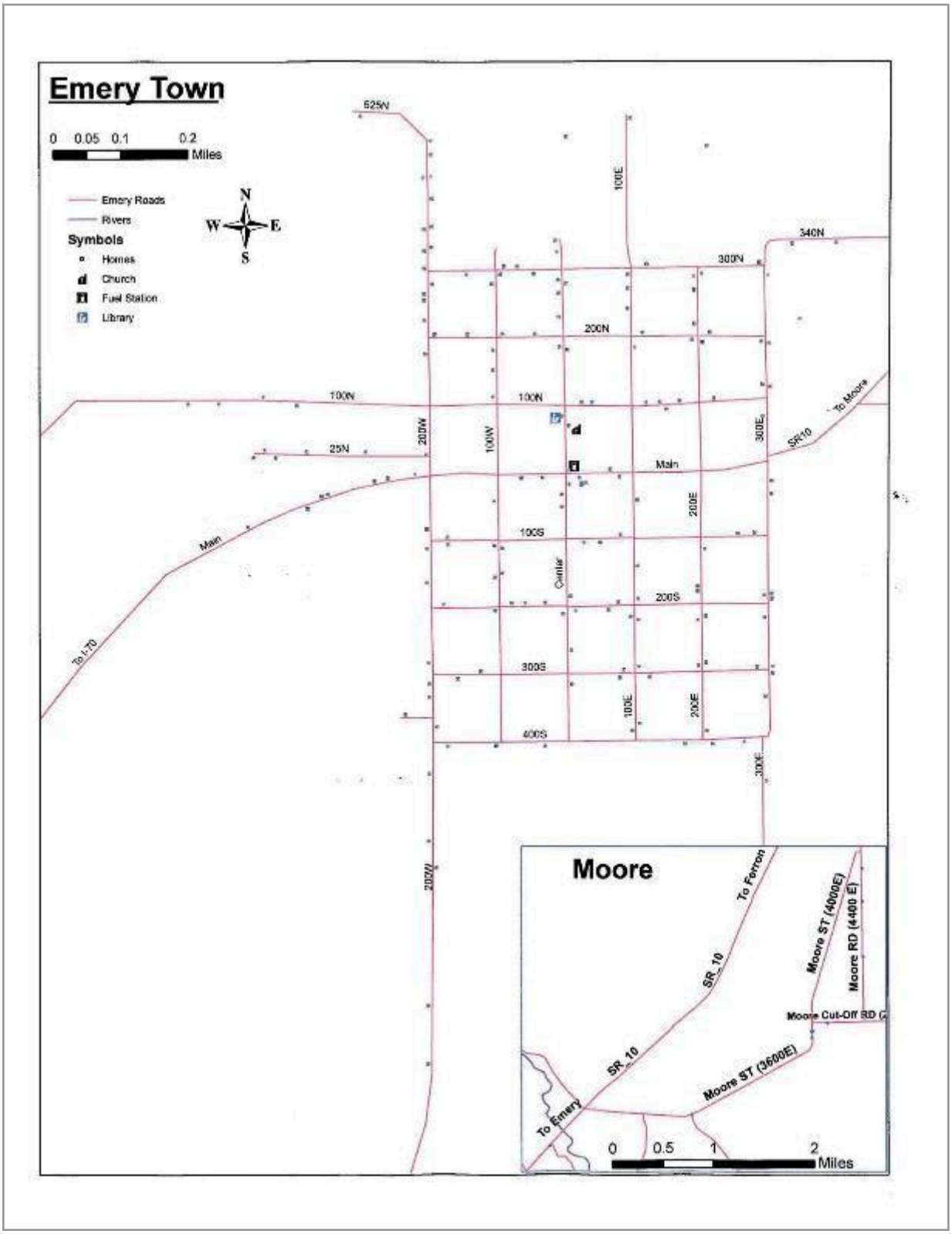
As of 2022, Emery Town had a small population of 307. The primary economy of Emery Town focused on industries such as agriculture and mining. Agriculture plays a significant role, with residents engaged in farming and ranching activities, including livestock production and crop cultivation. Mining, particularly coal and other mineral extraction, contributes to the local economy as well.



7.6.2 Location & Extent

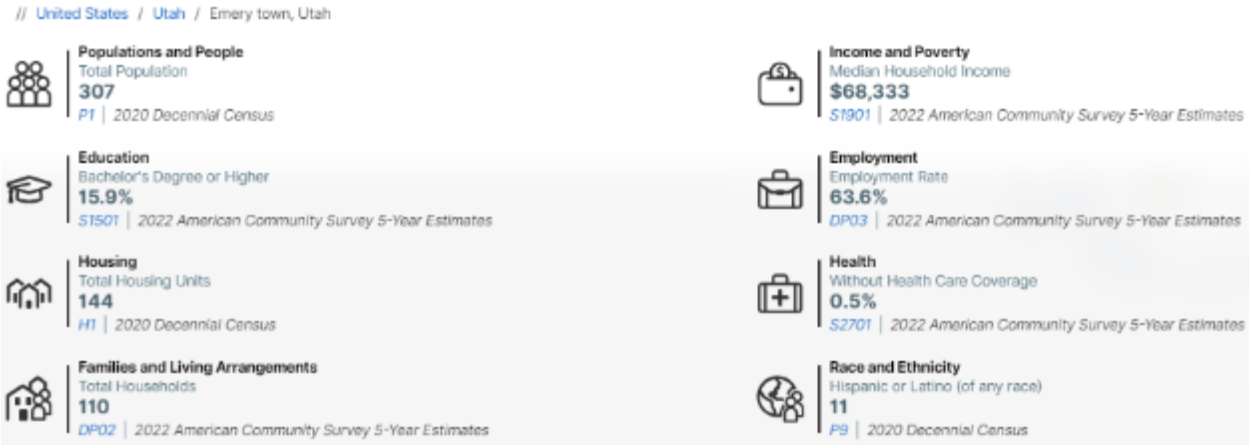
Emery is in western Emery County. Emery Town sits at the base of the mountains that contain the North Horn Formation. The elevation is around 7000 feet. The town has a total area of 1.2 square miles.

Figure 7.6.2.1 - Overview Map of Emery Town



7.6.3 Demographic & Population Growth

The 2020 Decennial Census shows 307 people, and 110 households residing in the town. The population density was 253.7 people per square mile. There were 144 housing units at an average density of 115.3 per square mile. The racial makeup of the town was 97.73% White, 0.97% Native American, and 1.30% from two or more races. Hispanic or Latino of any race were 0.35% of the population.



7.6.4 Vulnerable Populations

EMERY TOWN - POPULATIONS AT RISK (2021)	
Population under 5	1.60%
Population over 65	15.20%
Population Non-White (all other races)	9.60%
Population Hispanic	0.00%
Population without a High School Diploma	4.50%
Population that speak English "Not Well"	0.00%
Population in "Deep Poverty"	7.50%
Families Below Poverty	8.80%
Families that are Single Mother Households and Below Poverty	2.50%
Households Receiving Food Stamps (SNAP)	7.10%
Population that "Did Not Work"	28.60%
Rentals where Gross Rent Exceeds 30% of Household Income	25.00%
Housing that are Mobile Homes	0.90%
Households that are Single Female with Children under 18	1.80%
Households with No Car	2.70%
Population over 65 and Living Alone	11.60%
Population with Disabilities	21.10%
Population without Health Insurance	0.80%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.6.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **LANDSLIDE (L):** There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas. The foothill area west of city limits shows landslide depositions
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

7.6.6 Changes Since 2018 Plan

Emery Town has experienced several notable changes affecting hazard vulnerability:

1. Population and Demographics:
    - The population has decreased slightly since 2018.
    - Increasing percentage of elderly residents and residents with disabilities.
    - Slight increase in percentage of households below poverty level.
2. Infrastructure Changes:
    - Improvements to water delivery infrastructure affecting drought resilience.
    - Limited enhancements to stormwater management systems.
    - Upgrades to emergency notification systems.
3. Economic Shifts:
    - Continued reduction in traditional mining employment.
    - Limited commercial property development.
    - Changes in agricultural practices affecting drought resilience.
4. Environmental Changes:
    - Increased wildfire risk due to prolonged drought conditions.
    - Changes in localized flooding patterns due to altered precipitation trends.
    - Increased focus on landslide mitigation in foothill areas.

These changes directly influenced how this plan was revised for Emery Town. Specifically:

1. Drought mitigation actions were expanded and prioritized based on water supply challenges experienced during extended dry periods since 2018.
2. Landslide risk assessment was incorporated following identification of potential vulnerability zones in the foothill areas west of town limits.
3. Problem soil mitigation measures were included after infrastructure damage revealed soil stability issues in certain development areas.
4. Flood mitigation now focuses on specific infrastructure improvements identified through engineering assessments of drainage capacity limitations.
5. Wildfire mitigation has been prioritized due to increased risk in the wildland-urban interface areas surrounding the town and watershed protection concerns.

7.6.7 Development in Hazard Prone Areas - Emery Town

In the years since the previous hazard plan, most of the development in Emery Town was infill and redevelopment. This development hasn't significantly changed the community's overall vulnerability.

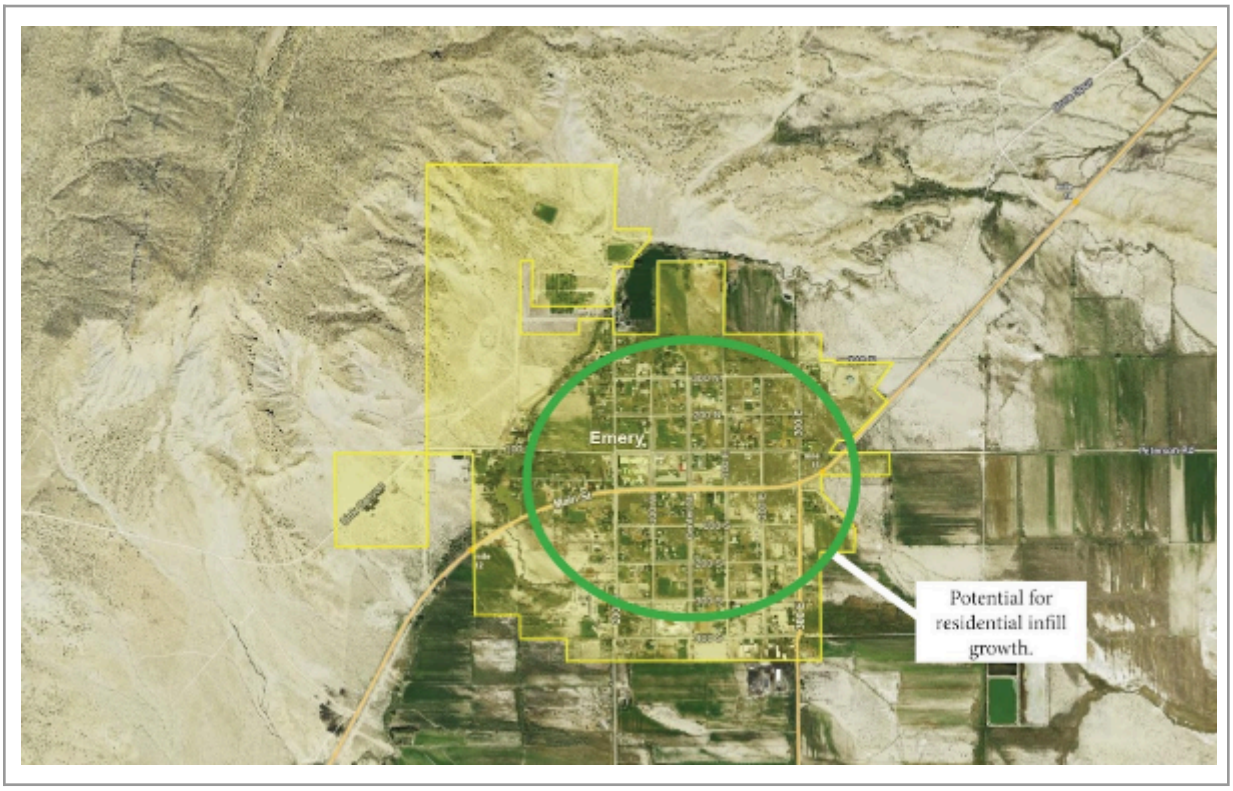
Emery isn't expecting future development that would increase the community's overall vulnerability. Areas of expected growth are illustrated below.

Since 2018, specific development activities affecting hazard vulnerability include:

1. **Water Storage Improvements**: Enhanced water storage facilities have DECREASED vulnerability to drought and fire suppression limitations by increasing available supply during dry periods.
2. **Residential Construction**: Limited new home construction has occurred primarily within established neighborhoods and built to current building codes, maintaining existing vulnerability levels without introducing new risks.
3. **Mud Creek Diversion Structure**: Repairs to this structure have DECREASED vulnerability to flooding from the creek by improving flow control during high water events.
4. **Roadway Drainage Improvements**: Enhanced drainage along key transportation routes has DECREASED vulnerability to road damage and accessibility issues during heavy precipitation.

These strategic infrastructure improvements, while modest in scale, have generally decreased Emery's vulnerability to primary hazards, particularly flooding and drought, through targeted investments in critical systems.

Figure 7.6.7.1 Illustration of Potential Development Areas



7.6.8 Status of 2018 Mitigation Actions

While the 2018 plan primarily took a countywide approach, Emery Town participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
Drought - Improve the irrigation canal systems (D2)	Participant	Ongoing	Ongoing coordination with local irrigation companies
Flooding - Repair and replace diversion structure Quitchupah Creek	Lead	Completed	Completed in 2020
Earthquake - Planning and Zoning Departments adjust building codes (E3)	Participant	Completed	County now provides building inspection

7.6.9 Emery Town Mitigation Strategy

7.6.9.1 Emery Town Strategy Overview

Emery Town employs a comprehensive mitigation approach focusing on both structural and non-structural measures to address its unique hazard profile. The town prioritizes infrastructure improvements, public

education, emergency preparedness, and natural resource protection. Given its location at the base of mountains containing the North Horn Formation and proximity to Muddy Creek, Emery Town faces challenges from flooding, drought, and earthquake hazards. The strategy balances immediate protective measures with long-term resilience planning, emphasizing actions that provide multiple benefits across hazard types while considering the town's limited financial and administrative resources.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Emery Town employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water system maintenance and upgrades.
    - Irrigation canal improvements and efficiency enhancements.
    - Diversion structure repairs and replacements.
- **Planning & Regulations**:
    - Building code enforcement in coordination with the County.
    - Subdivision ordinance updates focused on hazard reduction.
    - Emergency operations planning.
- **Natural Systems**:
    - Pond and reservoir maintenance.
    - Vegetation management for wildfire mitigation.
    - Stream channel stabilization.
- **Education/Awareness**:
    - Community emergency preparedness programs.
    - Water conservation education.
    - Landslide risk awareness campaigns.

Note: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible. The town prioritized actions with the greatest benefit relative to cost and implementation capacity.

7.6.9.2 Earthquake Mitigation Actions

1. **Planning and Building Code Enforcement**
    - **Description**: Continue coordination with County Building Inspectors to ensure that new construction meets current building code standards for seismic safety.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County Building Department
    - **Potential Funding Source**: Town general funds, County support
    - **Estimated Cost**: Staff time (minimal direct costs)
    - **Timeframe**: Ongoing

- **Priority Level**: Medium
- **Justification**: Emery Town's aging building stock creates significant vulnerability to seismic events, with many structures constructed before modern seismic standards. Proper code enforcement represents the most cost-effective approach to reducing earthquake risk for new development.
- **Status**: Completed (County now provides building inspection services)

2. **Public Education for Earthquake Preparedness**
    - **Description**: Implement comprehensive earthquake preparedness education including participation in the Great Utah ShakeOut, distribution of informational materials, and community workshops.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County Emergency Management
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Emery County Emergency Management
    - **Estimated Cost**: $2,500 annually
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Public awareness and preparedness can significantly reduce injuries and facilitate faster recovery after an earthquake. With 21.1% of residents having disabilities and 15.2% over age 65, targeted education is essential for vulnerable populations.
    - **Status**: Planned

7.6.9.3 Flood Mitigation Actions

1. **Repair and Replacement of Diversion Structure**
    - **Description**: Repair and replace diversion structure at Quitchupah Creek that was washed out by previous flood events.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County Engineering Department
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance, State CIB, Local funds
    - **Estimated Cost**: $300,000
    - **Timeframe**: 2020
    - **Priority Level**: High
    - **Justification**: The diversion structure is critical infrastructure for managing floodwaters from Quitchupah Creek that threatens residential areas. Its failure during previous floods demonstrated the need for more resilient design.
    - **Status**: Completed

2. **Adopt Policies to Reduce Stormwater Runoff**
    - **Description**: Update the subdivision ordinance and development standards to incorporate modern stormwater management requirements, including retention/detention facilities, permeable surfaces, and drainage standards.
    - **Responsible Party**: Emery Town Administration (Lead), Town Planning Commission
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Utah Department of Environmental Quality planning grants
    - **Estimated Cost**: $14,000
    - **Timeframe**: 2024
    - **Priority Level**: High
    - **Justification**: Updated development standards will ensure that new growth doesn't exacerbate existing flooding issues. With Emery's location at the base of mountains, proper stormwater management is essential for mitigating flash flooding risks.
    - **Status**: Underway

7.6.9.4 Landslide Mitigation Actions

1. **Critical Infrastructure Landslide Vulnerability Assessment**
    - **Description**: Complete an inventory of locations where critical facilities, other buildings, and infrastructure are vulnerable to landslides, particularly focusing on foothill areas west of town limits.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County GIS Department
    - **Potential Funding Source**: FEMA PDM Grant, Utah Geological Survey
    - **Estimated Cost**: $10,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: Low
    - **Justification**: The foothill area west of city limits shows landslide depositions that could impact infrastructure. A detailed inventory will guide future mitigation priorities and development decisions.
    - **Status**: Upcoming

7.6.9.5 Wildfire Mitigation Actions

1. **Wildland-Urban Interface Defensible Space Program**
    - **Description**: Establish a program to help property owners create defensible space around structures in wildland-urban interface areas, including education, technical assistance, and potential cost-sharing for vegetation management.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County Fire Department

- **Potential Funding Source**: Utah Division of Forestry, Fire and State Lands; FEMA grants
- **Estimated Cost**: $15,000 annually
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: With wildfire risk identified in the town's hazard profile and proximity to forested areas, defensible space is a proven strategy to reduce structure ignition. The program addresses both existing and future development.
- **Status**: Planned

7.6.9.6 Problem Soils Mitigation Actions

1. **Problem Soils Public Education Campaign**
    - **Description**: Develop and distribute educational materials on problem soil risks and appropriate construction techniques for Emery Town residents, particularly targeting new development.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County Building Department
    - **Potential Funding Source**: Town general funds, Utah Geological Survey
    - **Estimated Cost**: $3,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Low
    - **Justification**: Awareness of problem soil issues can lead to appropriate construction methods that reduce structural damage. Educational approach is cost-effective for addressing this moderate-risk hazard.
    - **Status**: Planned

7.6.9.7 Drought Mitigation Actions

1. **Maintenance of Water Storage Infrastructure**
    - **Description**: Conduct regular maintenance work on ponds and reservoir at Muddy Creek to ensure maximum storage capacity and system efficiency.
    - **Responsible Party**: Emery Town Public Works Department
    - **Potential Funding Source**: Utah Division of Water Resources, Town water utility funds
    - **Estimated Cost**: $100,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium

- **Justification**: Proper maintenance of water storage infrastructure is crucial for drought resilience, ensuring maximum available supply during dry periods. Historical drought patterns indicate this is an essential mitigation measure.
- **Status**: Ongoing

2. **Irrigation Canal System Improvements**
    - **Description**: Coordinate with irrigation companies to improve canal systems for increased water use efficiency through canal lining, automated gates, and water metering.
    - **Responsible Party**: Emery Town Administration (Lead), Local Irrigation Companies
    - **Potential Funding Source**: Utah Division of Water Resources, NRCS, CIB
    - **Estimated Cost**: $500,000 (town portion: $75,000)
    - **Timeframe**: 2024-2027
    - **Priority Level**: Medium
    - **Justification**: Agricultural water use represents the majority of water consumption. Improving irrigation efficiency provides significant drought resilience benefits for the entire community.
    - **Status**: Ongoing

7.6.9.8 Severe Weather Mitigation Actions

1. **Building Code Adoption and Enforcement**
    - **Description**: Adopt the International Building Code (IBC) and International Residential Code (IRC) into local land use code to ensure structures can withstand extreme weather events.
    - **Responsible Party**: Emery Town Administration (Lead), Town Council
    - **Potential Funding Source**: Town general funds
    - **Estimated Cost**: Staff time (minimal direct costs)
    - **Timeframe**: 2025
    - **Priority Level**: Low
    - **Justification**: Updated building codes ensure that new construction can withstand severe weather events including high winds, heavy snow loads, and heat / cold wave events. This mitigates property damage and potential injuries during severe weather.
    - **Status**: Planned
2. **Emergency Warning System Enhancement**
    - **Description**: Install and maintain an emergency notification system for severe weather events, including sirens and digital alerts.
    - **Responsible Party**: Emery Town Administration (Lead), Emery County Emergency Management

- **Potential Funding Source**: FEMA BRIC grant, FEMA Emergency Management Performance Grants, County Emergency Management
- **Estimated Cost**: $25,000
- **Timeframe**: 2025-2026
- **Priority Level**: Medium
- **Justification**: With 21.1% of residents having disabilities and 15.2% over age 65, ensuring timely warnings of severe weather events is crucial for protecting vulnerable populations.
- **Status**: Planned

7.6.9.9 Justification for Hazards Not Included

- **Dam Failure**: While dam failure is identified in Table 6.5.7 as a hazard for Emery County, specific mitigation actions for Emery Town are not included because the town is not located in the direct inundation zone of any high-hazard dams. The maintenance work on ponds and reservoir at Muddy Creek (listed under Drought mitigation) also provides some mitigation benefit for local dam safety.
- **Infestation**: Although infestation is identified as a county-wide hazard, Emery Town has determined this is a lower priority compared to other identified hazards. The town currently addresses infestation issues through county-wide programs coordinated by the Emery County Weed and Mosquito Department rather than town-specific mitigation actions.

7.6.10 Information Integration

Past Integration (2018-2023): Emery Town was a stakeholder of the previous plan. The town did not formally integrate the previous plan into other planning mechanisms during this period as no general plan or major planning document updates occurred.

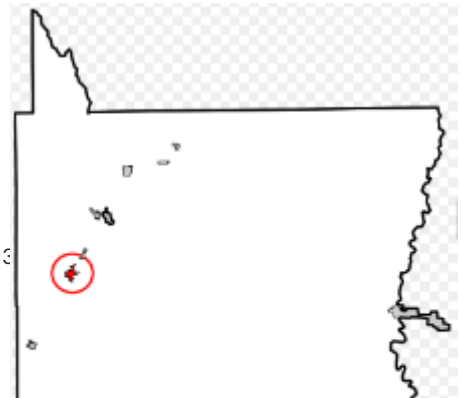
Current Integration: Emery Town will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Water system master planning
- Future land use planning decisions

7.7 Ferron City

7.7.1 Background

The economy of Ferron City (population 1,474) is more diverse than other communities in the region. Agriculture plays a significant role, with residents engaged in farming and ranching

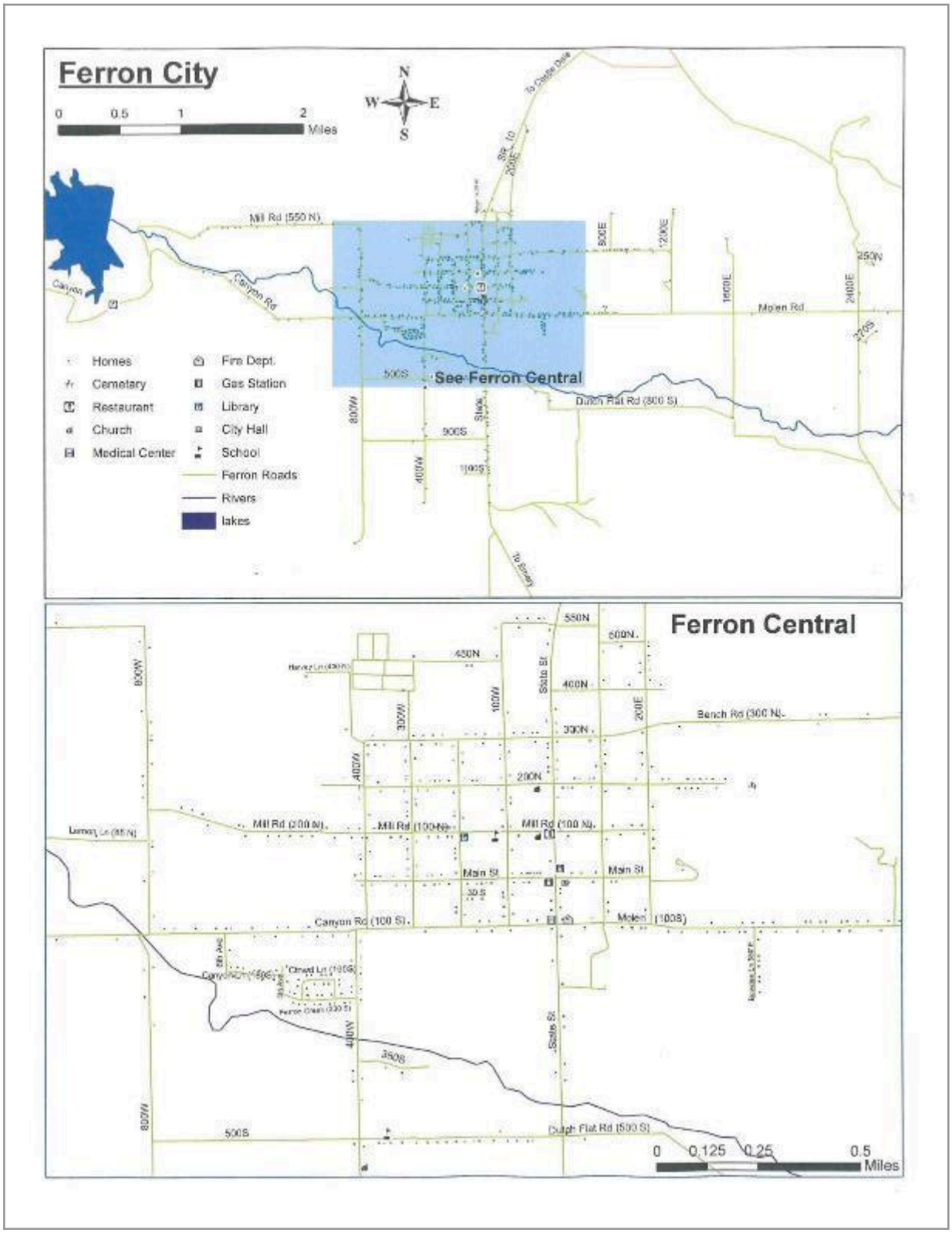


activities, including livestock production and crop cultivation. The area's natural resources, such as coal and minerals, also contribute to the local economy through mining activities.

7.7.2 Location & Extent

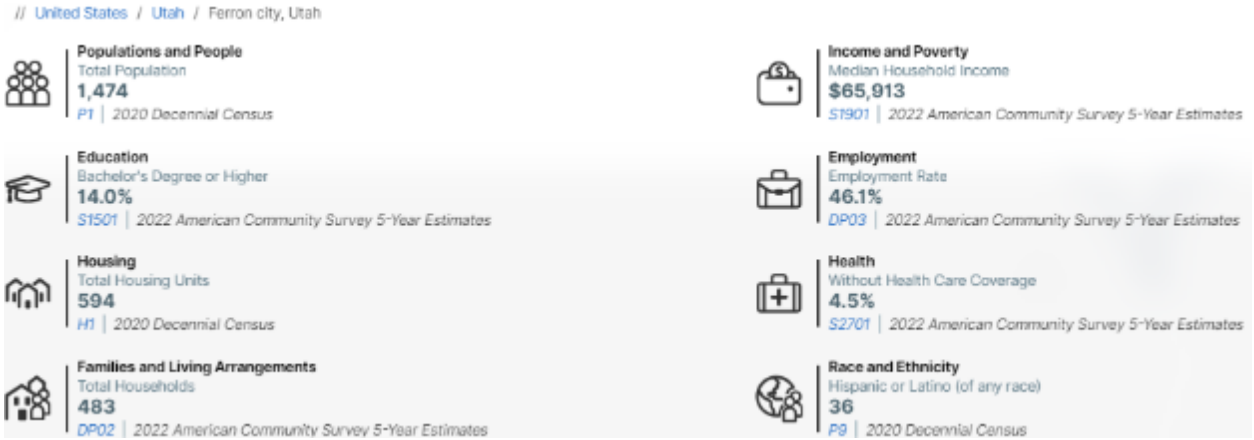
Ferron is in western Emery County, along Utah State Route 10, which leads northeast 11 miles to Castle Dale, the County seat, and southwest 14 miles to Emery. According to the United States Census Bureau, Ferron has a total area of 2.2 square miles.

Figure 7.7.2.1 - Overview Map of Ferron City



7.7.3 Demographic & Population Growth

As of 2020, there were 1,474 people, and 483 households, residing in the city. The population density was 728.8 people per square mile. There were 594 housing units at an average density of 262.7 per square mile. The racial makeup of the city was 97.78% White, 0.25% African American, 0.31% Native American, 0.31% Asian, 0.43% from other races, and 0.92% from two or more races. Hispanic or Latino of any race were 2.44% of the population.



7.7.4 Vulnerable Population

FERRON - POPULATIONS AT RISK (2021)	
Population under 5	4.90%
Population over 65	14.60%
Population Non-White (all other races)	0.20%
Population Hispanic	3.00%
Population without a High School Diploma	1.10%
Population that speak English "Not Well"	0.00%
Population in "Deep Poverty"	7.60%
Families Below Poverty	4.70%
Families that are Single Mother Households and Below Poverty	4.70%
Households Receiving Food Stamps (SNAP)	15.40%
Population that "Did Not Work"	33.30%
Rentals where Gross Rent Exceeds 30% of Household Income	35.00%
Housing that are Mobile Homes	2.90%
Households that are Single Female with Children under 18	10.30%
Households with No Car	10.50%
Population over 65 and Living Alone	10.90%
Population with Disabilities	13.00%
Population without Health Insurance	4.00%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.7.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **LANDSLIDE (L):** There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

7.7.7 Changes Since 2018 Plan

Ferron City has experienced several notable changes affecting hazard vulnerability:

1. **Population and Demographics**:
    - Population remained relatively stable with minor fluctuations
    - Slight increase in senior population
    - Gradual shift in household composition
2. **Land Use Changes**:
    - Limited new residential development in targeted growth areas
    - Enhancement of commercial corridors
    - Preservation of critical agricultural lands
3. **Infrastructure and Services**:
    - Completion of water system improvements affecting drought resilience
    - Stormwater management system upgrades
    - Communications system enhancements
4. **Policy Updates**:
    - Adoption of updated building codes
    - Revised floodplain management procedures

These changes directly influenced how this plan was revised for Ferron City. Specifically:

1. Flood control infrastructure improvements were prioritized based on specific vulnerability points identified during recent heavy precipitation events.
2. Water storage capacity enhancement received higher priority due to supply vulnerabilities revealed during prolonged drought conditions.
3. Seismic assessment and retrofit actions were incorporated after building evaluations identified structural vulnerabilities in key public facilities.
4. Stormwater management policies were updated to address drainage issues in new development areas identified since the previous plan.
5. Wildfire mitigation measures were expanded due to increased risk in the wildland-urban interface areas affecting the city's water supply and residential zones.

7.7.6 Development in Hazard Prone Areas - Ferron City

In the years since the previous hazard plan, most of the development in Ferron City was infill and redevelopment. This development has not significantly changed the community's overall vulnerability.

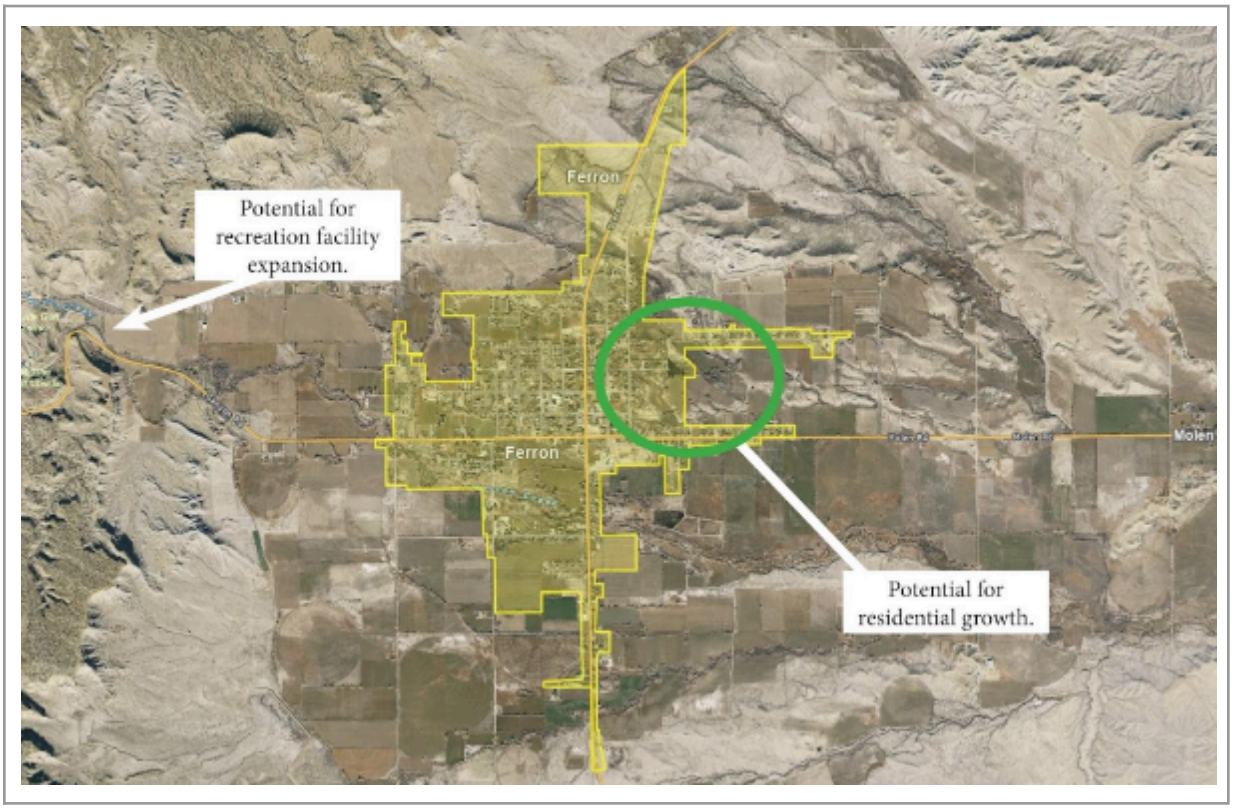
Since 2018, development changes affecting hazard vulnerability include:

1. **Stormwater Infrastructure**: Completion of drainage improvements along Main Street and in the southeastern neighborhood have DECREASED vulnerability to localized flooding by improving stormwater conveyance.
2. **Water System Upgrades**: Improvements to the municipal water system have DECREASED vulnerability to drought conditions through reduced system losses and enhanced storage capacity.
3. **Public Facility Renovations**: Upgrades to municipal buildings have incorporated seismic considerations, slightly DECREASING vulnerability to earthquake hazards for critical government functions.
4. **Residential Development**: New housing construction has been limited to areas outside mapped flood hazard zones and built to current building codes, maintaining existing vulnerability levels without creating new exposure.

These development changes reflect Ferron's commitment to maintaining or reducing hazard vulnerability through strategic infrastructure investments and appropriate development standards, despite limited growth overall.

Ferron is not expecting future development that would increase the community's overall vulnerability. Areas of expected growth are illustrated below.

Figure 7.7.6.1 - Illustration of Potential Development Areas



7.7.8 Status of 2018 Mitigation Actions

2018 Action	Role	Current Status	Explanation
D2: Improve irrigation canal systems	Participant	Ongoing	Ongoing coordination with local irrigation companies
F2: Technical analysis on irrigation canals	Participant	Ongoing	Regular assessment to reduce flood threat from canal failures
F8: Improve Molen Lane	Lead	Modified	Clean-out project partially completed, rip-rap work pending
F9: Improve Muddy Lane	Lead	Modified	Maintenance ongoing, culvert repairs pending
F10: Improve Millsite Road	Lead	Deferred	Waiting for funding
E3: Planning and Zoning Departments adjust building codes	Participant	Completed	County now provides building inspection

7.7.9 Ferron City Mitigation Strategies

7.7.9.1 Ferron Strategy Overview

Ferron City employs a comprehensive approach to hazard mitigation focused on protecting both existing and future development from natural hazards. The city's strategy balances infrastructure improvements, regulatory measures, natural systems protection, and public education to create multiple layers of protection. The strategy prioritizes water system resilience, flood control infrastructure, and seismic safety while also addressing emerging concerns related to wildfire and severe weather. Implementation relies on partnerships with county, state, and federal agencies to maximize resources and technical expertise. The city has carefully assessed its specific vulnerabilities and developed targeted actions that address the unique risk profile of its geographic location at the intersection of mountain and valley environments.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Ferron City employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water storage capacity enhancements
    - Flood control structures and improvements
    - Road and culvert upgrades in vulnerable areas
    - Canal reinforcement and maintenance
- **Planning & Regulations**:
    - Updated building codes and zoning
    - Drought management protocols
    - Floodplain management procedures
    - Emergency response coordination
- **Natural Systems**:
    - Stream channel maintenance
    - Watershed protection measures
    - Erosion control implementation
    - Vegetation management
- **Education/Awareness**:
    - Public drought awareness programs
    - Flood insurance promotion
    - Extreme weather preparedness
    - Emergency notification procedures

Note: Prior to selecting the mitigation actions presented in this section, the jurisdiction considered a comprehensive range of potential mitigation actions. The actions selected above represent those deemed most appropriate, feasible, and effective for the jurisdiction based on their risk assessment, capabilities, and priorities.

I'll revise the mitigation strategies to focus on hazards specifically identified for Ferron City based on section 7.7.5, while providing justification aligned with the city's profile.

7.7.9.2 Earthquake Mitigation Actions

1. **Seismic retrofit assessment and implementation for critical public facilities**
    - **Description:** Conduct seismic vulnerability assessments of critical public facilities and implement retrofitting measures for buildings identified as high-risk priorities.
    - **Responsible Party:** Ferron City Public Works Department (Lead); County Building Department
    - **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC) Program; Utah Community Impact Board; Local funds
    - **Estimated Cost:** $250,000 for assessment and initial retrofits
    - **Timeframe:** 2025-2027
    - **Priority Level:** Medium
    - **Justification:** Ferron contains buildings constructed before modern seismic codes were implemented, creating vulnerability to ground shaking. Critical facilities must remain operational during disaster response.
    - **Status:** Planned
2. **Building code implementation and enforcement**
    - **Description:** Continue to implement and enforce current building codes with seismic provisions through coordination with County building inspection services.
    - **Responsible Party:** Ferron City Planning Department (Lead); County Building Department
    - **Potential Funding Source:** Local funds; permit fees
    - **Estimated Cost:** Staff time
    - **Timeframe:** Ongoing
    - **Priority Level:** Medium
    - **Justification:** Ensuring compliance with seismic standards in new construction and substantial renovations is the most cost-effective way to reduce earthquake vulnerability over time.
    - **Status:** Ongoing

7.7.9.3 Flood Mitigation Actions

1. **Technical analysis of irrigation canals**
    - **Description:** Conduct engineering analysis to reduce the threat of floods from canal failures through identification of vulnerable segments and implementation of reinforcement strategies.
    - **Responsible Party:** Ferron City Public Works Department (Lead); Irrigation Companies
    - **Potential Funding Source:** FEMA Flood Mitigation Assistance; State Division of Water Resources

- **Estimated Cost:** $750,000
- **Timeframe:** 2024-2028
- **Priority Level:** Medium
- **Justification:** Canal failures have historically caused significant flooding in Ferron, with infrastructure vulnerabilities concentrated in older canal sections.
- **Status:** Ongoing

2. **Molen Lane improvements**
    - **Description:** Complete channel clearance and rip-rap restoration to prevent erosion and flooding of adjacent properties during high water events.
    - **Responsible Party:** Ferron City Public Works Department
    - **Potential Funding Source:** FEMA BRIC; CDBG; State CIB
    - **Estimated Cost:** $600,000
    - **Timeframe:** 2024-2026
    - **Priority Level:** Medium
    - **Justification:** This area has experienced recurring flood damage during heavy precipitation events, requiring improved drainage infrastructure.
    - **Status:** Partially completed (channel clearance finished, rip-rap work pending)
3. **Muddy Lane improvements**
    - **Description:** Complete channel clearance and culvert repairs to improve drainage and reduce flood risk.
    - **Responsible Party:** Ferron City Public Works Department
    - **Potential Funding Source:** State CIB; County Road Department
    - **Estimated Cost:** $250,000
    - **Timeframe:** 2024-2026
    - **Priority Level:** Medium
    - **Justification:** Undersized and obstructed culverts have created localized flooding during heavy rainfall events, threatening adjacent properties.
    - **Status:** Partially completed (maintenance ongoing, culvert repairs pending)
4. **Millsite Road culvert upsizing**
    - **Description:** Replace undersized culverts at three locations to accommodate increased water volumes during heavy precipitation events.
    - **Responsible Party:** Ferron City Public Works Department (Lead); County Road Department
    - **Potential Funding Source:** FEMA BRIC; State CIB

- **Estimated Cost:** $1,500,000
- **Timeframe:** 2025-2027
- **Priority Level:** Medium
- **Justification:** Existing culverts are inadequate during peak flows, causing road overtopping and erosion that threatens critical access routes.
- **Status:** Waiting for funding

5. **Stormwater management policy update**
    - **Description:** Adopt policies to reduce stormwater runoff by updating the subdivision ordinance and development standards to require on-site retention and green infrastructure.
    - **Responsible Party:** Ferron City Planning Department
    - **Potential Funding Source:** State planning assistance grants
    - **Estimated Cost:** $14,000
    - **Timeframe:** 2024
    - **Priority Level:** High
    - **Justification:** New development contributes to increased runoff and flood risk; updated standards will ensure future growth incorporates appropriate stormwater management.
    - **Status:** Underway

7.7.9.4 Landslide Mitigation Actions

1. **Slope stability assessment and inventory**
    - **Description:** Complete an inventory of locations where critical facilities, other buildings, and infrastructure are vulnerable to landslides, with particular focus on canyon mouth areas.
    - **Responsible Party:** Ferron City Planning Department (Lead); County GIS Department
    - **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC) Program; Utah Geological Survey
    - **Estimated Cost:** $20,000
    - **Timeframe:** 2024-2028
    - **Priority Level:** Medium
    - **Justification:** Ferron's location near canyon areas creates landslide vulnerability that requires systematic assessment to prioritize mitigation efforts.
    - **Status:** Upcoming
2. **Setback requirements update**

- **Description:** Update setback requirements for roads and development near slopes of marginal stability to reduce exposure to landslide hazards.
- **Responsible Party:** Ferron City Planning Department
- **Potential Funding Source:** Local funds
- **Estimated Cost:** Staff time
- **Timeframe:** 2025-2027
- **Priority Level:** Low
- **Justification:** Appropriate setbacks from unstable slopes represent a low-cost regulatory approach to reduce future landslide vulnerability.
- **Status:** Upcoming

7.7.9.5 Drought Mitigation Actions

1. **Water storage capacity enhancement**
    - **Description:** Install a second water storage tank to increase system capacity and resilience during drought conditions.
    - **Responsible Party:** Ferron City Public Works Department
    - **Potential Funding Source:** Utah Division of Drinking Water; CIB; USDA Rural Development
    - **Estimated Cost:** $3,000,000
    - **Timeframe:** 2024-2026
    - **Priority Level:** High
    - **Justification:** Existing water storage is insufficient to meet demand during extended drought periods; additional capacity will enhance system resilience.
    - **Status:** In progress
2. **Irrigation canal system improvement**
    - **Description:** Coordinate with irrigation companies to improve canal efficiency and reduce water loss through seepage and evaporation.
    - **Responsible Party:** Ferron City Public Works Department (Lead); Irrigation Companies
    - **Potential Funding Source:** Utah Division of Water Resources; USDA Natural Resources Conservation Service Environmental Quality Incentives Program (EQIP)
    - **Estimated Cost:** $500,000
    - **Timeframe:** 2024-2028
    - **Priority Level:** Medium
    - **Justification:** Irrigation canals experience significant water loss that could be mitigated through system improvements, conserving water during drought periods.

- **Status:** Ongoing coordination with local irrigation companies

3. **Drought contingency ordinance development**
    - **Description:** Develop an ordinance to restrict non-essential water usage during drought emergencies through a staged approach based on drought severity.
    - **Responsible Party:** Ferron City Administration (Lead); Planning Department
    - **Potential Funding Source:** Local funds
    - **Estimated Cost:** Staff time
    - **Timeframe:** 2024-2028
    - **Priority Level:** Medium
    - **Justification:** Clear regulatory authority for water conservation measures is essential for effective drought response and preservation of water supplies for critical needs.
    - **Status:** Planned

7.7.9.6 Dam Failure Mitigation Actions

1. **Land Use Planning in Millsite Dam Inundation Zone**
    - **Description:** Adopt overlay zoning regulations for properties located within the Millsite Reservoir (high hazard potential dam) inundation area. Regulations will require elevated construction for new habitable structures, flood-resistant building materials and methods, restrictions on new critical facilities and infrastructure in high-risk areas, and setback requirements from primary inundation flow paths. These permanent land use controls reduce long-term vulnerability to dam failure by limiting exposure of people and property to inundation hazards.
    - **Responsible Party**: Ferron City Planning Department (Lead), City Council
    - **Potential Funding Source**: FEMA High Hazard Potential Dam (HHPD) Grant Program, State planning assistance grants, local funds
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Ferron is located three miles downstream from Millsite Reservoir, a high hazard potential dam with a maximum breach flow of 258,000 cfs. The 2022 dam rehabilitation project significantly improved dam safety, but land use planning provides an additional layer of long-term protection by reducing development exposure in inundation zones. This action specifically addresses the high hazard potential dam and is eligible for FEMA HHPD grant funding.
    - **Status**: Planned

7.7.9.7 Severe Weather Mitigation Actions

1. **Heat / Cold Wave education program**
    - **Description:** Develop educational materials regarding the dangers of extreme heat and cold and protective measures residents can take during temperature extremes.
    - **Responsible Party:** Ferron City Administration (Lead); County Health Department
    - **Potential Funding Source:** Utah Department of Health Emergency Preparedness grants; Local funds
    - **Estimated Cost:** $10,000
    - **Timeframe:** 2024-2028
    - **Priority Level:** Low
    - **Justification:** Public awareness of temperature-related health risks is particularly important for vulnerable populations, including elderly residents and those with health conditions.
    - **Status:** Waiting for funding support
2. **Critical facility backup power assessment**
    - **Description:** Conduct assessment of backup power needs for critical facilities and implement recommendations for generator installation or enhancement.
    - **Responsible Party:** Ferron City Public Works Department (Lead); Emergency Management
    - **Potential Funding Source:** FEMA Emergency Management Performance Grants, County Emergency Management
    - **Estimated Cost:** $75,000
    - **Timeframe:** 2024-2026
    - **Priority Level:** Medium
    - **Justification:** Power outages during severe weather events can disrupt essential services; backup power ensures continuity of operations for critical facilities.
    - **Status:** Planned
3. **Storm drainage system maintenance program**
    - **Description:** Implement a systematic maintenance program for the city's storm drainage system to ensure maximum capacity during severe precipitation events.
    - **Responsible Party:** Ferron City Public Works Department
    - **Potential Funding Source:** Local funds; stormwater utility fees
    - **Estimated Cost:** $25,000 annually
    - **Timeframe:** 2024-2028
    - **Priority Level:** Medium

- **Justification:** Regular maintenance of storm drainage systems is essential to prevent blockages that can exacerbate flooding during heavy rainfall events.
- **Status:** Planned

7.7.9.8 Multi-Hazard Mitigation Actions

1. **Emergency operations plan update**
    - **Description:** Update the city's emergency operations plan to address all identified hazards with specific response protocols and coordination procedures.
    - **Responsible Party:** Ferron City Administration (Lead); Emergency Management
    - **Potential Funding Source:** FEMA Emergency Management Performance Grants, County Emergency Management; Local funds
    - **Estimated Cost:** $20,000
    - **Timeframe:** 2024-2025
    - **Priority Level:** High
    - **Justification:** A comprehensive emergency operations plan is essential for coordinated response to all hazard events, ensuring efficient use of resources and clear communication.
    - **Status:** Planned
2. **Critical facility risk assessment**
    - **Description:** Conduct a comprehensive risk assessment of all critical facilities to identify specific vulnerabilities and prioritize mitigation measures.
    - **Responsible Party:** Ferron City Administration (Lead); Public Works Department
    - **Potential Funding Source:** FEMA BRIC; FEMA Emergency Management Performance Grants, County Emergency Management
    - **Estimated Cost:** $35,000
    - **Timeframe:** 2025-2026
    - **Priority Level:** Medium
    - **Justification:** Critical facilities must remain operational during and after disaster events; systematic assessment will identify priorities for protective measures.
    - **Status:** Planned

7.7.9.9 Justification for Additional Hazard Considerations

While not explicitly identified as primary hazards for Ferron City in section 7.7.5, the following hazards warrant consideration based on the city's geographic context and community profile:

Dam Failure: Ferron's location downstream from Millsite Reservoir creates inherent vulnerability to dam failure. Though the reservoir has undergone recent safety improvements (as noted in section 6.11),

emergency response planning remains prudent. This consideration is incorporated into the multi-hazard actions rather than as separate mitigation measures.

Wildfire: Ferron's proximity to undeveloped foothill areas creates potential wildfire risk, particularly during drought conditions. While not identified as a primary hazard, defensive measures would be prudent given the increasing wildfire trends in the region. This consideration is addressed through multi-hazard planning rather than specific wildfire actions.

Problem Soils: Though not identified as a primary hazard for Ferron specifically, the regional geology suggests potential for expansive soils that could affect infrastructure. This consideration is addressed through building code enforcement rather than separate mitigation actions.

Infestation: While infestation is identified as a potential hazard affecting Emery County, Ferron City has not developed city-specific infestation mitigation actions because the city participates in and relies upon county-wide programs administered by the Emery County Weed and Mosquito Department. These existing county services provide comprehensive pest and weed control coverage that is more efficient and cost-effective than developing separate municipal programs. The city will continue to coordinate with county programs rather than establishing independent infestation mitigation actions.

7.7.10 Information Integration

Past Integration (2018-2023): Ferron City was a stakeholder of the previous plan, but the city hasn't updated its general plan since 2007. The city did not formally integrate the previous plan into other planning mechanisms during this period.

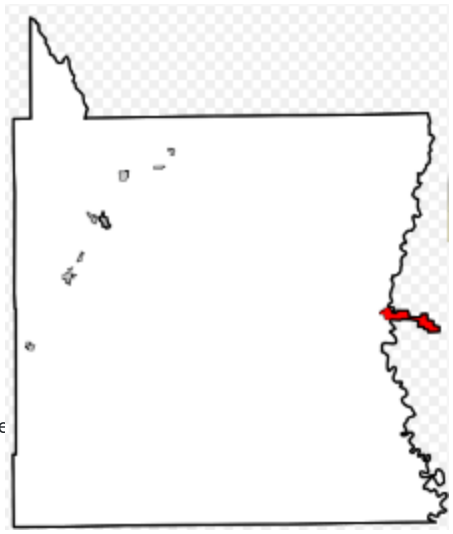
Current Integration: Ferron City will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Future general plan update
- Infrastructure planning decisions for water, flood control, and transportation systems

7.8 Green River City

7.8.1 Background

Green River's seasonal climate temperatures are moderate, with some spikes in summer and winter seasons. The population of Green River City is 847 according to the 2020 Decennial Census.



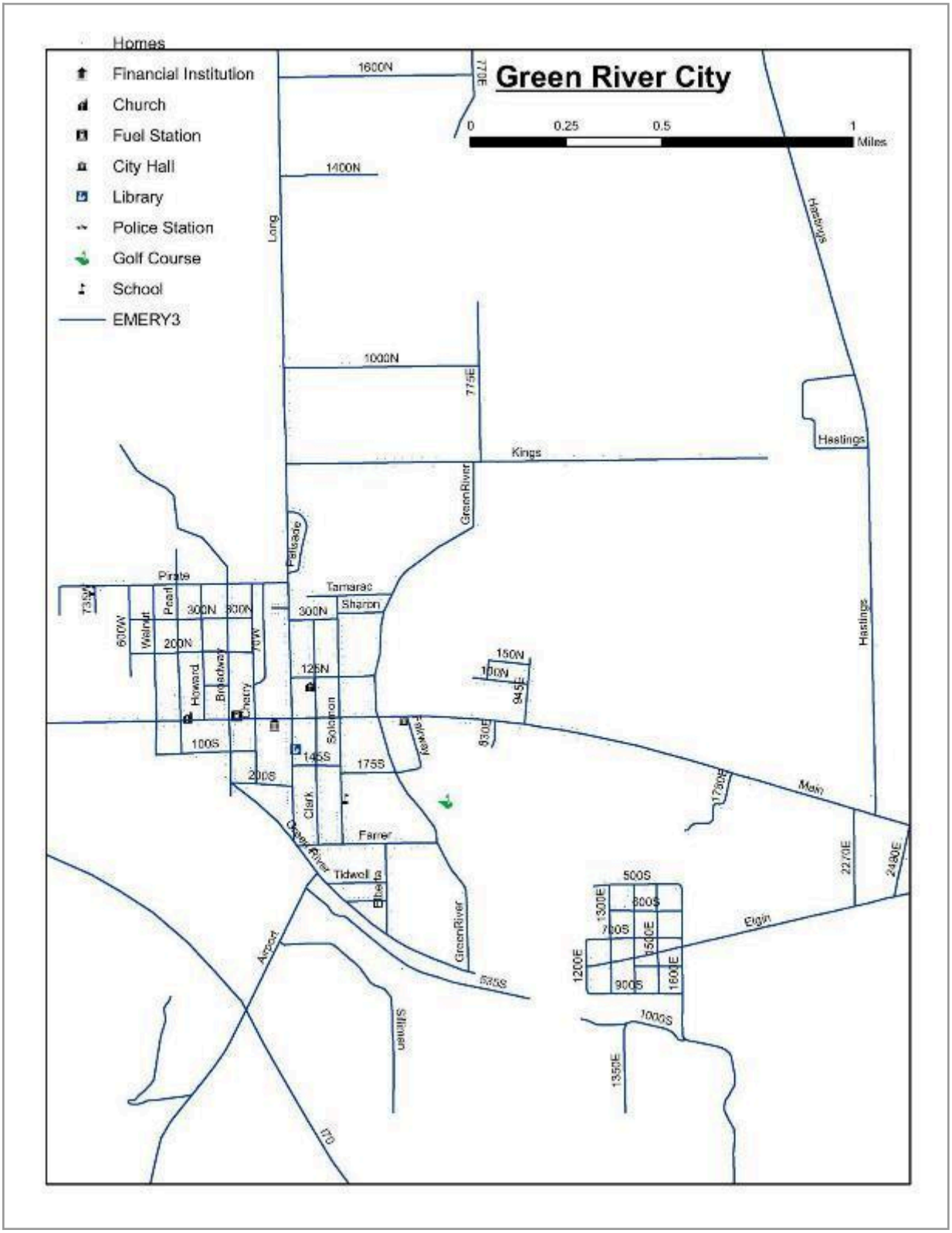
Green River's Main Street businesses are generally travel-oriented, such as motels, restaurants, and gas/convenience stores. The outlying area is typically farming and ranching. Recreation is centered on river rafting and off-highway vehicle trails. Previous planning sessions have

indicated a strong desire of the community to retain and enhance the rural atmosphere of the Green River Valley.

7.8.2 Location & Extent

Green River is located on the banks of the Green River, after which the City is named. The San Rafael Swell region is to the west of Green River, while Canyonlands and Arches National Parks lie to the south. Today located exclusively in Emery County, it was split between Emery and Grand Counties until 2003, when Emery County's boundaries were expanded. According to the U.S. Census Bureau, the city has a total area of 12.6 square miles.

Figure 7.8.2.1 Overview Map of Green River City



7.8.3 Demographic & Population Growth

As of 2020, there were 847 people and 312 households residing in the city. The population density was 34.45 people per square mile. There were 397 housing units at an average density of 14.5 per square miles. The racial makeup of the city was 70.2% White, 0% African American, 0.2% Native American, 0.5% Asian, 0% Pacific Islander, 11.6% from other races, and 17.2% from two or more races. Hispanic or Latino of any race were 33% of the population.

7.8.4 Vulnerable Populations

Below is a list of general information about the population of Green River City, these statistics have helped officials in the city, in conjunction with the Core Planning Team, develop mitigation strategies that would focus efforts on historically underserved and vulnerable populations (data from the 2020 US Census).

- 40.4% residents are single, 59.6% are married.
- 90.3% of the population graduated high school or have a GED. 10.7% have college degrees.
- The races making up the largest parts of the population are: White, 79.2%, Hispanic, 21.4%, and two or more races, 0.7%.
- Residents are 50.9% male and 49.1% female.
- 96.8% were born U.S. citizens, while 3.2% were born outside of the country.
- Average household size is 2.86.

GREEN RIVER - POPULATIONS AT RISK (2021)	
Population under 5	7.40%
Population over 65	14.60%
Population Non-White (all other races)	3.00%
Population Hispanic	33.00%
Population without a High School Diploma	22.10%

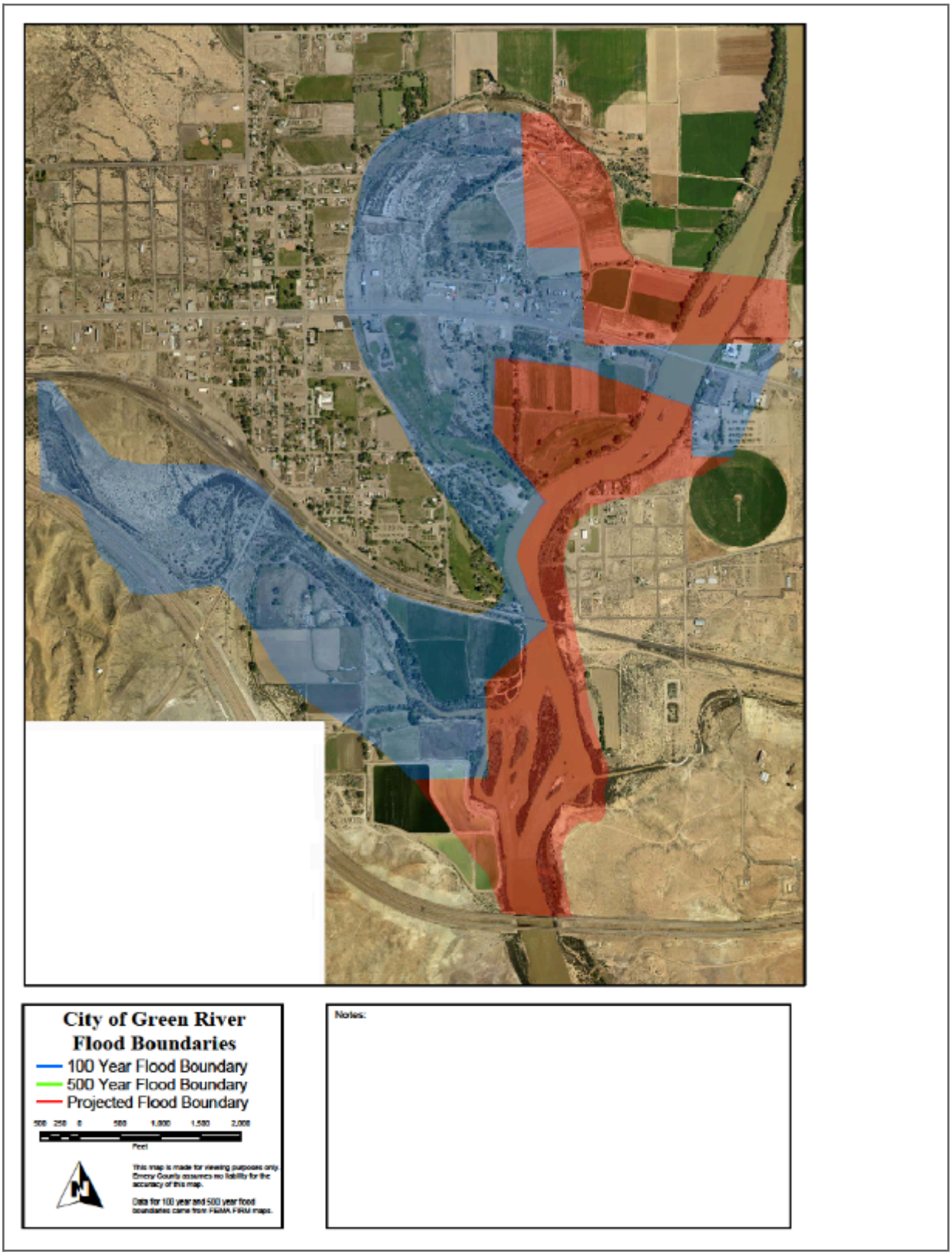
Population that speak English "Not Well"	8.10%
Population in "Deep Poverty"	4.90%
Families Below Poverty	14.40%
Families that are Single Mother Households and Below Poverty	6.00%
Households Receiving Food Stamps (SNAP)	9.20%
Population that "Did Not Work"	25.60%
Rentals where Gross Rent Exceeds 30% of Household Income	27.80%
Housing that are Mobile Homes	32.80%
Households that are Single Female with Children under 18	9.60%
Households with No Car	0.00%
Population over 65 and Living Alone	14.00%
Population with Disabilities	16.50%
Population without Health Insurance	22.00%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.8.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Green River is located in an area with historical earthquakes. A significant earthquake event could disrupt local and interstate transportation in particular. Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work can be done to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

Figure 7.8.5.1 - Map of Flood Boundaries - Green River



7.8.6 Changes Since 2018 Plan

Green River City has experienced several notable changes affecting hazard vulnerability:

1. **Population and Demographics**:
    - Modest decline in permanent resident population.
    - Increase in seasonal tourism-related population fluctuations.
    - Shift in demographic profile with growing Hispanic population.
2. **Land Use Changes**:
    - Limited new development focused in existing commercial corridors.
    - Gradual transition of some agricultural lands to tourism support uses.
    - Enhanced riverfront management and access.
3. **Infrastructure and Services**:
    - Water treatment system upgrades underway.
    - Transportation access improvements along main corridors.
    - Communications network enhancements.
4. **Policy Updates**:
    - Flood hazard management protocols strengthened.
    - Updated building codes implementation.
    - Enhanced emergency response coordination with interstate stakeholders.

These changes directly influenced how this plan was revised for Green River City. Specifically:

1. Water treatment plant upgrades received the highest priority based on critical infrastructure vulnerability assessments and drought-related water quality challenges.
2. Flood protection infrastructure improvements were targeted to specific locations identified through engineering assessments of the aging dike system.
3. Emergency notification systems were enhanced based on communication challenges experienced during recent river flooding events.
4. Tourism-oriented emergency information was incorporated into the education strategies to address the city's unique visitor population vulnerability.
5. Interstate transportation emergency coordination was prioritized due to the city's critical location along major transportation corridors and experiences during recent severe weather events.

7.8.7 Development in Hazard Prone Areas - Green River City

In the years since the previous hazard plan, most of the development in Green River City was infill and redevelopment. This development has not significantly changed the community's overall vulnerability.

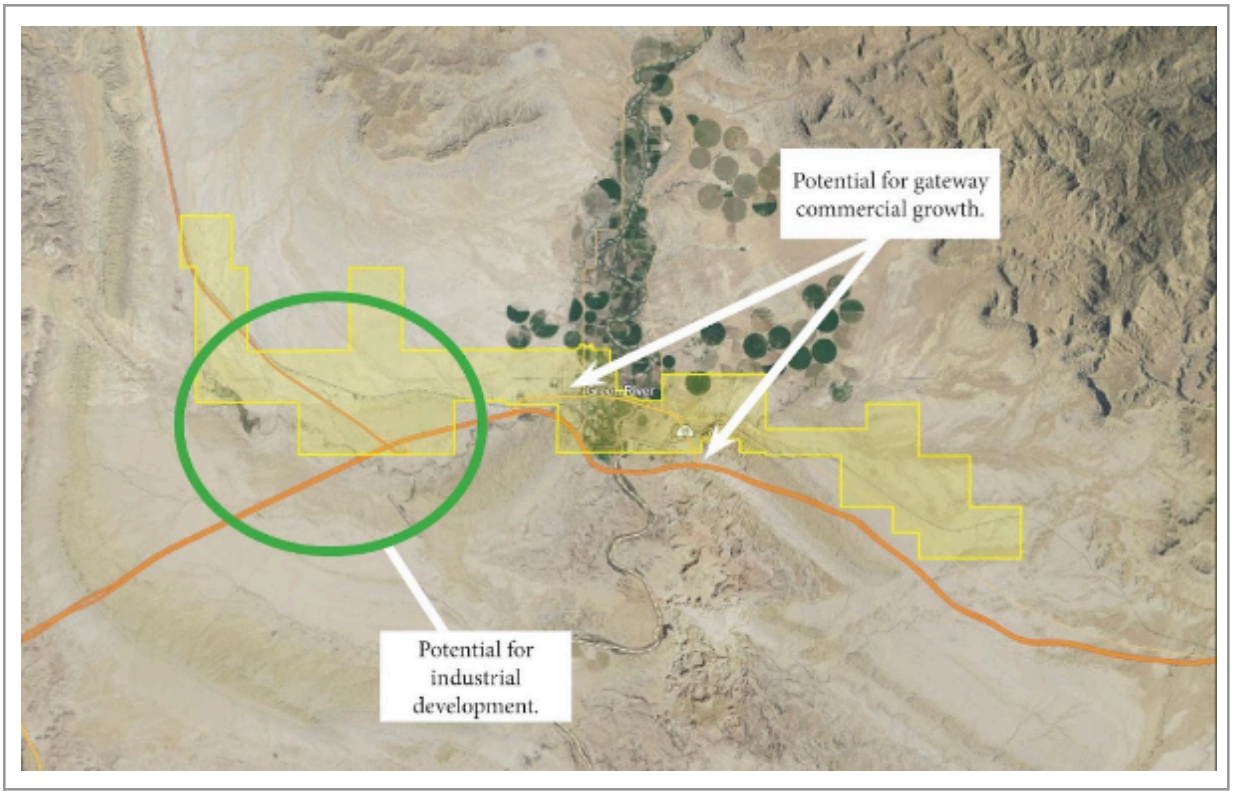
Green River is not expecting future development that would increase the community's overall vulnerability. Areas of expected growth are illustrated below (the area with circles indicating the areas of anticipated development).

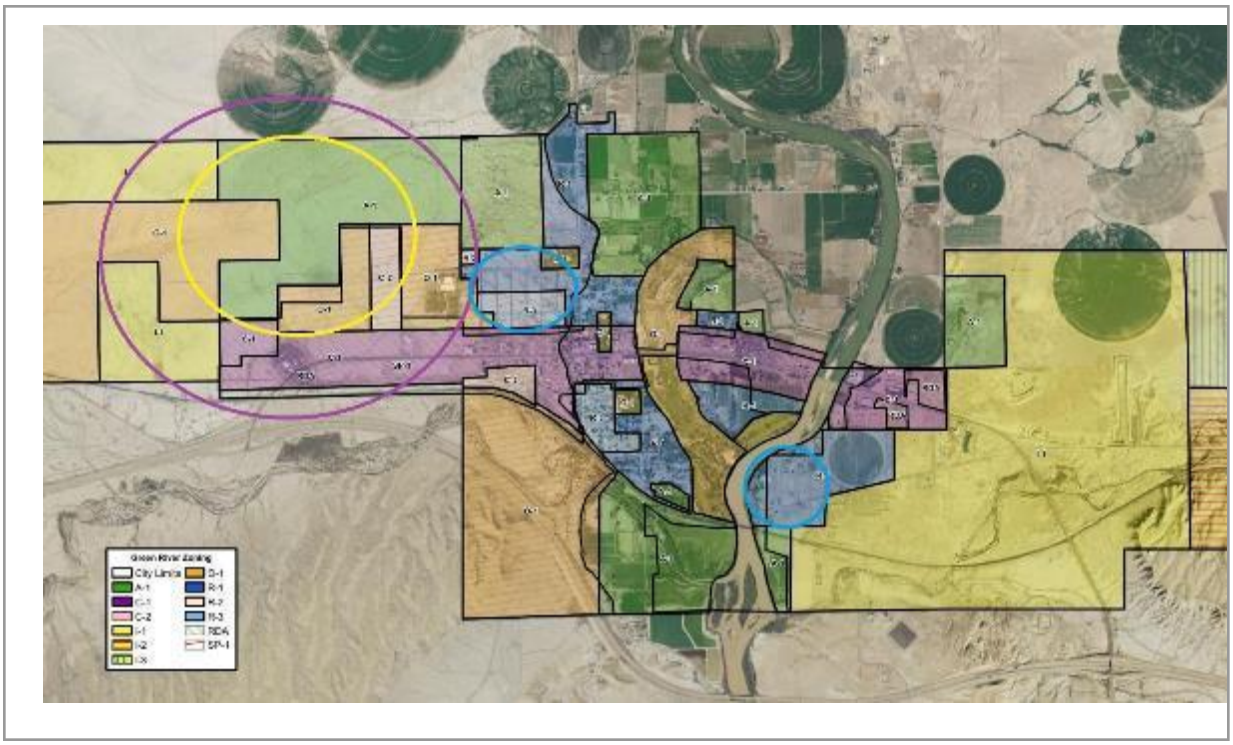
Since 2018, development activities affecting hazard vulnerability include:

1. **Commercial Corridor Improvements**: Renovations along Main Street have incorporated flood resilience measures, DECREASING vulnerability to flood damage in this critical economic area.
2. **Water Treatment Facility Upgrades**: Ongoing improvements to the water treatment plant have DECREASED vulnerability to drought conditions through more efficient processing and capacity enhancement.
3. **Highway Access Modifications**: Transportation infrastructure improvements have DECREASED vulnerability to isolation during flood or severe weather events by ensuring more reliable emergency access.
4. **Tourism Infrastructure**: Development of recreation-supporting facilities has occurred outside identified high-hazard zones, maintaining the city's overall vulnerability profile.
5. **Riverfront Management**: Enhanced bank stabilization and flood control measures have DECREASED vulnerability to riverine flooding by improving capacity to handle high water events.

These targeted improvements, particularly to water and transportation infrastructure, have generally decreased Green River's vulnerability to its primary hazards while supporting economic development in appropriate locations.

Figure 7.8.7.1 - Illustration of Potential Development Areas





7.8.8 Status of 2018 Mitigation Actions

2018 Action	Role	Current Status	Explanation
F2: Technical analysis on irrigation canals	Participant	Ongoing	Regular assessment to reduce flood threat from canal failures
F11: Improve Price River Road	Lead	Ongoing	Road maintenance continues where it crosses washway to prevent further erosion
F12: Evaluate Dike West upgrades	Lead	Modified	Engineering assessment completed, awaiting implementation funding
E3: Planning and Zoning Departments adjust building codes	Participant	Completed	County now provides building inspection

7.8.9 Green River Mitigation Strategy

7.8.9.1 Green River Strategy Overview

Green River City employs a comprehensive approach to hazard mitigation that combines infrastructure improvements, planning initiatives, natural system protections, and public education. The city focuses on enhancing resilience through water system upgrades, flood control infrastructure, building code enforcement, and emergency preparedness. Given Green River's unique location along a major river

corridor and interstate transportation route, special attention is paid to flood protection, drought resilience, and transportation-related hazards. The city prioritizes projects that provide multiple benefits, protect critical facilities, and enhance the community's ability to withstand and recover from natural hazards. This strategic approach reflects the city's commitment to protecting its residents, economy, and natural resources from both immediate threats and long-term hazard challenges.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Green River City employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water treatment plant upgrades
    - Dike and flood control structure improvements
    - Road and culvert enhancements in vulnerable areas
    - Drought-resilient water supply systems
- **Planning & Regulations**:
    - Updated building codes and zoning
    - Floodplain management procedures
    - Drought contingency planning
    - Interstate transportation emergency coordination
- **Natural Systems**:
    - Riverbank stabilization
    - Watershed protection measures
    - Erosion control implementation
    - Green infrastructure development
- **Education/Awareness**:
    - Tourist-oriented emergency information
    - Flood insurance promotion
    - Extreme weather preparedness
    - Interstate traveler notification systems

Note: Prior to selecting the mitigation actions presented in this section, the jurisdiction considered a comprehensive range of potential mitigation actions. The actions selected above represent those deemed most appropriate, feasible, and effective for the jurisdiction based on their risk assessment, capabilities, and priorities.

7.8.9.2 Earthquake Mitigation Actions

1. **Conduct seismic retrofitting for critical public facilities**
    - **Description**: Evaluate and implement seismic retrofits for critical public facilities identified as most vulnerable to earthquake damage, including city hall, emergency operations center, and water treatment facilities.

- **Responsible Party**: Green River City Public Works Department
- **Potential Funding Sources**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, State CIB funds
- **Estimated Cost**: $375,000
- **Timeframe**: 2026-2028
- **Priority Level**: Medium
- **Justification**: Green River is located in an area with historical earthquake activity. Critical facilities must remain operational during and after seismic events to ensure continued emergency response and essential services.
- **Status**: Upcoming

2. **Implement the International Building Code and Residential Code**
    - **Description**: Adopt and enforce the International Building Code (IBC) and International Residential Code (IRC) to ensure new construction meets current seismic standards.
    - **Responsible Party**: Green River City Building Department (Lead), County Building Officials
    - **Potential Funding Sources**: City general fund
    - **Estimated Cost**: Staff time
    - **Timeframe**: 2025-2026
    - **Priority Level**: Low
    - **Justification**: Building codes that address seismic safety are essential for reducing structural vulnerability to earthquakes and providing consistent standards for development.
    - **Status**: Planned

7.8.9.3 Flood Mitigation Actions

1. **Technical analysis on irrigation canals**
    - **Description**: Conduct detailed engineering analysis of irrigation canals to identify vulnerabilities and implement measures to reduce flood threats from canal failures.
    - **Responsible Party**: Green River City Public Works Department (Lead), local irrigation companies
    - **Potential Funding Sources**: Natural Resources Conservation Service, Utah Division of Water Resources
    - **Estimated Cost**: $750,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium

- **Justification**: Canal failures present significant flood risks to Green River. Proactive identification of vulnerabilities can prevent catastrophic failures and protect nearby properties.
- **Status**: Ongoing

2. **Improve Price River Road**
    - **Description**: Stabilize and improve Price River Road where it crosses the wash on a rock ledge that is slowly eroding to prevent failure during flood events.
    - **Responsible Party**: Green River City Public Works Department
    - **Potential Funding Sources**: FEMA Hazard Mitigation Grant Program, Utah Department of Transportation, CIB
    - **Estimated Cost**: $250,000
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium
    - **Justification**: The erosion threatens a critical access road. Stabilization will maintain emergency access during flood events and prevent costly road failures.
    - **Status**: Maintenance ongoing
3. **Upgrade and maintain Dike West**
    - **Description**: Implement engineering recommendations for upgrading the Dike West flood control structure to improve flood protection for the city.
    - **Responsible Party**: Green River City Public Works Department
    - **Potential Funding Sources**: FEMA Flood Mitigation Assistance (FMA) Program, US Army Corps of Engineers, FEMA Emergency Management Performance Grant Program
    - **Estimated Cost**: $400,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: The Dike West provides critical flood protection for Green River. Enhancements will improve structural integrity and increase protection capacity.
    - **Status**: Engineering assessment completed, implementation pending
4. **Reduce stormwater runoff through subdivision ordinance**
    - **Description**: Update subdivision ordinance and development standards to incorporate stormwater management requirements that reduce runoff and flood risks.
    - **Responsible Party**: Green River City Planning Department
    - **Potential Funding Sources**: Utah Department of Environmental Quality planning grants
    - **Estimated Cost**: $14,000

- **Timeframe**: 2024
- **Priority Level**: High
- **Justification**: Updated ordinances will ensure new development incorporates appropriate stormwater management, reducing flood risks and infrastructure impacts.
- **Status**: Underway

7.8.9.4 Drought Mitigation Actions

1. **Upgrade Green River City's water system**
    - **Description**: Complete comprehensive upgrades to the water system including treatment plant improvements, finished water clear well enhancements, and distribution center modernization.
    - **Responsible Party**: Green River City Public Works Department
    - **Potential Funding Sources**: Community Impact Board (CIB), Utah Division of Water Quality, USDA Rural Development
    - **Estimated Cost**: $4,210,870
    - **Timeframe**: 2018-2025
    - **Priority Level**: High
    - **Justification**: Water system upgrades will improve efficiency, reduce losses, and enhance the city's ability to maintain water service during drought conditions, protecting public health and safety.
    - **Status**: Ongoing
2. **Implement water conservation program**
    - **Description**: Develop and implement a comprehensive water conservation program including public education, water-efficient landscaping standards, and conservation-based rate structures.
    - **Responsible Party**: Green River City Public Works Department
    - **Potential Funding Sources**: Utah Division of Water Resources, City general fund
    - **Estimated Cost**: $35,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Reducing water consumption through conservation measures will extend available supplies during drought periods and promote sustainable water use.
    - **Status**: Planning phase

7.8.9.5 Severe Weather Mitigation Actions

1. **Install/relocate generators for critical facilities**

- **Description**: Install new generators and/or relocate existing generators to critical facilities to maintain essential services during severe weather events and resulting power outages.
- **Responsible Party**: Green River City Public Works Department (Lead), Emergency Management
- **Potential Funding Sources**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, CIB, City general fund
- **Estimated Cost**: $112,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Backup power is essential for maintaining critical services during severe weather events that cause power outages, particularly given Green River's relatively isolated location.
- **Status**: Planned

2. **Enhance emergency notification system**
    - **Description**: Update and expand the emergency notification system to provide timely alerts to residents during severe weather events.
    - **Responsible Party**: Green River City Emergency Management
    - **Potential Funding Sources**: FEMA Emergency Management Performance Grant Program
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium
    - **Justification**: Improved notification systems can provide critical warnings to residents, visitors, and interstate travelers during severe weather events, potentially saving lives.
    - **Status**: Upcoming

7.8.9.6 Justification for Hazards Not Included

Landslide: Green River City's developed areas sit on relatively flat terrain with minimal direct landslide exposure. However, the city faces indirect landslide vulnerability related to surrounding cliffs and geological features. The primary concern is potential upstream landslide activity that could impact the city's water intake structures on the Green River, which are critical to the culinary water system. The city addresses this vulnerability through: (1) coordination with the Bureau of Land Management and Utah Geological Survey on monitoring of known unstable slopes in the Green River corridor, (2) emergency response planning for alternate water sources if primary intake is compromised, and (3) the water treatment facility upgrades identified in Section 7.8.9.4, which include redundancy measures. Additionally, landslide risks to transportation corridors outside city limits are addressed through coordination with UDOT and Emery County. The city determined these collaborative approaches provide more effective risk reduction than independent city mitigation actions given the location of landslide hazards outside city jurisdiction.

Wildfire: Green River City experiences moderate wildfire risk concentrated around vegetated areas near the river corridor, where fire could impact tourism-related businesses that form a significant portion of the local economy. While the city's desert environment has sparse vegetation overall, riparian vegetation along the Green River and isolated patches of vegetation create localized wildfire exposure. The city's wildfire mitigation approach emphasizes: (1) maintaining defensible space around critical facilities and tourism infrastructure through standard maintenance procedures, (2) coordinating with the Bureau of Land Management on vegetation management in the limited wildland-urban interface areas adjacent to the city, (3) ensuring adequate water supply for firefighting through the water system improvements identified in Section 7.8.9.4, and (4) incorporating wildfire considerations into tourist emergency information programs (Section 7.8.9.5). The city determined these integrated programmatic approaches provide effective wildfire risk management appropriate to Green River's specific conditions and risk profile, particularly given the limited extent of wildland-urban interface within city boundaries.

Problem Soils: Green River City experiences significant vulnerability to expansive soils and gypsum-rich soil conditions, with approximately $75,000 in annual infrastructure repair costs related to soil-induced damage to water and sewer lines. The city addresses problem soil impacts through multiple ongoing programs rather than standalone mitigation actions: (1) requiring geotechnical investigations and appropriate foundation design for new construction through the building permit review process, (2) implementing proactive infrastructure inspection and repair programs to address soil-related pipe damage before failures occur, (3) incorporating soil considerations into the capital improvements prioritization process, with priority given to replacing aging infrastructure in areas with the most severe problem soil conditions, and (4) coordinating with Emery County and the Natural Resources Conservation Service on soil mapping updates. The water system improvements identified in Section 7.8.9.4 include replacement of infrastructure most vulnerable to soil movement. The city determined this integrated infrastructure management approach provides more cost-effective long-term risk reduction than independent problem soil mitigation projects.

Dam Failure: Green River City is not in the direct inundation zone of any high-hazard dams. The city's distance from major dam infrastructure (approximately 142 miles downstream from Flaming Gorge Reservoir) and the absence of significant high-hazard dams in the immediate watershed result in minimal direct vulnerability to dam failure events. The potential for upstream dam failures affecting river levels is addressed through the city's existing flood mitigation actions.

Infestation: Green River City coordinates with County and State agencies on monitoring and response to invasive species and pest infestations. The primary concerns relate to tamarisk along the river corridor, which is addressed through ongoing vegetation management efforts by multiple agencies.

7.8.10 Information Integration

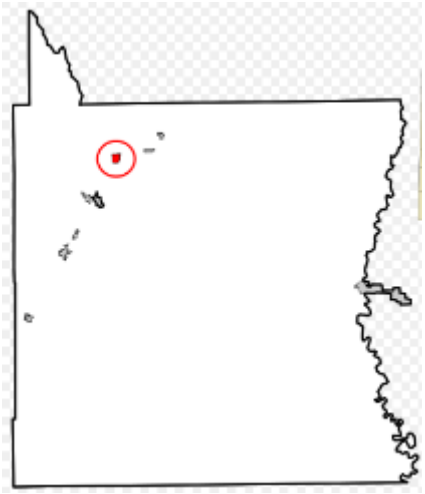
Past Integration (2018-2023): Green River City was a stakeholder of the previous plan, but the city hasn't updated its general plan since 2014. The city did not formally integrate the previous plan into other planning mechanisms during this period.

Current Integration: Green River City will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Future general plan update
- Water system master planning

7.9 Huntington City

7.9.1 Background

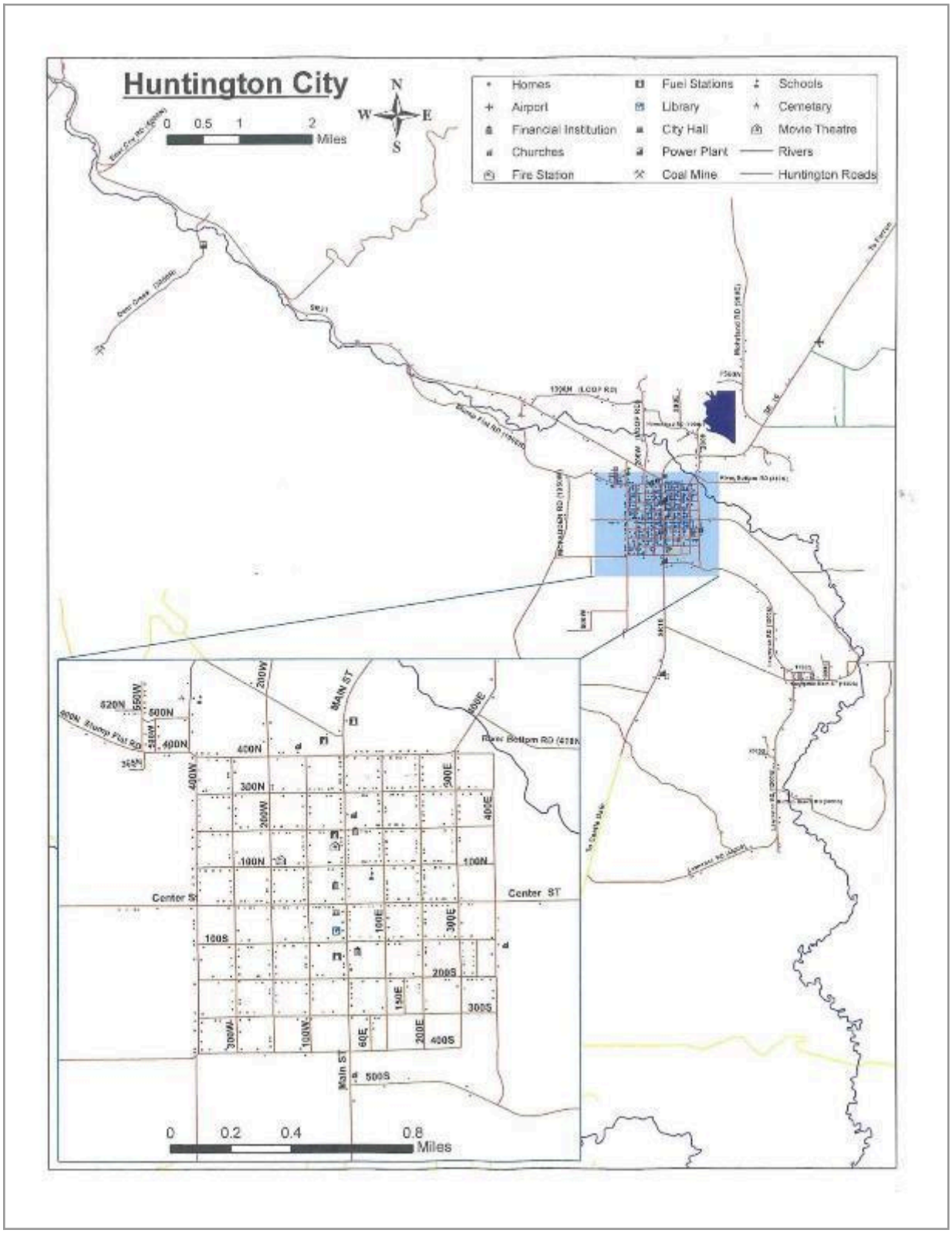


The local economy of Huntington City is diverse and supported by various sectors. Agriculture plays a significant role, with residents engaged in farming and ranching activities, including livestock production and crop cultivation. The region's natural resources, including coal and minerals, contribute to the local economy through mining activities. Additionally, the city benefits from other industries such as retail, services, and small businesses. Huntington City offers a close-knit community feel where residents can enjoy the tranquility of small-town living, abundant outdoor recreational opportunities, and a strong sense of community spirit.

7.9.2 Location & Extent

Huntington is the largest municipality in Emery County with a population of 1,914 (US Census). Huntington is located in northwestern Emery County near the mouth of a long canyon that cuts diagonally into the Wasatch Plateau. According to the United States Census Bureau, Huntington has a total area of 2.0 square miles.

Figure 7.9.2.1 - Overview Map of Huntington City



7.9.3 Demographic & Population Growth

As of 2020, there were 1,914 people and 710 households residing in the city (US Census). The population density was 1,047.6 people per square mile. There were 779 housing units at an average density of 382.5 per square mile. The racial makeup of the town was 92.40% White, 0.19% African American, 0.47% Native American, 0.19% Asian, 0.05% Pacific Islander, 5.02% from other races, and 1.69% from two or more races. Hispanic or Latino of any race were 9.19% of the population.

7.9.4 Vulnerable Populations

HUNTINGTON CITY - POPULATIONS AT RISK (2021)	
Population under 5	5.80%
Population over 65	11.80%
Population Non-White (all other races)	1.00%
Population Hispanic	9.80%
Population without a High School Diploma	7.90%
Population that speak English "Not Well"	0.40%
Population in "Deep Poverty"	5.00%
Families Below Poverty	13.60%
Families that are Single Mother Households and Below Poverty	7.80%
Households Receiving Food Stamps (SNAP)	12.70%
Population that "Did Not Work"	27.10%
Rentals where Gross Rent Exceeds 30% of Household Income	49.10%
Housing that are Mobile Homes	16.00%
Households that are Single Female with Children under 18	9.40%
Households with No Car	0.40%
Population over 65 and Living Alone	6.60%
Population with Disabilities	16.60%
Population without Health Insurance	10.00%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.9.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and municipalities within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **LANDSLIDE (L):** There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.
- **WILDLAND FIRES (WF):** Wildfire can significantly impact identified areas of Emery County. Urban contiguous fire impacts lives and property in the County. The foothill and canyon areas west of Huntington have experienced significant wildfires. The highest risk from wildfire is likely to be to the community water supply and to the operation of the Huntington Power Plant.

7.9.6 Changes Since 2018 Plan

Huntington City has experienced several notable changes affecting hazard vulnerability:

1. **Population and Demographics**:
    - Population decreased slightly by approximately 1.5% since 2018.
    - Aging housing stock increases vulnerability to various hazards.
    - Changes in economic conditions affecting emergency preparedness resources.
2. **Infrastructure Changes**:
    - Completion of several infrastructure improvement projects addressing flood risks.
    - Updates to stormwater management systems in key areas.
    - Improvements to emergency warning and communication systems.
3. **Economic Shifts**:
    - Continued transition away from mining-dependent economy.
    - Growth in small businesses changing occupancy patterns in commercial structures.
    - Modifications to critical facility operations and locations.

4. **Environmental Changes**:
    - Increased wildfire risk in surrounding areas due to prolonged drought conditions.
    - Changes in flood patterns due to altered precipitation trends.
    - Modified landslide risk due to changing ground conditions in canyon areas.

These changes directly influenced how this plan was revised for Huntington City. Specifically:

1. Flood control infrastructure received higher priority based on specific vulnerability points identified during recent precipitation events in Huntington Creek.
2. Seismic assessment and retrofit actions were incorporated for remaining unreinforced masonry buildings based on vulnerability assessments conducted since 2018.
3. Wildfire mitigation measures were expanded and prioritized due to increased risk following recent fires in surrounding watershed areas.
4. Water conservation and storage actions were strengthened in response to supply challenges experienced during extended drought conditions.
5. The community emergency response team (CERT) program was enhanced based on lessons learned from recent emergency response experiences.

7.9.7 Development in Hazard Prone Areas - Huntington City

In the years since the previous hazard plan, most of the development in Huntington was infill and redevelopment. This development has not significantly changed the community's overall vulnerability.

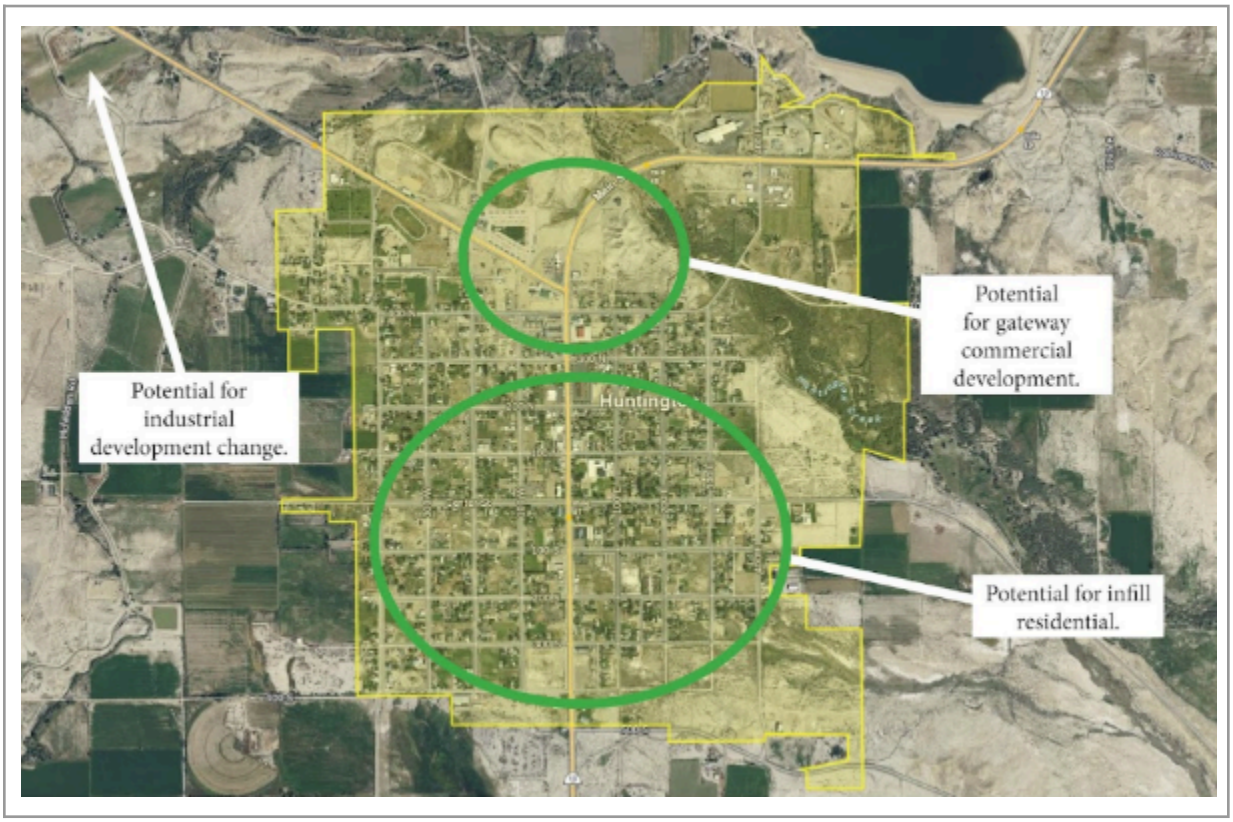
Since 2018, specific development changes affecting hazard vulnerability include:

1. **Stormwater Management Improvements**: Completion of drainage system upgrades in the downtown area and eastern neighborhoods has DECREASED vulnerability to localized flooding during intense precipitation events.
2. **Creek Channel Maintenance**: Clearing and bank stabilization along Huntington Creek has DECREASED vulnerability to flooding by improving flow capacity during high water events.
3. **Public Building Renovations**: Structural improvements to municipal facilities have incorporated seismic considerations, DECREASING vulnerability to earthquake impacts for critical government functions.
4. **Residential Development**: Limited new housing construction has been directed to areas outside identified hazard zones and built to current building codes, maintaining existing vulnerability levels.
5. **Transportation Infrastructure**: Road improvements, particularly along evacuation routes, have DECREASED vulnerability to isolation during hazard events by ensuring more reliable emergency access.

These strategic development decisions and infrastructure investments have generally maintained or decreased Huntington's vulnerability to identified hazards, particularly flooding and seismic events.

The city is not expecting future development that would increase the community's overall vulnerability. Areas of expected growth are illustrated below.

Figure 7.9.7.1 - Illustration of Potential Development Areas



7.9.8 Status of 2018 Mitigation Actions

While the 2018 plan primarily took a countywide approach, Huntington City participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
D2: Improve irrigation canal systems	Participant	Ongoing	Coordinating with local irrigation companies to improve efficiency of water usage.
F2: Technical analysis on irrigation canals	Participant	Ongoing	Analysis to reduce the threat of floods from canal failures.
F11: Improve Huntington Creek	Lead	Modified	Partially completed; carried forward with updated scope.
F12: Improve Grange Spur	Lead	Completed	Project finished in 2022.
F13: Improve Huntington Back Road	Lead	Completed	Project finished in 2020.
SW1: Establish CERT training	Lead	Completed	Program successfully implemented.

E3: Planning and zoning building codes	Participant	Completed	County now provides building inspection.

7.9.9 Huntington Mitigation Strategy

7.9.9.1 Huntington City Strategy Overview

Huntington City employs a comprehensive approach to hazard mitigation that balances infrastructure improvements, regulatory measures, natural systems protection, and public education. The city prioritizes actions that address multiple hazards simultaneously while focusing on protecting critical facilities, ensuring continuity of essential services, and enhancing community resilience. Recognizing the city's geographic vulnerabilities, particularly to earthquakes, flooding, and severe weather, Huntington has developed targeted strategies that consider both existing development and future growth patterns. The city works collaboratively with county agencies and neighboring jurisdictions to maximize resource efficiency and ensure coordinated emergency response. Implementation emphasizes cost-effective measures that can be sustained through local capacity while leveraging external funding opportunities when available.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Huntington City employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Stormwater management system improvements
    - Canal stabilization and overflow protection
    - Transportation network upgrades to handle severe weather
    - Critical infrastructure hardening against multiple hazards
- **Planning & Regulations**:
    - Updated building codes and subdivision standards
    - Enhanced emergency response procedures
    - Implementation of water conservation measures
    - Secondary water metering system adoption
- **Natural Systems**:
    - Watershed protection and management
    - Riparian corridor restoration
    - Wildfire fuel reduction programs
    - Slope stabilization in vulnerable areas
- **Education/Awareness**:
    - Community Emergency Response Team (CERT) training
    - Public awareness campaigns for multiple hazards
    - Water conservation education programs

- School-based emergency preparedness initiatives

Note: Prior to selecting the mitigation actions presented in this section, the jurisdiction considered a comprehensive range of potential mitigation actions. The actions selected above represent those deemed most appropriate, feasible, and effective for the jurisdiction based on their risk assessment, capabilities, and priorities.

7.9.9.2 Earthquake Mitigation Actions

1. **Complete seismic assessment and retrofit plan for remaining unreinforced masonry (URM) buildings**
    - **Description**: Develop comprehensive evaluation criteria and implementation timeline for seismic retrofits of publicly-owned URM buildings, focusing on critical facilities and historic structures.
    - **Responsible Party**: Huntington City Building Department
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, State School Building Fund
    - **Estimated Cost**: $150,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Huntington has several aging public buildings constructed before modern seismic codes. Unreinforced masonry structures are particularly vulnerable to earthquake damage and pose significant life safety risks.
    - **Status**: Upcoming
2. **Conduct annual earthquake response training and drills at all public facilities**
    - **Description**: Implement regular earthquake preparedness training for city staff and conduct evacuation drills at municipal facilities, including coordination with school facilities.
    - **Responsible Party**: Huntington City Emergency Management
    - **Potential Funding Source**: Local budget, FEMA Emergency Management Performance Grants, County Emergency Management
    - **Estimated Cost**: $5,000 annually
    - **Timeframe**: 2023-Ongoing
    - **Priority Level**: High
    - **Justification**: Preparedness training significantly improves response capabilities and reduces potential injuries during seismic events, particularly important given Huntington's location in a seismically active region.
    - **Status**: Ongoing

7.9.9.3 Flood Mitigation Actions

1. **Improve Huntington Creek flood protection infrastructure**
    - **Description**: Place riprap downstream of box culverts, design and construct a headwall with a middle debris wall upstream of the double box culvert, and clean out debris upstream of the box culverts to prevent blockage and overtopping during heavy precipitation events. These improvements will increase flow capacity and reduce the risk of flooding in downstream residential areas.
    - **Responsible Party**: Huntington City Public Works
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance, CIB, Local funds
    - **Estimated Cost**: $500,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium
    - **Justification**: Previous flooding events have demonstrated vulnerability of the existing infrastructure to debris blockage and overtopping, potentially affecting downtown areas and residential neighborhoods.
    - **Status**: Partially completed, design work finalized
2. **Improve Grange Spur flood control measures**
    - **Description**: Replace the existing dip crossing, clean out the channel downstream to improve water flow through the culvert, clean out the overflow channel to blend into the dip, and enlarge the box culvert to handle higher flows.
    - **Responsible Party**: Huntington City Public Works
    - **Potential Funding Source**: Utah Community Impact Board, FEMA Flood Mitigation Assistance (FMA) Program
    - **Estimated Cost**: $400,000
    - **Timeframe**: 2023-2024
    - **Priority Level**: Medium
    - **Justification**: Current infrastructure is undersized for peak flows experienced during spring runoff and intense storm events, threatening adjacent properties and transportation routes.
    - **Status**: Completed 2021
3. **Improve Huntington Back Road drainage**
    - **Description**: Address undersized culverts where the gravel road is used as a dip, and remove vegetation buildup upstream and downstream of the culverts to improve flow capacity.
    - **Responsible Party**: Huntington City Public Works

- **Potential Funding Source**: Local, Utah Department of Transportation, FEMA Hazard Mitigation Grant Program (HMGP)
- **Estimated Cost**: $50,000
- **Timeframe**: 2023-2024
- **Priority Level**: Medium
- **Justification**: This road serves as an important secondary access route that becomes impassable during flood events, potentially isolating residents and hindering emergency response.
- **Status**: Completed 2020

4. **Adopt policies to reduce stormwater runoff**
    - **Description**: Update subdivision ordinance and development standards to include modern stormwater management requirements for new development and significant redevelopment.
    - **Responsible Party**: Huntington City Planning Department
    - **Potential Funding Source**: Utah Department of Environmental Quality planning grants
    - **Estimated Cost**: $14,000
    - **Timeframe**: 2024
    - **Priority Level**: High
    - **Justification**: Current standards do not adequately address stormwater management, contributing to increased runoff during development that exacerbates flooding issues throughout the city.
    - **Status**: Underway

7.9.9.4 Wildfire Mitigation Actions

1. **Join the "Firewise Communities/USA" recognition program**
    - **Description**: Participate in the national Firewise program sponsored by the National Wildlife Coordinating Group to enhance community wildfire preparedness.
    - **Responsible Party**: Huntington City Emergency Management
    - **Potential Funding Source**: Local budget
    - **Estimated Cost**: Staff time
    - **Timeframe**: 2024-2028
    - **Priority Level**: Low
    - **Justification**: Portions of Huntington are in the wildland-urban interface zone where residential areas meet wildlands, creating fire risks during dry periods.
    - **Status**: Upcoming

2. **Implement defensible space requirements**
    - **Description**: Develop and enforce regulations requiring defensible space around properties in wildland-urban interface areas.
    - **Responsible Party**: Huntington City Fire Department
    - **Potential Funding Source**: USDA Forest Service Community Wildfire Defense Grant, Utah Division of Forestry Fire and State Lands grants
    - **Estimated Cost**: $30,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Recent wildfire events in neighboring areas have demonstrated the effectiveness of defensible space in protecting structures, particularly in the city's western neighborhoods adjacent to public lands.
    - **Status**: Upcoming

7.9.9.4 Dam Failure Mitigation Actions

1. **Multi-Dam Early Warning and Notification System**
    - **Description:** Design and implement an integrated early warning system that monitors multiple upstream dams (Electric Lake, Huntington Mammoth Reservoir, Cleveland Reservoir, and Huntington North Reservoir) and provides automated alerts to city officials and residents. Install real-time monitoring equipment at key locations, integrate with Bureau of Reclamation and dam owner monitoring systems, and establish automated public notification through sirens, mobile alerts, and digital signage. Develop scenario-specific response protocols for single-dam and compound failure events. This system provides critical advance warning time for the community's high-risk profile from multiple dam threats.
    - **Responsible Party:** Huntington City Emergency Management (Lead), County Emergency Management, Bureau of Reclamation
    - **Potential Funding Source:** FEMA Hazard Mitigation Grant Program (HMGP), Bureau of Reclamation, State Division of Emergency Management
    - **Estimated Cost:** $275,000
    - **Timeframe:** 2025-2027
    - **Priority Level:** High
    - **Justification:** Huntington's location downstream from four separate dams creates unique vulnerability requiring integrated monitoring. The compound risk scenario—where multiple dam failures could occur simultaneously—necessitates sophisticated early warning capabilities to provide maximum evacuation time for residents.
    - **Status:** Planned
2. **Evacuation Route Improvements and Redundancy Planning**

- **Description:** Upgrade and clearly mark primary and alternate evacuation routes leading away from potential inundation zones. Improve road surfaces, widen critical bottleneck sections, install illuminated evacuation route signage, and establish multiple egress paths to ensure evacuation capacity even if primary routes are compromised. Conduct evacuation time studies for different dam failure scenarios (single vs. compound events) and implement traffic management protocols. Coordinate with County Road Department and UDOT on regional evacuation planning. Create mapped safe zones and vertical evacuation options for areas where horizontal evacuation may be time-limited.
- **Responsible Party:** Huntington City Public Works Department (Lead), City Administration, County Road Department
- **Potential Funding Source:** FEMA Building Resilient Infrastructure and Communities (BRIC), UDOT Transportation Alternatives Program, Local CIP funds
- **Estimated Cost:** $320,000
- **Timeframe:** 2025-2028
- **Priority Level:** High
- **Justification:** Effective evacuation is the primary protective action for dam failure events. Huntington's compound risk from multiple dams requires robust, redundant evacuation infrastructure to prevent the emergency response system from being overwhelmed. Improved evacuation routes directly reduce potential casualties by ensuring residents can reach safety within available warning times.
- **Status:** Planned

7.9.9.5 Drought Mitigation Actions

2. **Implement meters on the secondary water system**
    - **Description**: Install water meters on the secondary irrigation system to monitor usage, identify leaks, and encourage conservation.
    - **Responsible Party**: Huntington City Public Works
    - **Potential Funding Source**: State water conservation grants, Local funds
    - **Estimated Cost**: $650,000
    - **Timeframe**: 2023-2026
    - **Priority Level**: High
    - **Justification**: Studies show that metered systems typically reduce water consumption by 20-30%, which is critical for Huntington's long-term water security given regional drought trends.
    - **Status**: Ongoing
3. **Develop a drought emergency ordinance**

- **Description**: Create an ordinance to restrict the use of public water resources for non-essential usage during drought emergencies, such as landscaping, washing cars, and filling swimming pools.
- **Responsible Party**: Huntington City Administration
- **Potential Funding Source**: Local budget
- **Estimated Cost**: Staff time
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: Formal restrictions during drought emergencies are necessary to ensure water availability for critical needs and prevent system failures during peak demand periods.
- **Status**: In development

4. **Perform maintenance work on Snowball Pond and Elmo Pond**
    - **Description**: Conduct significant maintenance and improvements on these water storage facilities to ensure reliability during drought conditions.
    - **Responsible Party**: Huntington City Public Works
    - **Potential Funding Source**: CIB, State water resources grants
    - **Estimated Cost**: $250,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: These storage facilities are critical components of the city's water supply system but require maintenance to prevent leakage and ensure maximum storage capacity during drought conditions.
    - **Status**: Waiting for funding support

7.9.9.6 Severe Weather Mitigation Actions

1. **Establish CERT (Community Emergency Response Team) training**
    - **Description**: Develop and maintain a volunteer CERT program to train residents in emergency response procedures for severe weather and other hazards.
    - **Responsible Party**: Huntington City Emergency Management
    - **Potential Funding Source**: Local budget, FEMA Emergency Management Performance Grant Program
    - **Estimated Cost**: $5,000 per year
    - **Timeframe**: Ongoing
    - **Priority Level**: Medium

- **Justification**: A trained volunteer corps enhances community resilience during severe weather events when professional emergency resources may be strained or delayed.
- **Status**: Completed and maintained annually

2. **Develop education materials regarding heat wave or cold wave hazards**
    - **Description**: Create and distribute information about dangers of extreme heat and cold, with protective measures particularly targeted to vulnerable populations.
    - **Responsible Party**: Huntington City Emergency Management
    - **Potential Funding Source**: Local funds, Utah Department of Health Emergency Preparedness grants
    - **Estimated Cost**: $5,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Low
    - **Justification**: Climate projections indicate increasing frequency of heat/cold wave events, which disproportionately affect elderly residents and those with limited resources.
    - **Status**: Upcoming

7.9.9.7 Multi-Hazard Mitigation Actions

1. **Implement an emergency notification system**
    - **Description**: Acquire and deploy a modern emergency notification system capable of targeting specific geographic areas with hazard-specific information.
    - **Responsible Party**: Huntington City Emergency Management
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program
    - **Estimated Cost**: $50,000
    - **Timeframe**: 2023-2025
    - **Priority Level**: High
    - **Justification**: Rapid communication during emergencies is critical for public safety across multiple hazard types, especially for flash floods and severe weather that can develop quickly.
    - **Status**: Ongoing
2. **More accurately map hazard-prone areas**
    - **Description**: Develop improved GIS mapping of hazard areas to educate residents about risks and guide emergency response planning.
    - **Responsible Party**: Huntington City Planning Department
    - **Potential Funding Source**: FEMA Risk MAP, Utah Geological Survey, Local funds
    - **Estimated Cost**: $35,000

- **Timeframe**: 2024-2028
- **Priority Level**: Low
- **Justification**: Current hazard mapping lacks sufficient detail for effective public education and emergency planning, potentially leaving residents unaware of specific risks to their properties.
- **Status**: Upcoming

7.9.9.8 Justification for Hazards Not Included

- **Landslide**: Huntington City has moderate landslide vulnerability concentrated in areas where development approaches steeper terrain, with several documented instances where previous landslides have damaged water delivery infrastructure. The city's landslide mitigation approach focuses on: (1) protecting existing water infrastructure in canyon areas through the water system improvements and redundancy measures identified in Section 7.9.9.3, (2) coordinating with Emery County and Utah Geological Survey on monitoring known unstable slopes in Huntington Canyon that could affect municipal water supplies, (3) incorporating landslide hazard considerations into review of development proposals near canyon approaches or steep slopes, and (4) utilizing the multi-hazard mapping initiative (Section 7.9.9.7) to identify and document landslide-prone areas within city boundaries for improved emergency planning. The primary landslide risks are located in the mountains and canyons where water infrastructure is located rather than in developed portions of the city. The city determined that protecting critical water infrastructure and coordinating with regional agencies provides more effective landslide risk reduction than standalone landslide mitigation projects within city boundaries.
- **Problem Soils**: Problem soils affect limited areas of Huntington, primarily in undeveloped sections of the city. The city will address these concerns through the existing building permit process, requiring geotechnical studies for new construction in potentially affected areas. This approach is more efficient than creating dedicated mitigation actions given the isolated nature of the hazard and limited municipal resources.
- **Infestation**: Huntington coordinates with the Emery County Weed and Mosquito Department and the Utah Department of Agriculture on infestation issues rather than implementing independent mitigation actions. This collaborative approach maximizes efficiency by utilizing county-level expertise and resources while allowing the city to focus on higher-priority hazards.

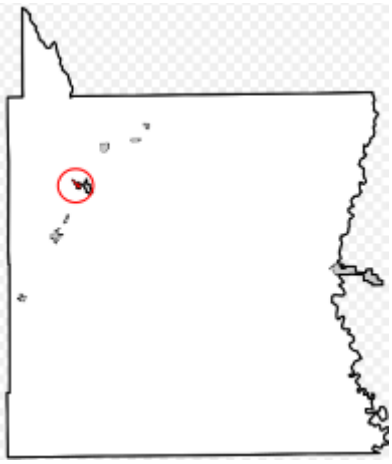
7.9.10 Information Integration

Past Integration (2018-2023): Huntington City was a stakeholder of the previous plan, but the city hasn't updated its general plan since 2017. The city did not formally integrate the previous plan into other planning mechanisms during this period.

Current Integration: Huntington City will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Future general plan update
- Infrastructure planning decisions for water, flood control, and transportation systems

7.10 Orangeville City



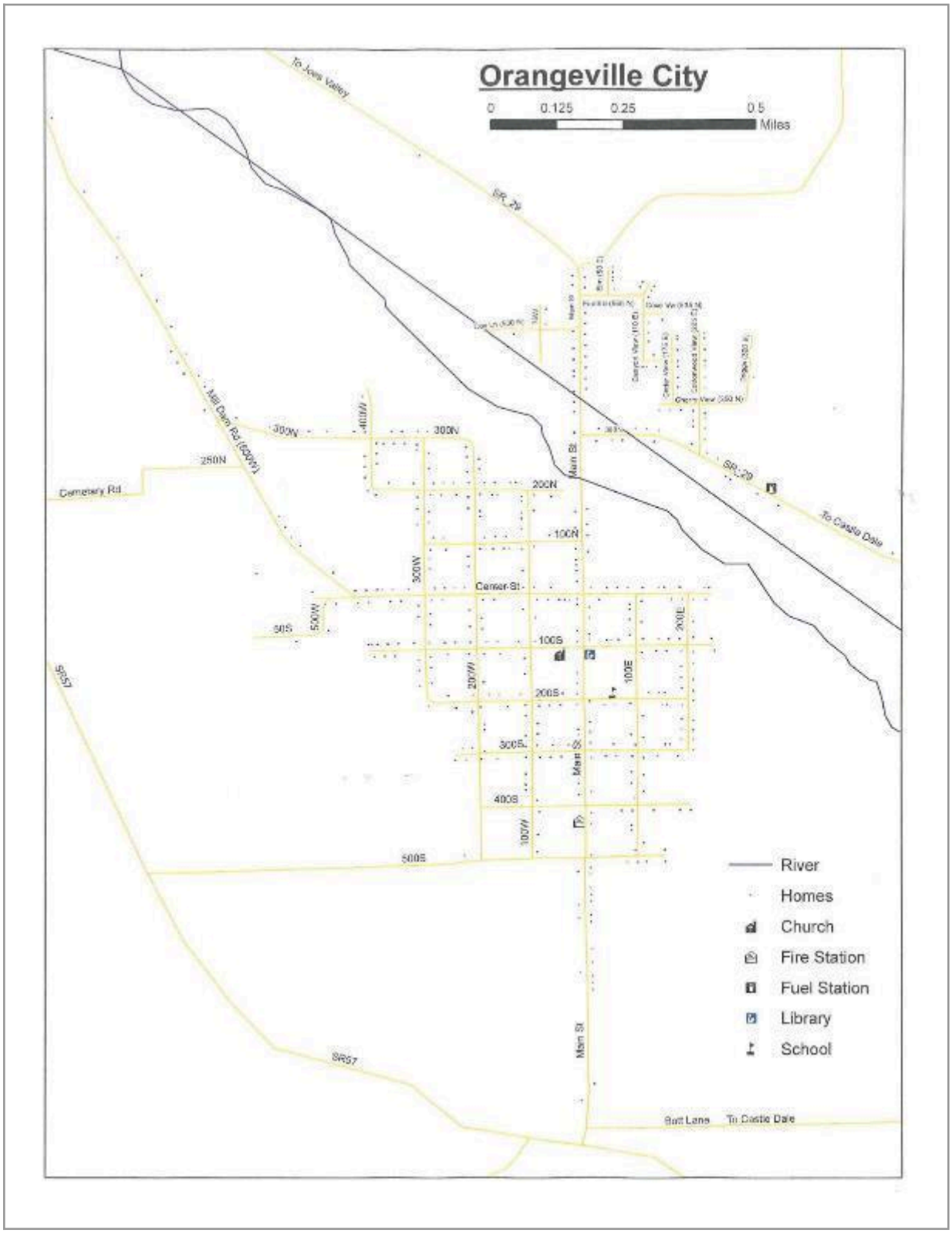
7.10.1 Background

Orangeville is estimated to have a population of 1,224 (US Census). The region's natural resources, such as coal and minerals, contribute to the local economy through mining activities. Additionally, the city benefits from other industries such as retail, services, and small businesses. Notably, Orangeville City has been experiencing a growing interest in bouldering, with its unique rock formations and scenic landscapes attracting outdoor recreation enthusiasts.

7.10.2 Location & Extent

Orangeville is 2 miles west of Castle Dale, the Emery County seat. The city is located at the edge of the Manti-La Sal National Forest. It is at the junction of State Routes 29 and 57, straddling the banks of Cottonwood Creek. According to the United States Census Bureau, the city has a total area of 1.4 square miles.

Figure 7.10.2.1 Overview Map of Orangeville



7.10.3 Demographic & Population Growth

As of 2020, Orangeville is estimated to have a population of 1,224, with 485 total households, and 476 housing units (US Census). The racial make-up of the city was 98.43% White, 0.07% African American, 0.43% Native American, 0.14% Asian, 0.50% from other races and 0.43% from two or more races. Hispanic or Latino of any race were 3.02% of the population.

7.10.4 Vulnerable Populations

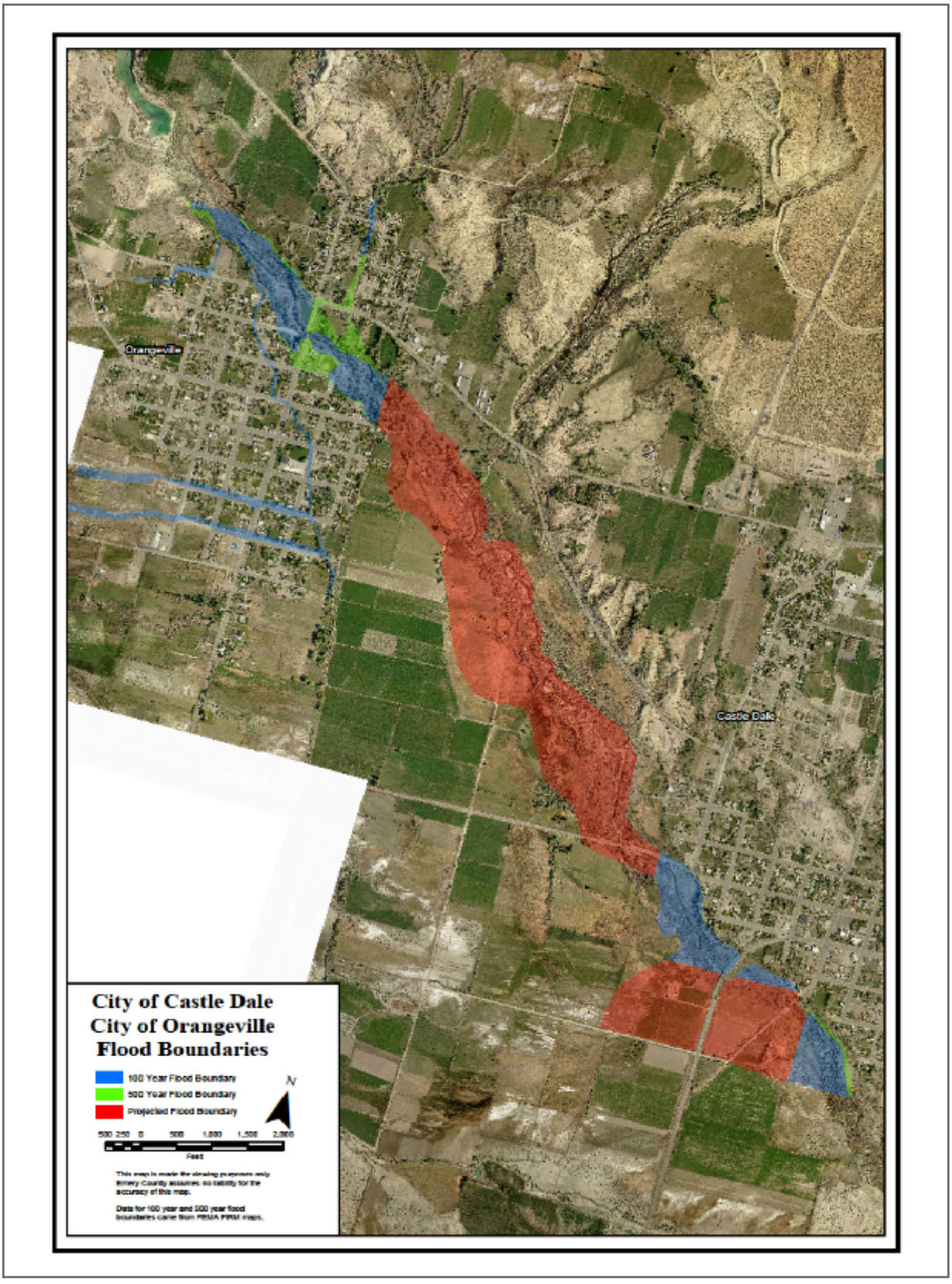
ORANGEVILLE - POPULATIONS AT RISK (2021)	
Population under 5	9.00%
Population over 65	18.10%
Population Non-White (all other races)	2.10%
Population Hispanic	3.60%
Population without a High School Diploma	2.60%
Population that speak English "Not Well"	0.00%
Population in "Deep Poverty"	2.70%
Families Below Poverty	0.00%
Families that are Single Mother Households and Below Poverty	0.00%
Households Receiving Food Stamps (SNAP)	0.00%
Population that "Did Not Work"	28.30%
Rentals where Gross Rent Exceeds 30% of Household Income	8.30%
Housing that are Mobile Homes	0.00%
Households that are Single Female with Children under 18	3.00%
Households with No Car	4.90%
Population over 65 and Living Alone	6.70%
Population with Disabilities	12.40%
Population without Health Insurance	4.00%

The estimates of vulnerable populations were generated by Headwaters Economics, and are based on data from the US Census, ACS 2021.

7.10.5 Specific Community Hazards

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event.
- **FLOODING (F):** Flooding continues to be of concern in the County and municipalities within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **WILDLAND FIRES (WF):** The foothill and canyon areas west of Orangeville have experienced significant wildfires. The highest risk from wildfire is likely to be to the community water supply.

Figure 7.10.5.1 - Map of Flood Boundaries - Orangeville



7.10.6 Changes Since 2018 Plan

Orangeville City has experienced several notable changes affecting hazard vulnerability:

1. **Population and Demographics**:
    - Population has remained relatively stable with minimal change since 2018.
    - Aging infrastructure requires additional maintenance for hazard resilience.
    - Shifts in economic patterns influencing emergency response capabilities.
2. **Infrastructure Changes**:
    - Completion of water system improvements affecting drought resilience.
    - Updates to stormwater management infrastructure in flood-prone areas.
    - Implementation of warning systems for flash flooding hazards.
3. **Development Patterns**:
    - Limited new development, primarily consisting of infill projects.
    - Focused improvements to existing structures rather than expansion.
    - Agricultural land use patterns remaining consistent.
4. **Environmental Changes**:
    - Increased wildfire risk in surrounding forest areas due to prolonged drought.
    - More frequent flash flooding events from intense but short-duration precipitation.
    - Heightened concern about dam safety upstream due to changing hydrological patterns.

These changes directly influenced how this plan was revised for Orangeville City. Specifically:

1. The mitigation strategy now emphasizes Adobe Wash maintenance due to flooding issues experienced during recent heavy precipitation events.
2. Water storage capacity improvement was prioritized based on supply vulnerabilities revealed during prolonged drought conditions.
3. Dam failure preparedness actions were incorporated following reassessment of the city's location in potential inundation zones.
4. Wildfire mitigation measures received greater emphasis due to increasing risk in surrounding watershed areas that could impact water quality and supply.
5. Seismic assessment of public facilities was prioritized after building evaluations identified structural vulnerabilities in several aging municipal structures.

7.10.7 Development in Hazard Prone Areas - Orangeville City

In the years since the previous hazard plan, most of the development in Orangeville was infill and redevelopment. This development hasn't significantly changed the community's overall vulnerability.

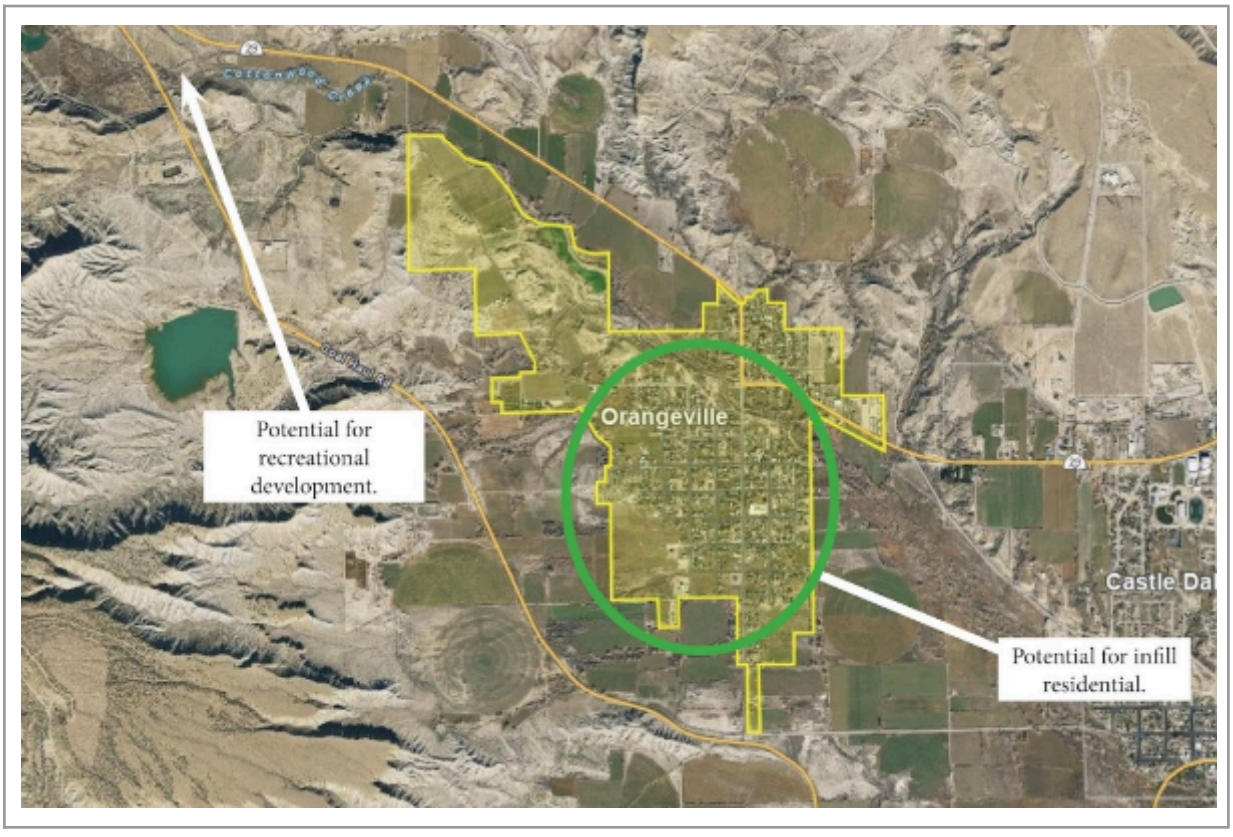
Since 2018, development activities affecting hazard vulnerability include:

1. **Water Storage Improvements**: Installation of additional water storage capacity has DECREASED vulnerability to drought conditions and fire suppression limitations.
2. **Stormwater System Upgrades**: Drainage improvements along Castle Dale Road and in the western neighborhood have DECREASED vulnerability to localized flooding during heavy precipitation events.
3. **Adobe Wash Management**: Enhanced maintenance and structural improvements along Adobe Wash have DECREASED vulnerability to flash flooding by improving flow capacity during storm events.
4. **Residential Construction**: Limited new home development has occurred outside identified flood hazard zones and built to current building codes, maintaining the city's current vulnerability level.
5. **Public Facility Renovations**: Upgrades to municipal buildings have incorporated hazard-resistant features, slightly DECREASING vulnerability to various hazards, particularly seismic events.

These infrastructure improvements, while modest in scale, have generally decreased Orangeville's vulnerability to primary hazards, particularly flooding and drought, through targeted investments in critical systems.

Orangeville isn't expecting future development that would increase the community's overall vulnerability. Areas of expected growth are illustrated below.

Figure 7.10.7.1 - Illustration of Potential Development Areas



7.10.8 Status of 2018 Mitigation Actions

While the 2018 plan primarily took a countywide approach, Orangeville City participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
DF1: Install Early Remote Warning System	Participant	Modified	System design updated for more comprehensive coverage; partial installation completed.
D1: Install needed water storage tanks	Lead	In Progress	Funding secured; construction began in 2023.
F8: Adobe Wash Regulatory Reservoir dam	Lead	Modified	Maintenance procedures established; capital improvements pending.
E3: Planning and Zoning building codes	Participant	Completed	County now provides building inspection.
SW1: StormReady program	Participant	Completed	Certification achieved in 2023.

7.10.9 Orangeville Mitigation Strategy

7.10.9.1 Orangeville Strategy Overview

Orangeville City employs a comprehensive approach to hazard mitigation focused on protecting critical infrastructure, enhancing emergency preparedness, and reducing vulnerability to natural hazards through both structural and non-structural measures. The city prioritizes actions that address its most significant hazard threats—particularly flooding, drought, and dam failure—while maintaining readiness for other potential hazards. Orangeville's strategy balances immediate protective measures with long-term planning initiatives, emphasizing infrastructure resilience, updated development standards, and public education. The city coordinates closely with county emergency management and regional partners to maximize available resources and implement cost-effective solutions that serve its vulnerable populations while preserving the community's rural character.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Orangeville City employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water storage capacity improvements
    - Stormwater management system enhancements
    - Adobe Wash maintenance program
    - Transportation infrastructure hardening
- **Planning & Regulations**:

    - Updated subdivision standards for stormwater management
    - Strategic annexation planning for water resource control
    - Building code improvements for hazard resilience
    - Emergency operations planning
- **Natural Systems**:
    - Watershed protection initiatives
    - Riparian corridor preservation along Cottonwood Creek
    - Vegetative barriers for erosion control
    - Forest management coordination with federal agencies
- **Education/Awareness**:
    - Flash flood warning systems and protocols
    - Water conservation programs
    - Firewise community initiatives
    - Public emergency preparedness campaigns

Note: Prior to selecting the mitigation actions presented in this section, the jurisdiction considered a comprehensive range of potential mitigation actions. The actions selected above represent those deemed most appropriate, feasible, and effective for the jurisdiction based on their risk assessment, capabilities, and priorities.

7.10.9.2 Earthquake Mitigation Actions

1. **Seismic assessment and retrofit of critical municipal facilities**
    - **Description**: Conduct comprehensive seismic vulnerability assessments of key city facilities and implement priority retrofits based on findings.
    - **Responsible Party**: Orangeville City Administration (Lead), County Building Department
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, Community Impact Board (CIB)
    - **Estimated Cost**: $250,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Many municipal buildings were constructed before current seismic standards, creating vulnerability for essential services during earthquake events.
    - **Status**: Planned
2. **Adopt the International Building Code (IBC) and International Residential Code (IRC) into local land use code**
    - **Description**: Update and implement building codes to ensure new construction meets current seismic safety standards.
    - **Responsible Party**: Orangeville City Council (Lead), County Building Department

- **Potential Funding Source**: City general funds
- **Estimated Cost**: Staff time
- **Timeframe**: 2025
- **Priority Level**: Low
- **Justification**: Current building codes need updating to incorporate latest seismic standards, ensuring future development is more resilient.
- **Status**: Planned

7.10.9.3 Flood Mitigation Actions

1. **Reduce impact of catastrophic storm flooding**
    - **Description**: Upgrade, replace and repair aging curb, gutter and sidewalks to improve stormwater management system performance during heavy rainfall events.
    - **Responsible Party**: Orangeville Public Works Department
    - **Potential Funding Source**: CIB, State Division of Water Resources
    - **Estimated Cost**: $500,000
    - **Timeframe**: 2023-2026
    - **Priority Level**: Medium
    - **Justification**: Aging stormwater infrastructure is insufficient to handle increasing precipitation intensities, creating flood risk for residential areas.
    - **Status**: Ongoing
2. **Establish a process to clean and maintain Adobe Wash**
    - **Description**: Develop and implement regular maintenance protocols for Adobe Wash to prevent debris accumulation and ensure proper water flow during heavy precipitation events.
    - **Responsible Party**: Orangeville Public Works Department
    - **Potential Funding Source**: City general funds, County assistance
    - **Estimated Cost**: $15,000 annually
    - **Timeframe**: 2025-2026
    - **Priority Level**: High
    - **Justification**: - The Adobe Wash Regulating Reservoir (moderate hazard dam, 23 acre-feet capacity) is a critical drainage feature that has experienced reduced capacity due to sediment accumulation, increasing flood risk. While this dam is not classified as a high hazard potential dam, regular maintenance reduces vulnerability to localized flooding.
    - **Status**: Ongoing
3. **Adopt policies to reduce stormwater runoff**

- **Description**: Update subdivision ordinance and development standards to incorporate green infrastructure requirements and improved stormwater management.
- **Responsible Party**: Orangeville Planning Department (Lead), City Council
- **Potential Funding Source**: State planning assistance grants
- **Estimated Cost**: $14,000
- **Timeframe**: 2024
- **Priority Level**: High
- **Justification**: Current development standards do not adequately address stormwater management, contributing to increasing runoff volumes during storm events.
- **Status**: Underway

7.10.9.4 Wildfire Mitigation Actions

1. **Join the "Firewise Communities/USA" recognition program**
    - **Description**: Complete the process to become recognized as a Firewise community, implementing recommended practices for wildfire risk reduction.
    - **Responsible Party**: Orangeville Emergency Management (Lead), Fire Department
    - **Potential Funding Source**: Local funds, volunteer efforts
    - **Estimated Cost**: $10,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: Low
    - **Justification**: Orangeville's proximity to wildland areas, particularly in the surrounding foothills, creates vulnerability to wildfire that can be reduced through Firewise practices.
    - **Status**: Upcoming
2. **Create defensible space requirements for properties in wildland-urban interface areas**
    - **Description**: Develop and implement ordinances requiring defensible space maintenance for properties located in wildland-urban interface zones.
    - **Responsible Party**: Orangeville Planning Department (Lead), Fire Department
    - **Potential Funding Source**: Local funds, Utah Division of Forestry, Fire, and State Lands
    - **Estimated Cost**: $15,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: Properties at the city's perimeter face elevated wildfire risk that can be substantially reduced through proper defensible space requirements.
    - **Status**: Planned

7.10.9.5 Dam Failure Mitigation Actions

1. **Pursue strategic annexation to secure Mill Dam and ECRC**
    - **Description**: Implement annexation process for areas containing the Mill Dam and ECRC facilities to gain direct oversight of these critical infrastructures. This will allow the city to implement enhanced safety measures, conduct regular inspections, and improve early warning capabilities, reducing the risk to downstream populations and infrastructure in the event of a dam failure.
    - **Responsible Party**: Orangeville City Administration (Lead), City Council
    - **Potential Funding Source**: City general funds
    - **Estimated Cost**: $25,000 (legal and administrative costs)
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: The Mill Dam and ECRC facilities present significant hazard risk to Orangeville should they fail, but currently fall outside city jurisdiction, limiting mitigation options.
    - **Status**: Upcoming
2. **Develop emergency action plan for dam failure scenarios**
    - **Description**: Create comprehensive emergency action plans specifically addressing dam failure scenarios, including evacuation routes, notification systems, and coordination protocols.
    - **Responsible Party**: Orangeville Emergency Management (Lead), County Emergency Management
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP)
    - **Estimated Cost**: $30,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: High
    - **Justification**: Orangeville's downstream location from multiple dams requires specialized emergency planning to protect residents in the event of dam failure.
    - **Status**: Planned
3. **Critical Facility Protection in Joe's Valley Reservoir Inundation Zone**
    - **Description**: Conduct assessment of city facilities located within the Joe's Valley Reservoir (high hazard potential dam) inundation zone and implement protective measures for critical municipal infrastructure. Measures include elevating utilities and mechanical systems at facilities within inundation areas, installing flood-resistant construction materials and barriers, implementing emergency backup power systems to maintain operations during dam failure events, and adopting policies restricting future critical facility development in

highest-risk inundation areas. These permanent protective measures reduce long-term vulnerability of essential city services to high hazard potential dam failure.

- **Responsible Party**: Orangeville City Administration (Lead), Public Works Department
- **Potential Funding Source**: FEMA High Hazard Potential Dam (HHPD) Grant Program, FEMA Building Resilient Infrastructure and Communities (BRIC) Program, Community Impact Board (CIB)
- **Estimated Cost**: $200,000
- **Timeframe**: 2025-2028
- **Priority Level**: High
- **Justification**: Orangeville is located one mile downstream from Adobe Wash Regulating Reservoir (moderate hazard) and in the inundation zone of Joe's Valley Reservoir (high hazard potential dam, 62,500 acre-foot capacity, maximum breach flow potential). Joe's Valley Reservoir is classified as a high hazard potential dam by the Bureau of Reclamation due to significant downstream development. Protecting critical city facilities ensures continued governmental operations and emergency services following a dam failure event. This action specifically addresses the high hazard potential dam and is eligible for FEMA HHPD grant funding.
- **Status**: Planned

7.10.9.6 Drought Mitigation Actions

1. **Install needed water storage tanks**
    - **Description**: Complete installation of additional water storage tanks to increase system capacity during drought conditions.
    - **Responsible Party**: Orangeville Public Works Department
    - **Potential Funding Source**: Local funds, State Division of Drinking Water, CIB
    - **Estimated Cost**: $3,000,000
    - **Timeframe**: 2018-2024
    - **Priority Level**: High
    - **Justification**: Increased water storage capacity is essential for maintaining adequate supply during extended drought periods, particularly with growing population demands.
    - **Status**: In progress, approximately 65% complete
2. **Implement water conservation program**
    - **Description**: Develop and implement comprehensive water conservation program including education, incentives for water-efficient fixtures, and conservation-oriented rate structures.
    - **Responsible Party**: Orangeville Public Works Department (Lead), City Administration
    - **Potential Funding Source**: State Division of Water Resources, Local funds

- **Estimated Cost**: $35,000
- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: Proactive water conservation measures can significantly extend available water supplies during drought conditions while creating long-term usage efficiency.
- **Status**: Planned

7.10.9.7 Severe Weather Mitigation Actions

1. **Establish emergency notification system for severe weather events**
    - **Description**: Implement advanced notification system for severe weather events, including multiple communication channels to reach all residents.
    - **Responsible Party**: Orangeville Emergency Management
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Local funds
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium
    - **Justification**: Timely notifications during severe weather events are essential for protecting vulnerable populations and allowing residents to take appropriate shelter.
    - **Status**: Planned
2. **Develop heat / cold wave response plan**
    - **Description**: Create comprehensive response plan for heat wave and/or cold wave events, including cooling/warming centers, check-in systems for vulnerable residents, and emergency utilities assistance.
    - **Responsible Party**: Orangeville Emergency Management, City Administration
    - **Potential Funding Source**: Local funds, County emergency management
    - **Estimated Cost**: $10,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: Heat wave or cold wave events particularly impact Orangeville's elderly population (18.1%) and those with disabilities (12.4%), requiring specialized response planning.
    - **Status**: Planned

7.10.9.8 Justification for Hazards Not Included

- **Landslide Mitigation Actions**: While landslides are identified as a potential hazard in Table 6.5.7 for Emery County, Orangeville's specific geographic location has limited direct exposure to significant landslide risk areas. The city's relatively flat topography and distance from major canyon slopes results in minimal landslide vulnerability within city boundaries. The primary landslide concerns relate to transportation routes outside city limits, which fall under County or state transportation agency jurisdiction.
- **Problem Soils Mitigation Actions**: Although problem soils are identified as a county-wide hazard in Table 6.5.7, geotechnical assessments indicate that Orangeville has limited exposure to problematic soil conditions that would significantly impact development or infrastructure. The city follows county building code requirements for soil testing and appropriate foundation design where localized soil concerns may exist. These standard practices are deemed sufficient given the low risk profile, and no specialized mitigation actions beyond normal engineering practices are currently needed.
- **Infestation Mitigation Actions**: While infestation is noted in Table 6.5.7 as a county-wide concern, Orangeville addresses this hazard through ongoing coordination with the Emery County Weed and Mosquito Department rather than through independent city initiatives. The cooperative approach ensures that Orangeville benefits from county-level expertise and resources for monitoring and responding to potential infestations, making separate city-specific actions unnecessary at this time.

7.10.10 Information Integration

Past Integration (2018-2023): Orangeville City was a stakeholder of the previous plan. The city did not formally integrate the previous plan into other planning mechanisms during this period as no general plan or major planning document updates occurred.

Current Integration: Orangeville City will incorporate relevant elements of this updated LHMP into its:

- Forthcoming subdivision ordinance update in 2024
- Capital improvement program prioritization
- Future general plan development
- Water system master planning

8.0 Special Service Districts (SSD)

Utah State Code, Annotated, Section 17B-1-102, defines Specialized Local Districts (SLD) as a local district that is a cemetery maintenance district, a drainage district, a fire protection district, an improvement district, an irrigation district, a metropolitan water district, a mosquito abatement district, a public transit district, a service area or a water conservancy district. An SLD is a body corporate with perpetual succession, a quasi-municipal corporation, and is a political subdivision of the state.

SLDs may be created to provide services consisting of: airport operations; cemetery operations; fire, paramedic, and emergency services; garbage collection and disposal; health care including health department or hospital service; library operations; abatement or control of mosquitoes and other insects; park or recreation facilities or services; sewage system operations; street lighting; construction and maintenance of curb, gutter and sidewalk; transportation, including providing streets and roads; water system operations, including the collection, storage, retention, control, conservation, treatment, supplying, distribution, or reclamation of water, including storm, flood, sewage, irrigation, and culinary water, whether the system is operated on a wholesale or retail level or both.

Because SLDs are defined as quasi-municipal, they may be eligible for FEMA disaster funding reimbursement under the Stafford Act. Most of the SLD's have jurisdictional boundaries within a specific County.

Specialized local districts identified in the County are listed below. There may be others not identified here which will be included as they adopt this plan.

8.1 Castle Valley Special Service District (SSD)

8.1.1 Background

Utah State Code, Annotated, Section 17B-1-102, defines Specialized Local Districts (SLD) as a local district that is a cemetery maintenance district, a drainage district, a fire protection district, an improvement district, an irrigation district, a metropolitan water district, a mosquito abatement district, a public transit district, a service area or a water conservancy district. An SLD is a body corporate with perpetual succession, a quasi-municipal corporation, and is a political subdivision of the state.

The Castle Valley Special Service District (CVSSD) is a local governmental entity located in Emery County. It serves as a special service district that provides various essential services to the residents and communities within its jurisdiction. The CVSSD's primary role is to administer and manage services such as water supply, wastewater treatment, solid waste management, and other public utilities and infrastructure projects.

The CVSSD is responsible for ensuring the provision of clean and safe drinking water to the residents in its service area. It manages water treatment facilities, distribution systems, and storage infrastructure to meet the water needs of the community. Additionally, the CVSSD oversees wastewater treatment and disposal, ensuring the proper treatment of sewage and the protection of the local environment.

In terms of solid waste management, the CVSSD implements programs for the collection, disposal, and recycling of solid waste materials, promoting environmentally friendly practices within its jurisdiction.

The CVSSD operates under the authority of a board of directors who are responsible for policy-making, budgeting, and overall governance of the district. The board members are typically elected or appointed officials who represent the interests of the community.

By providing essential services, the Castle Valley Special Service District plays a crucial role in enhancing the quality of life for residents within its jurisdiction, ensuring the efficient and sustainable management of water, wastewater, and solid waste services.

8.1.2 Location & Extent

The Castle Valley Special Service District serves communities throughout Emery County. It owns and operates water and wastewater facilities which serve multiple municipalities within the service area.

8.1.3 Demographic & Population Growth

The Castle Valley Special Service District serves residents throughout Emery County's municipalities and surrounding areas. (See County-level statistics).

8.1.4 Vulnerable Populations

Not directly applicable to the District. (See County-level statistics).

8.1.5 Specific Stakeholder Hazards & Vulnerabilities

Analysis of natural hazards affecting the Castle Valley Special Service District revealed potential losses associated with flooding, drought, and infrastructure damage from earthquakes. These hazards have varied potential to impact life, property, infrastructure, and other district assets.

- **FLOODING (F):** The district's infrastructure, particularly in low-lying areas, remains vulnerable to flash flood events common in the region. Critical facilities including pump stations and treatment plants require ongoing mitigation. Potential impacts include contamination of drinking water supplies, physical damage to water and wastewater treatment facilities, sewage backups into homes and businesses, complete service interruption to multiple communities, overwhelming repair costs, and public health emergencies from water-borne diseases.
- **DROUGHT (D):** Extended drought conditions place significant strain on the district's water supply and distribution capabilities, potentially affecting service reliability. Potential impacts include insufficient water supply to meet community needs, deteriorating water quality as source levels decrease, implementation of emergency conservation measures, economic losses to water-dependent businesses, and substantial costs for developing alternative water sources.
- **EARTHQUAKE (E):** The district's water and wastewater infrastructure, including aging pipelines and treatment facilities, could be vulnerable to seismic events. Potential impacts include widespread pipe breakage throughout distribution systems, treatment facility failure causing service interruptions, contamination of drinking water from cross-connections, insufficient water for fire suppression, and extensive repair costs exceeding district financial resources.

8.1.6 Changes Since 2018 Plan

The Castle Valley Special Service District has experienced several notable changes affecting hazard vulnerability:

1. **Infrastructure Improvements**:
    - Completion of water distribution system upgrades.
    - Implementation of enhanced monitoring systems.
    - Improved emergency power backup capabilities.
2. **Service Area Modifications**:
    - Updated service requirements for evolving community needs.
    - Enhanced coordination with municipal partners.
    - Modified response protocols for vulnerable populations.
3. **Operational Enhancements**:
    - Implementation of new water quality monitoring technologies.
    - Enhanced drought response capabilities.
    - Improved emergency response protocols.
4. **Risk Assessment Updates**:
    - Comprehensive infrastructure vulnerability analysis.
    - Refined evaluation of drought impacts on water supplies.
    - Updated assessment of flood risks to critical facilities.

These changes directly informed the development of Castle Valley Special Service District's section in this plan update. Specifically:

1. Water system seismic resilience projects were incorporated due to infrastructure vulnerability assessments conducted since 2018.
2. Flood protection measures for critical water and wastewater facilities were prioritized based on specific vulnerabilities identified during recent precipitation events.
3. Emergency power capability enhancement was included following power disruptions during severe weather events that affected water service reliability.
4. Source water protection actions were incorporated to address wildfire-related water quality impacts observed in nearby watersheds.
5. Drought contingency planning was prioritized based on operational challenges experienced during extended dry periods affecting water sources and delivery capabilities.

8.1.7 Development in Hazard Prone Areas - Castle Valley SSD

This issue is not directly applicable to the District . See County and municipal profiles for development expectations.

However, since 2018, the District has implemented the following infrastructure changes affecting hazard vulnerability:

1. **Water Treatment Facility Upgrades**: Modernization of treatment facilities has DECREASED vulnerability to service disruptions during flood and seismic events through improved structural resilience and operational redundancy.

2. **Distribution System Improvements**: Replacement of aging water lines with more resilient materials has DECREASED vulnerability to water service disruptions during earthquake events.
3. **Emergency Power Systems**: Installation of backup generation at critical facilities has DECREASED vulnerability to service interruptions during severe weather events and resulting power outages.
4. **Monitoring Technology**: Implementation of advanced water system monitoring has DECREASED vulnerability to undetected infrastructure failures during hazard events by enabling faster response.

These infrastructure investments have strategically reduced the District's vulnerability to service disruptions across multiple hazard scenarios while improving its capacity to maintain critical water and wastewater services during emergency events.

8.1.8 Status of 2018 Mitigation Actions - Castle Valley SSD

While the 2018 plan did not assign specific actions solely to the Service District, the District participated in several related initiatives:

2018 Action	Role	Current Status	Explanation
F5: Reduce catastrophic storm flooding impacts	Lead	Ongoing	Working on stormwater infrastructure improvements
D1: Promote water conservation practices	Participant	Ongoing	Public education support and implementation of conservation measures
DF2: Silt management at reservoirs	Supporting	Modified	Working with County on updated approach

8.1.9 Castle Valley Special Service District Mitigation Strategy

8.1.9.1 Castle Valley Strategy Overview

The Castle Valley Special Service District employs a comprehensive approach to hazard mitigation that focuses on protecting critical water and wastewater infrastructure while ensuring service continuity during disasters. This approach balances infrastructure hardening, operational protocols, and resource management to address multiple hazards including earthquakes, flooding, drought, and wildfire threats. The District prioritizes projects that provide maximum benefit to public health and safety, with particular emphasis on ensuring water availability, maintaining water quality, and preserving system functionality during emergencies. This strategy leverages a combination of structural improvements, planning enhancements, natural system protection, and public education to create a resilient water service network throughout the District's service area.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

The Castle Valley Special Service District employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water system improvements and hardening
    - Treatment facility upgrades for resilience
    - Emergency power systems installation
    - Pipeline reinforcement in vulnerable areas
- **Planning & Regulations**:
    - Emergency response procedures development
    - System maintenance standards implementation
    - Operating protocols for disaster scenarios
    - Service restoration prioritization planning
- **Natural Systems**:
    - Watershed protection coordination
    - Source water management improvement
    - Natural infrastructure utilization
    - Erosion control implementation
- **Education/Awareness**:
    - Water conservation promotion
    - Emergency notification systems
    - Public safety information campaigns
    - Community preparedness coordination

***Note**: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible. Actions were prioritized to maximize benefit to critical infrastructure and public health and safety.*

8.1.9.2 Earthquake Mitigation Actions

1. **Replace Asbestos Cement Water Transmission Pipeline**
    - **Description**: Replace the existing asbestos cement water transmission pipeline with PVC to increase seismic resilience and reduce failure risk during earthquakes.
    - **Responsible Party**: Castle Valley Special Service District Engineering Department
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program, CIB, USDA Rural Development
    - **Estimated Cost**: $1,016,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: High
    - **Justification**: The existing asbestos cement pipeline is highly vulnerable to seismic events, potentially compromising water delivery to multiple communities. PVC replacement will significantly reduce failure risk and ensure continued service during earthquakes.

- **Status**: Engineering phase

2. **Seismic Assessment of Critical Water Infrastructure**
    - **Description**: Conduct comprehensive seismic vulnerability assessment of all water and wastewater treatment facilities, pump stations, and critical distribution nodes.
    - **Responsible Party**: Castle Valley Special Service District Engineering Department
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), Utah Division of Water Resources
    - **Estimated Cost**: $75,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium
    - **Justification**: Identifying specific seismic vulnerabilities in water infrastructure will enable targeted mitigation investments, reducing potential service disruptions during earthquake events.
    - **Status**: Planned

8.1.9.3 Flooding Mitigation Actions

1. **Stormwater System Improvements**
    - **Description**: Reduce impacts of catastrophic storm flooding through drainage system improvements in service areas, including culvert upgrades, retention basins, and channel maintenance.
    - **Responsible Party**: Castle Valley Special Service District Operations Department
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance, CIB
    - **Estimated Cost**: $1,500,000
    - **Timeframe**: 2023-2028
    - **Priority Level**: Medium
    - **Justification**: Improved stormwater management will reduce flood damage to critical water infrastructure while minimizing service disruptions during heavy precipitation events.
    - **Status**: Ongoing

2. **Flood-Resistant Upgrades for Pump Stations**
    - **Description**: Install flood barriers, elevation modifications, and waterproof controls at vulnerable pump stations and treatment facilities in flood-prone areas.
    - **Responsible Party**: Castle Valley Special Service District Engineering Department
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance, CIB
    - **Estimated Cost**: $350,000
    - **Timeframe**: 2024-2027

- **Priority Level**: Medium
- **Justification**: Critical pump stations in flood-prone areas require specific protection measures to ensure continued operation during flood events.
- **Status**: Planning phase

8.1.9.4 Wildfire Mitigation Actions

1. **Spring Collection Infrastructure Protection**
    - **Description**: Improve road access to springs and remove fire-damaged trees threatening spring collection boxes to protect water supply sources.
    - **Responsible Party**: Castle Valley Special Service District Operations Department
    - **Potential Funding Source**: Utah Division of Forestry, Fire & State Lands; District funds
    - **Estimated Cost**: $100,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: High
    - **Justification**: Fire-damaged trees threaten spring collection infrastructure, requiring immediate mitigation to protect water sources.
    - **Status**: Upcoming
2. **Defensible Space Implementation**
    - **Description**: Create and maintain defensible space around critical water infrastructure facilities, including treatment plants, pump stations, and control buildings.
    - **Responsible Party**: Castle Valley Special Service District Operations Department
    - **Potential Funding Source**: Utah Division of Forestry, Fire & State Lands; District funds
    - **Estimated Cost**: $45,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Protecting critical infrastructure from wildfire damage through vegetation management reduces service disruption risk while ensuring continued operation during fire events.
    - **Status**: Planning phase

8.1.9.5 Problem Soils Mitigation Actions

1. **Soil Stability Assessment for Critical Infrastructure**
    - **Description**: Conduct comprehensive soil stability assessments for water and wastewater infrastructure in areas with expansive soils, followed by implementation of appropriate foundation reinforcements.

- **Responsible Party**: Castle Valley Special Service District Engineering Department
- **Potential Funding Source**: CIB, District funds
- **Estimated Cost**: $85,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Problem soils present significant risks to underground infrastructure integrity, requiring specialized assessment and mitigation measures.
- **Status**: Planned

8.1.9.6 Dam Failure Mitigation Actions

1. **Structural Infrastructure Protection Integration**
    - **Description**: Implement automated infrastructure protection systems that activate upon dam failure early warning signals, including automatic valve closures, backup power activation for critical pumping stations, and structural barriers to protect water treatment facilities from inundation. Integration with early warning systems enables proactive infrastructure protection measures that reduce long-term vulnerability to service disruption and equipment damage.
    - **Responsible Party**: Castle Valley Special Service District Emergency Management Coordinator
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program, Bureau of Reclamation
    - **Estimated Cost**: $50,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Integration with early warning systems will allow preventative measures to protect water infrastructure before inundation occurs.
    - **Status**: Planning phase
2. **Permanent Infrastructure Hardening in Inundation Zones**
    - **Description**: Install permanent structural modifications to water infrastructure within dam inundation zones, including elevated equipment installations, flood-resistant building materials, sealed underground utilities, reinforced structures, and redundant system pathways located outside inundation areas. These permanent modifications reduce long-term vulnerability to dam failure impacts and ensure continued water service capability.
    - **Responsible Party**: Castle Valley Special Service District Engineering Department
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program, CIB
    - **Estimated Cost**: $175,000

- **Timeframe**: 2025-2028
- **Priority Level**: Medium
- **Justification**: Critical water infrastructure in dam inundation zones requires specialized protection to minimize damage and service disruption.
- **Status**: Planned

8.1.9.7 Drought Mitigation Actions

1. **Drought Contingency Plan Development**
    - **Description**: Develop comprehensive drought contingency plans to ensure water availability during extended dry periods, including source prioritization, usage restrictions, and alternative supply options.
    - **Responsible Party**: Castle Valley Special Service District Management
    - **Potential Funding Source**: Utah Division of Water Resources, District funds
    - **Estimated Cost**: $45,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: The region's vulnerability to extended drought requires comprehensive planning to ensure continued water service during water shortage conditions.
    - **Status**: Planning phase
2. **Water Source Redundancy Development**
    - **Description**: Develop additional water sources and interconnections to provide system redundancy during drought conditions.
    - **Responsible Party**: Castle Valley Special Service District Engineering Department
    - **Potential Funding Source**: Utah Division of Water Resources, USDA Rural Development, CIB
    - **Estimated Cost**: $1,500,000
    - **Timeframe**: 2025-2028
    - **Priority Level**: High
    - **Justification**: Additional water sources are critical to ensuring service continuity during extended drought periods, particularly for communities with limited source options.
    - **Status**: Conceptual planning

8.1.9.8 Severe Weather Mitigation Actions

1. **Emergency Power System Enhancement**

- **Description**: Enhance emergency power capabilities at critical district facilities through generator installation, maintenance, and fuel storage improvements.
- **Responsible Party**: Castle Valley Special Service District Operations Department
- **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), CIB
- **Estimated Cost**: $350,000
- **Timeframe**: 2024-2026
- **Priority Level**: High
- **Justification**: Power outages during severe weather events present significant risks to water service continuity, requiring reliable backup power at critical facilities.
- **Status**: In progress

2. **Weather-Hardened SCADA System Implementation**
   - **Description**: Upgrade supervisory control and data acquisition (SCADA) systems with weather-hardened components to ensure continued monitoring and control capabilities during severe weather events.
   - **Responsible Party**: Castle Valley Special Service District Engineering Department
   - **Potential Funding Source**: CIB, District funds
   - **Estimated Cost**: $275,000
   - **Timeframe**: 2025-2027
   - **Priority Level**: Medium
   - **Justification**: Maintaining monitoring and control capabilities during severe weather events is essential for system management and safety.
   - **Status**: Planning phase

8.1.9.9 Multi-Hazard Mitigation Actions

1. **Emergency Response Protocol Implementation**
   - **Description**: Implement comprehensive emergency response protocols to ensure continuity of water and wastewater services during disasters of all types.
   - **Responsible Party**: Castle Valley Special Service District Management
   - **Potential Funding Source**: FEMA Emergency Management Performance Grants, County Emergency Management, District funds
   - **Estimated Cost**: $25,000
   - **Timeframe**: 2022-2024
   - **Priority Level**: High

- **Justification**: Formalized emergency response protocols ensure consistent and effective actions during all hazard events, minimizing service disruptions.
- **Status**: Completed

2. **Critical Infrastructure Mapping and Documentation**
    - **Description**: Develop comprehensive digital mapping and documentation of all infrastructure components with vulnerability assessments for multiple hazards.
    - **Responsible Party**: Castle Valley Special Service District GIS Department
    - **Potential Funding Source**: CIB, District funds
    - **Estimated Cost**: $65,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Accurate infrastructure documentation is essential for effective mitigation planning, emergency response, and recovery operations across all hazard types.
    - **Status**: Ongoing

8.1.9.10 Justification for Hazards Not Included

- **Landslide and Infestation**: While these hazards are not specifically addressed with individual actions in this plan, they are considered within the Multi-Hazard Mitigation Actions. The District's infrastructure is minimally exposed to landslide risk areas, and the comprehensive mapping and documentation action will identify any vulnerable components. Similarly, infestation risks to water systems are addressed through routine operations and maintenance protocols rather than specific mitigation actions. If future vulnerability assessments indicate increased risks from these hazards, specific actions will be developed in subsequent plan updates.

8.1.10 Integration of 2018 Plan

1. **Past Integration (2018-2023):** The District integrated elements of the previous hazard mitigation plan in several ways:
    - Updated emergency response procedures based on identified vulnerabilities.
    - Prioritized capital improvements for infrastructure at highest risk.
    - Enhanced coordination with municipal partners on joint mitigation efforts.
2. **Current Integration:** The District will incorporate relevant elements of this updated plan into its:
    - Infrastructure master planning process.
    - Capital improvements program prioritization.
    - Emergency response and continuity of operations planning.
    - Public education and outreach efforts.

8.2 Emery County EMS Special Service District (SSD)

8.2.1 Background

Utah State Code, Annotated, Section 17B-1-102, defines Specialized Local Districts (SLD) as a local district that is a cemetery maintenance district, a drainage district, a fire protection district, an improvement district, an irrigation district, a metropolitan water district, a mosquito abatement district, a public transit district, a service area or a water conservancy district. An SLD is a body corporate with perpetual succession, a quasi-municipal corporation, and is a political subdivision of the state.

The Emery County EMS Special Service District is a local governmental entity established to oversee the provision of professional emergency medical care to all residents of Emery County. The district is responsible for ensuring that emergency medical services are accessible, efficient, and meet all required standards throughout its service area.

The district coordinates emergency medical response across the county, including ambulance services, emergency medical technician (EMT) staffing, equipment maintenance, and ongoing professional training. Through these efforts, the Emery County EMS Special Service District plays a vital role in public safety and healthcare delivery throughout the region.

The district operates under the direction of a governing board that establishes policies, oversees budgeting, and ensures that emergency medical resources are allocated effectively to serve the entire county population.

8.2.2 Location & Extent

The Emery County EMS Special Service District serves the entirety of Emery County, providing emergency medical services across all municipalities and unincorporated areas within county boundaries.

8.2.3 Demographic & Population Growth

The Emery County EMS Special Service District serves all residents of Emery County, regardless of location, socioeconomic status, or demographic characteristics.

8.2.4 Vulnerable Populations

Not directly applicable to the District. (See County-level statistics).

8.2.5 Specific Stakeholder Hazards & Vulnerabilities

- **EARTHQUAKE (E):** Seismic events could damage emergency medical facilities and equipment, potentially disrupting response capabilities at times of heightened need. Potential impacts include structural damage to EMS facilities rendering them unusable, destruction of critical medical equipment and supplies, ambulance service interruption when most needed, inability to respond to mass casualty incidents, extended response times during life-threatening emergencies, and increased patient mortality during the critical post-earthquake period.
- **LANDSLIDE (L):** Road blockages from landslides could isolate communities from emergency medical services, increasing response times during critical incidents. Potential impacts include complete inability to reach patients in cut-off areas, extended transport times to medical facilities

increasing mortality risk for time-sensitive conditions, damage to emergency vehicles attempting alternative routes, and resource depletion from extended operations in difficult conditions.

- **SEVERE WEATHER (SW)**: Extreme conditions could impede emergency response times and place additional strain on limited emergency medical resources during mass casualty events. Potential impacts include dangerous operating conditions for emergency vehicles, increased accident risks during response in hazardous conditions, surge in call volumes exceeding available resources, inability to reach remote patients during life-threatening emergencies, and potential for responder injuries during operations.

8.2.6 Changes Since 2018 Plan

The Emery County EMS Special Service District has experienced several notable changes affecting hazard response capabilities:

1. **Equipment and Resources**:
    - Aging ambulance fleet requiring replacement.
    - Updated emergency medical equipment needs.
    - Evolution of communication technologies.
2. **Training Requirements**:
    - Enhanced medical response protocols.
    - Evolving certification standards.
    - Specialized training needs for diverse emergency scenarios.
3. **Service Coordination:**
    - Improved integration with county emergency management.
    - Enhanced mutual aid agreements with neighboring jurisdictions.
    - Refined coordination with healthcare facilities.
4. **Risk Assessment**:
    - Updated analysis of emergency medical response capabilities.
    - Refined understanding of response time vulnerabilities.
    - Modified assessment of equipment and training needs.

These changes directly informed the development of Emery County EMS Special Service District's section in this plan update. Specifically:

1. Equipment modernization was prioritized based on operational challenges identified during recent emergency response events.
2. Alternative route planning for emergency response was incorporated due to access limitations experienced during recent landslide and flooding events.
3. Training enhancements were included to address evolving emergency medical needs identified through recent incident responses.

4. Communication system improvements were prioritized based on coordination challenges experienced during multi-agency emergency responses.
5. Multi-hazard emergency planning received greater emphasis to address the district's evolving service responsibilities and changing demographic profile of the county.

8.2.7 Development in Hazard Prone Areas - Emery County EMS SSD

This issue is not directly applicable to the District. See County and municipal profiles for development expectations.

8.2.8 Status of 2018 Mitigation Actions - Emery County EMS SSD

The 2018 plan did not assign specific actions to the EMS District. However, the District has participated in several county-wide initiatives:

2018 Action	Role	Current Status	Explanation
SW1: StormReady program participation	Supporting	Completed	Contributed to certification achieved in 2023
SW4: Install/relocate generators	Participant	Modified	Coordinated emergency power needs with County
Multi-hazard: Communication improvements	Supporting	Ongoing	Participation in radio system upgrades

8.2.9 Emery County EMS Special Service District Mitigation Strategy

8.2.9.1 Emery County EMS Strategy Overview

The Emery County EMS Special Service District employs a comprehensive mitigation approach focused on maintaining and enhancing emergency medical response capabilities during hazard events. This strategy involves maintaining adequate equipment, vehicles, and communications systems; ensuring personnel receive proper training for diverse emergency scenarios; developing specialized response protocols for different hazard situations; and coordinating with other emergency management agencies throughout the county. By implementing these measures, the District aims to minimize response times, maintain service continuity during hazard events, and protect both responders and the public during emergencies.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

The Emery County EMS Special Service District employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Emergency vehicle procurement and maintenance
    - Medical equipment upgrades
    - Communication system enhancements
    - Station facility improvements

- **Planning & Regulations**:
    - Emergency response protocols development
    - Training and certification standards
    - Resource deployment procedures
    - Mass casualty incident planning
- **Natural Systems**:
    - Access route assessment and planning
    - Alternative transportation methods for difficult terrain
    - Seasonal hazard preparation
    - Environmental risk monitoring
- **Education/Awareness**:
    - Community emergency preparedness education
    - First aid training promotion
    - Emergency notification systems
    - Public safety information campaigns

***Note**: Each action was selected based on its effectiveness, feasibility, and ability to improve emergency medical response capabilities during multiple hazard scenarios.*

8.2.9.2 Earthquake Mitigation Actions

1. **Develop comprehensive earthquake response protocols**
    - **Description**: Create and implement specialized emergency medical response plans for seismic events, including mass casualty management, alternative transportation routes, and special equipment needs.
    - **Responsible Party**: Emery County EMS Director
    - **Potential Funding Source**: State Emergency Management funding, FEMA grants
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Earthquakes can damage healthcare facilities, block transportation routes, and create mass casualty situations that require specialized medical response protocols.
    - **Status**: Planning phase
2. **Conduct seismic vulnerability assessment of EMS facilities**
    - **Description**: Evaluate EMS stations and equipment storage facilities for seismic vulnerabilities and develop retrofit priorities.
    - **Responsible Party**: Emery County EMS Director (Lead), County Building Department
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program

- **Estimated Cost**: $35,000
- **Timeframe**: 2025-2026
- **Priority Level**: Medium
- **Justification**: Ensuring EMS facilities remain operational after seismic events is critical for emergency response capability.
- **Status**: Upcoming

8.2.9.3 Landslide Mitigation Actions

1. **Develop alternate route planning for emergency response**
    - **Description**: Create comprehensive mapping and protocols for alternative emergency response routes when primary roads are blocked by landslides.
    - **Responsible Party**: Emery County EMS Director (Lead), County GIS Department
    - **Potential Funding Source**: State Emergency Management, County funds
    - **Estimated Cost**: $15,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Landslides frequently block canyon roads in Emery County, potentially isolating communities from emergency medical services.
    - **Status**: Upcoming
2. **Establish specialized equipment caches for difficult terrain access.**
    - **Description**: Strategically place specialized equipment for accessing patients in landslide-affected areas where conventional ambulances cannot reach.
    - **Responsible Party**: Emery County EMS Director
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP), County funds
    - **Estimated Cost**: $50,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Specialized equipment is needed to safely access and transport patients from areas affected by landslides.
    - **Status**: Upcoming
3. **Critical Infrastructure Protection in Dam Inundation Zones.**
    - **Description:** Implement permanent protective measures for county facilities and infrastructure within dam inundation zones, including elevated utilities at the County Courthouse complex, flood-resistant modifications to emergency services buildings, reinforced structures for critical county operations, and land use policies restricting new

critical infrastructure development in high-risk inundation areas. These permanent modifications reduce long-term vulnerability of county assets and ensure continued governmental operations following dam failure events.

- **Responsible Party:** Emery County Engineering Department (Lead), County Emergency Management
- **Potential Funding Source:** FEMA Hazard Mitigation Grant Program (HMGP), FEMA Building Resilient Infrastructure and Communities (BRIC)
- **Estimated Cost**: $250,000
- **Timeframe:** 2025-2028
- **Priority Level**: High
- **Justification:** Chapter 6.11 identifies significant county assets in dam inundation zones, including the Castle Dale Courthouse complex and emergency services facilities. Permanent protective measures reduce long-term vulnerability and ensure continuity of governmental operations.
- **Status:** Planned

8.2.9.4 Severe Weather Mitigation Actions

1. **Enhance patient transport capabilities during extreme weather**
    - **Description**: Improve vehicle capabilities for extreme weather conditions through equipment upgrades, chains, specialized tires, and vehicle modifications.
    - **Responsible Party**: Emery County EMS Director
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Utah Emergency Medical Services training funds, Local budget
    - **Estimated Cost**: $40,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: High
    - **Justification**: Severe weather significantly impedes emergency response capabilities and increases risks to both patients and responders.
    - **Status**: Upcoming
2. **Implement enhanced emergency medical protocols for severe weather scenarios**
    - **Description**: Develop specialized procedures for responding to medical emergencies during extreme heat, cold, high winds, and winter storms.
    - **Responsible Party**: Emery County EMS Director (Lead), Medical Director
    - **Potential Funding Source**: State Emergency Management, Local budget
    - **Estimated Cost**: $10,000
    - **Timeframe**: 2024-2025

- **Priority Level**: Medium
- **Justification**: Different severe weather conditions require specialized medical response approaches to ensure patient and responder safety.
- **Status**: In progress

3. **Emergency power backup for EMS facilities**
    - **Description**: Install or upgrade generators at EMS facilities to maintain operations during power outages caused by severe weather.
    - **Responsible Party**: Emery County EMS Director (Lead), County Facilities Management
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) grant
    - **Estimated Cost**: $35,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: High
    - **Justification**: Power outages from severe weather can disable critical EMS equipment and communications systems.
    - **Status**: Planning phase

8.2.9.5 Multi-Hazard Mitigation Actions

1. **Procure new ambulances**
    - **Description**: Acquire two new ambulances that are more reliable and meet current safety requirements.
    - **Responsible Party**: Emery County EMS Director
    - **Potential Funding Source**: State CIB, County budget
    - **Estimated Cost**: $600,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: High
    - **Justification**: Modern, reliable ambulances are essential for responding effectively to all hazard types.
    - **Status**: Upcoming
2. **Advanced EMT training**
    - **Description**: Provide education opportunities to advance EMTs to a paramedic level.
    - **Responsible Party**: Emery County EMS Director (Lead), Training Officer
    - **Potential Funding Source**: U.S. Department of Labor Workforce Innovation and Opportunity Act, Utah Emergency Medical Services training funds

- **Estimated Cost**: $60,000
- **Timeframe**: 2026-2030
- **Priority Level**: Medium
- **Justification**: Advanced medical training enables first responders to better handle complex medical emergencies resulting from natural hazards.
- **Status**: Upcoming

3. **Improve multi-agency coordination**
    - **Description**: Enhance coordination with county emergency management and other jurisdictions for multi-hazard response through joint training, exercises, and communication systems.
    - **Responsible Party**: Emery County EMS Director (Lead), County Emergency Manager
    - **Potential Funding Source**: Local budgets, FEMA Emergency Management Performance Grant Program
    - **Estimated Cost**: $15,000 annually
    - **Timeframe**: Ongoing
    - **Priority Level**: High
    - **Justification**: Effective multi-agency coordination is critical for responding to complex, multi-jurisdictional hazard events.
    - **Status**: Ongoing
4. **Comprehensive emergency medical response planning**
    - **Description**: Develop comprehensive emergency medical response plans for changing hazard patterns and emerging threats.
    - **Responsible Party**: Emery County EMS Director (Lead), Medical Director
    - **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, County funds
    - **Estimated Cost**: $30,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Continuously updated response plans are essential for addressing evolving hazard profiles in the county.
    - **Status**: Planning phase

8.2.9.6 Justification for Hazards Not Included

- **Flood**: While flooding is a significant hazard in Emery County, the EMS District's role in flood mitigation is primarily addressed through the multi-hazard actions, particularly the alternate route

planning and coordination with other agencies. The District focuses on response rather than direct flood mitigation.

- **Wildfire**: The EMS District's primary role during wildfires is medical response to affected individuals and support for firefighting personnel. These responsibilities are addressed in the multi-hazard response plans and through coordination with fire agencies. Specific wildfire mitigation actions would be duplicative of efforts by the fire authorities.
- **Problem Soils**: This geologic hazard primarily affects infrastructure development and maintenance rather than emergency medical services operations directly. The EMS District addresses any access challenges created by problem soils through its multi-hazard route planning.
- **Dam Failure**: The Emery County EMS SSD operates mobile emergency medical services without fixed facilities in dam inundation zones. The District's ambulances, medical equipment, and personnel deployment locations are situated outside mapped inundation areas. The nature of EMS operations—mobile response units rather than fixed infrastructure—limits direct vulnerability to dam failure events. The District's multi-hazard planning addresses access route alternatives and regional coordination that would apply to any hazard requiring modified service delivery.
- **Drought**: Drought conditions have limited direct impact on emergency medical service operations. The District maintains general emergency response capability regardless of drought conditions through its multi-hazard preparations.
- **Infestation**: This hazard primarily affects agriculture and natural resources with limited direct impact on emergency medical service operations. The District's role would be response to any related medical emergencies which is covered in its general emergency operations.

8.2.10 Integration of 2018 Plan

1. **Past Integration (2018-2023):** The District's integration of emergency management planning included:
    - Coordination with county-wide emergency response planning.
    - Alignment of medical resource deployment with identified hazard zones.
    - Participation in multi-agency emergency exercises based on plan scenarios.
2. **Current Integration:** The District will incorporate relevant elements of this updated plan into its:
    - Emergency medical response protocols and procedures.
    - Equipment procurement and deployment planning.
    - Training and certification requirements.
    - Resource allocation decision-making processes.

8.3 Emery County Recreation Special Service District (SSD)

8.3.1 Background

The Emery County Recreation Special Service District (ECRSSD) is a local governmental entity that focuses on providing recreational opportunities and enhancing the quality of life for residents in Emery County. The

district is dedicated to developing, managing, and maintaining recreational facilities, programs, and services within its jurisdiction.

The ECRSSD is responsible for the development and improvement of parks, trails, sports fields, and recreational facilities throughout the County. It aims to provide a wide range of recreational activities that cater to people of all ages and interests. This includes organizing sports leagues, tournaments, and events, as well as offering recreational programs such as fitness classes, arts and crafts, and educational workshops.

The district works closely with local communities, organizations, and stakeholders to identify recreational needs and priorities. It collaborates with schools, local government entities, and community groups to promote active lifestyles, community engagement, and the preservation of natural resources.

The ECRSSD is typically governed by a board of directors who oversee the district's operations, establish policies, and make decisions regarding budgeting and programming. The board members are often appointed or elected officials who represent the interests of the community.

Through its efforts, the Emery County Recreation Special Service District strives to provide residents with opportunities for physical activity, leisure, and social interaction. By investing in recreational infrastructure and programming, the district aims to enhance the well-being and overall quality of life for individuals and families throughout Emery County.

8.3.2 Location & Extent

Not directly applicable to the District. (See County-level statistics).

8.3.3 Demographic & Population Growth

Not directly applicable to the District. (See County-level statistics).

8.3.4 Vulnerable Populations

Not directly applicable to the District. (See County-level statistics).

8.3.5 Specific Stakeholder Hazards and Vulnerabilities

- **DAM FAILURE (DF)**: National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for 34% of all dam failures. Foundation defects, including settlement and slope instability, account for 30% of all failures. Piping and seepage cause 20% of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows, and cracks in the dam. The remaining 16% of failures are caused by other means. Potential impacts include sudden inundation of recreational facilities located in dam failure pathways, destruction of outdoor recreation infrastructure, visitor injuries or fatalities during catastrophic failures, loss of recreation-based tourism revenue, and substantial reconstruction costs for damaged facilities.
- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources. Potential impacts include water shortage for recreational facility operations, deterioration of fields and landscaped areas, cancellation of water-dependent recreational programming, reduced tourism affecting district revenue, and increased maintenance costs for vegetation recovery after drought conditions.

- **EARTHQUAKE (E)**: Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event. Potential impacts include structural damage to recreational buildings and facilities, injuries to facility users during events, destruction of specialized recreational equipment, closure of facilities during inspection and repair periods, and substantial reconstruction costs potentially exceeding insurance coverage.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow. Potential impacts include damage to recreational fields and courts, erosion of trails and outdoor facilities, contamination of facilities from floodwaters, disruption of scheduled recreational programming, and significant repair and cleaning costs.
- **LANDSLIDE (L)**: There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas. Potential impacts include destruction of trail systems in canyon and hillside areas, isolation of remote recreational facilities, damage to facility access roads preventing visitor entry, and substantial trail reconstruction costs following slope failures.
- **PROBLEM SOILS (PS)**: Problem soils are a risk to property and life due to its instability. Potential impacts include structural damage to recreational buildings, cracking of courts and playing surfaces, ongoing maintenance issues at affected facilities, potential injuries from sudden surface failures, and increased construction and repair costs due to specialized engineering requirements.
- **SEVERE WEATHER (SW)**: Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. Potential impacts include damage to outdoor facilities from wind and hail, visitor injuries during sudden weather events, cancellation of recreational programming affecting revenue, damage to vegetation and landscaping, and increased maintenance and repair costs following extreme weather conditions.
- **WILDLAND FIRES (WF)**: Wildfire can significantly impact identified areas of Emery County. Urban contiguous fire impacts lives and property in the County. Potential impacts include destruction of recreational facilities in wildland areas, complete loss of trail infrastructure, smoke damage to buildings, prolonged facility closures, evacuations of visitors during active fires, and substantial reconstruction costs for damaged facilities.

8.3.6 Changes Since 2018 Plan

The Emery County Recreation Special Service District has experienced several notable changes affecting hazard vulnerability:

1. **Infrastructure Changes**:
    - Completion of new recreational facility improvements.
    - Implementation of enhanced site security measures.
    - Upgraded emergency notification systems at public gathering areas.
2. **Service Population**:

- Modified programming to accommodate demographic shifts.
- Updated accessibility features for vulnerable populations.
- Enhanced coordination with schools and community organizations.

3. **Operational Updates**:
    - Implementation of new emergency response protocols.
    - Enhanced staff training for hazard identification and response.
    - Modified facility maintenance procedures to address potential hazards.
4. **Risk Assessment**:
    - Updated analysis of infrastructure vulnerabilities.
    - Enhanced evaluation of public safety concerns at facilities.
    - Modified assessments of wildfire risks to recreational areas.

These changes directly informed the development of Emery County Recreation Special Service District's section in this plan update. Specifically:

1. Facility safety assessments were incorporated based on vulnerability concerns identified during recent hazard events affecting recreational areas.
2. Emergency notification protocols for recreational sites were prioritized after communication challenges during recent severe weather events.
3. Wildfire defensible space actions were included to protect recreational infrastructure following fire risk assessments of facilities in wildland-urban interface areas.
4. Drought-resilient landscaping measures were incorporated based on maintenance challenges experienced during extended dry periods.
5. Multi-hazard staff training was prioritized to address identified knowledge gaps in emergency procedures at recreational facilities serving vulnerable populations.

8.3.7 Development in Hazard Prone Areas - Emery Recreation SSD

This issue is not directly applicable to the District. See County and municipal profiles for development expectations.

8.3.8 Status of 2018 Mitigation Actions - Emery Recreation SSD

The 2018 plan did not assign specific actions to the Recreation District. However, the District participated in the following countywide initiatives:

2018 Action	Role	Current Status	Explanation
WF1: Remove dead trees in WUI areas	Participant	Ongoing	Annual coordination with the County for recreation areas.
SW2: Encourage avalanche preparedness	Participant	Ongoing	Education materials at recreational sites.
D1: Promote water recycling	Participant	Ongoing	Conservation practices at facilities.

8.3.9 Emery County Recreation SSD Mitigation Strategy

8.3.9.1 Emery County Recreation SSD Strategy Overview

The Emery County Recreation Special Service District employs a comprehensive approach to hazard mitigation focusing on protecting recreational facilities, visitors, and natural resources across the county. The district's strategy includes structural improvements to recreational infrastructure, enhanced emergency protocols, natural resource protection measures, and public education initiatives. Their approach balances immediate safety concerns with long-term resilience planning, prioritizing actions that protect both visitors and critical recreational assets. The district coordinates closely with county emergency management and other agencies to ensure recreational facilities remain safe and accessible during hazard events while also serving as community resources during emergencies.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

The Emery County Recreation Special Service District employs a comprehensive mitigation strategy that includes:

- Infrastructure Projects:
    - Recreational facility improvements
    - Emergency shelters at key locations
    - Site access enhancements for emergency vehicles
- Planning & Regulations:
    - Emergency response procedures
    - Facility maintenance standards
    - Event safety protocols
- Natural Systems:
    - Watershed protection
    - Vegetation management
    - Natural infrastructure preservation
- Education/Awareness:
    - Recreational safety
    - Emergency notifications
    - Public hazard information

***Note**: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible.*

8.3.9.2 Earthquake Mitigation Actions

1. Seismic Assessment Protocol for Recreational Facilities

- **Description**: Develop and implement a comprehensive seismic assessment protocol for new and existing recreational facilities to identify vulnerabilities and prioritize retrofitting needs.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Engineering Department
- **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), Utah Geological Survey, District funds
- **Estimated Cost**: $25,000
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: Many recreational facilities serve as community gathering spaces and potential emergency shelters. Seismic assessments will identify structural vulnerabilities that could endanger visitors during earthquake events.
- **Status**: Upcoming

2. Structural Improvements to High-Risk Recreational Buildings

- **Description**: Implement seismic retrofits for recreational buildings identified as high-risk in the assessment protocol, focusing on facilities with high occupancy.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Building Department
- **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), CIB grants
- **Estimated Cost**: $150,000 per facility
- **Timeframe**: 2025-2028
- **Priority Level**: High
- **Justification**: Structural improvements to recreational facilities will reduce potential for injuries and property damage during seismic events while ensuring these facilities can provide continuity of services.
- **Status**: Planning phase

8.3.9.3 Flood Mitigation Actions

1. Recreation Area Drainage System Improvements

- **Description**: Develop and maintain comprehensive drainage systems at recreational facilities to minimize flood impacts and protect infrastructure.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Public Works
- **Potential Funding Source**: State CIB grants, Local funding
- **Estimated Cost**: $50,000
- **Timeframe**: 2023-2026

- **Priority Level**: Medium
- **Justification**: Improved drainage systems will reduce flooding at recreational facilities, preventing damage to infrastructure and ensuring continued safe public access.
- **Status**: Ongoing

2. Elevated Platforms for Flood-Prone Recreation Areas

- **Description**: Install elevated platforms and structures at recreation sites in flood-prone areas to maintain usability during high water events.
- **Responsible Party**: Emery County Recreation SSD
- **Potential Funding Source**: Utah Division of Outdoor Recreation grants, District funds
- **Estimated Cost**: $75,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Elevated structures will maintain recreational access during minor flooding events while protecting infrastructure investments in flood-prone areas.
- **Status**: Upcoming

8.3.9.4 Landslide Mitigation Actions

1. Recreational Facility Landslide Vulnerability Inventory

- **Description**: Complete an inventory of locations where recreational facilities and infrastructure are vulnerable to landslides or slope failures.
- **Responsible Party**: Emery County Recreation SSD (Lead), County GIS Department
- **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP), Utah Geological Survey, Local
- **Estimated Cost**: $20,000
- **Timeframe**: 2024-2028
- **Priority Level**: Low
- **Justification**: Identifying vulnerable facilities will allow for prioritized mitigation measures at sites most at risk from landslide hazards.
- **Status**: Upcoming

2. Trail Rerouting in Landslide-Prone Areas

- **Description**: Identify and reroute trails and recreational access points away from high-risk landslide areas based on inventory findings.
- **Responsible Party**: Emery County Recreation SSD
- **Potential Funding Source**: Utah Office of Outdoor Recreation, District funds
- **Estimated Cost**: $35,000

- **Timeframe**: 2025-2028
- **Priority Level**: Medium
- **Justification**: Rerouting trails away from landslide-prone areas will reduce risk to recreational users while maintaining access to recreational opportunities.
- **Status**: Dependent on inventory completion

8.3.9.5 Wildfire Mitigation Actions

1. Defensible Space Creation Around Recreational Facilities

- **Description**: Create and maintain defensible space around recreational facilities in high-risk wildfire areas through vegetation management and strategic landscaping.
- **Responsible Party**: Emery County Recreation SSD (Lead), Fire Department
- **Potential Funding Source**: USDA Forest Service Community Wildfire Defense Grant, Utah Division of Forestry Fire and State Lands, Local
- **Estimated Cost**: $35,000
- **Timeframe**: 2023-2025
- **Priority Level**: High
- **Justification**: Defensible space reduces wildfire risk to recreational facilities, protecting valuable infrastructure and potentially providing safe zones during evacuation.
- **Status**: Ongoing

2. Fire-Resistant Materials for Recreational Structures

- **Description**: Implement policy requiring fire-resistant materials for new recreational structures and renovations in wildfire-prone areas.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Building Department
- **Potential Funding Source**: District funds, Utah Division of Forestry Fire and State Lands grants
- **Estimated Cost**: $10,000 for policy development, implementation costs vary by project
- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: Fire-resistant materials will increase the resilience of recreational infrastructure against wildfire damage, reducing replacement costs and improving safety.
- **Status**: Upcoming

8.3.9.6 Problem Soils Mitigation Actions

1. Soil Stability Assessments at Major Recreational Facilities

- **Description**: Conduct comprehensive soil stability assessments at major recreational facilities to identify areas affected by expansive soils, subsidence, or other soil hazards.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Engineering Department

- **Potential Funding Source**: Local funding
- **Estimated Cost**: $30,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Soil stability assessments will identify areas where problem soils could damage recreational infrastructure, allowing for targeted mitigation measures.
- **Status**: Upcoming

2. Engineered Foundation Solutions for Problem Soil Areas

- **Description**: Implement specialized foundation designs and soil treatment methods for new and renovated recreational facilities in areas with identified problem soils.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Building Department
- **Potential Funding Source**: Utah Community Impact Board grants, District funds
- **Estimated Cost**: Varies by project ($25,000-$100,000)
- **Timeframe**: 2026-2028
- **Priority Level**: Medium
- **Justification**: Engineered solutions will extend the lifespan of facilities in problem soil areas and reduce maintenance costs associated with soil movement damage.
- **Status**: Dependent on assessment findings

8.3.9.7 Dam Failure Mitigation Actions

1. Facility Relocation and Permanent Risk Reduction

- **Description**: Evaluate recreational facilities in dam inundation zones for relocation outside risk areas, implement permanent structural modifications for facilities that cannot be relocated (including elevated utilities, flood-resistant construction, and protected access routes), and establish building restriction policies for future recreational development in inundation zones. This approach reduces long-term vulnerability by permanently removing or protecting recreational assets from dam failure impacts.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Emergency Management
- **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Utah Emergency Management, Local funds
- **Estimated Cost**: $15,000
- **Timeframe**: 2024-2025
- **Priority Level**: High
- **Justification**: While dam failures are rare, recreational facilities often host large numbers of visitors who may be unfamiliar with local hazards, making clear evacuation procedures critical.
- **Status**: Upcoming

2. Signage and Public Information at Risk Areas

- **Description**: Install informational signage and provide public materials about dam inundation risks at recreational facilities in potential inundation zones.
- **Responsible Party**: Emery County Recreation SSD
- **Potential Funding Source**: District funds
- **Estimated Cost**: $10,000
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: Clear information about potential risks and evacuation routes will improve visitor safety in the unlikely event of dam failure.
- **Status**: Upcoming

8.3.9.8 Drought Mitigation Actions

1. Water Conservation Measures Implementation

- **Description**: Implement comprehensive water conservation measures at all recreational facilities, including efficient irrigation systems and drought-resistant landscaping.
- **Responsible Party**: Emery County Recreation SSD
- **Potential Funding Source**: Local, State
- **Estimated Cost**: $15,000
- **Timeframe**: 2018-2023
- **Priority Level**: Medium
- **Justification**: Water conservation reduces facility vulnerability to drought conditions while demonstrating environmental stewardship.
- **Status**: Completed

2. Drought-Resistant Landscaping Implementation

- **Description**: Develop and implement standards for drought-resistant landscaping at all recreational facilities, including replacing high-water-use vegetation with native, drought-tolerant species.
- **Responsible Party**: Emery County Recreation SSD
- **Potential Funding Source**: Utah Division of Water Resources, District funds
- **Estimated Cost**: $40,000
- **Timeframe**: 2024-2027
- **Priority Level**: Medium
- **Justification**: Drought-resistant landscaping will maintain aesthetic appeal of recreational facilities during drought conditions while reducing water consumption.
- **Status**: Planning phase

8.3.9.9 Severe Weather Mitigation Actions

1. Weather Monitoring and Warning Systems Installation

- **Description**: Install weather monitoring and warning systems at outdoor recreational facilities to provide real-time alerts about developing severe weather conditions.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Emergency Management
- **Potential Funding Source**: FEMA Hazard Mitigation Grant Program (HMGP), Utah Emergency Management, Local funds
- **Estimated Cost**: $40,000
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: Real-time weather monitoring will allow facility managers to issue timely warnings to visitors, potentially preventing injuries during severe weather events.
- **Status**: Upcoming

2. Severe Weather Shelters at Key Recreational Facilities

- **Description**: Construct or designate severe weather shelters at key recreational facilities, particularly those with high visitation and limited evacuation options.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Building Department
- **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), Utah Community Impact Board
- **Estimated Cost**: $75,000 per facility
- **Timeframe**: 2025-2028
- **Priority Level**: High
- **Justification**: Designated shelters provide immediate protection for visitors during sudden severe weather events when evacuation is not feasible.
- **Status**: Upcoming

8.3.9.10 Infestation Mitigation Actions

1. Invasive Species Management Plan

- **Description**: Develop and implement a comprehensive invasive species management plan for recreational areas, focusing on prevention, early detection, and control measures.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Weed Department
- **Potential Funding Source**: Utah Department of Agriculture, District funds
- **Estimated Cost**: $25,000
- **Timeframe**: 2024-2026
- **Priority Level**: Medium

- **Justification**: Invasive species can degrade recreational experiences, damage infrastructure, and create hazardous conditions if left unmanaged.
- **Status**: Upcoming

2. Public Education on Invasive Species Prevention

- **Description**: Create educational materials and signage at recreational access points about preventing the spread of invasive species.
- **Responsible Party**: Emery County Recreation SSD
- **Potential Funding Source**: Utah Department of Natural Resources, District funds
- **Estimated Cost**: $10,000
- **Timeframe**: 2024-2025
- **Priority Level**: Low
- **Justification**: Visitor awareness and cooperation are essential to preventing the introduction and spread of invasive species in recreational areas.
- **Status**: Upcoming

8.3.9.11 Multi-Hazard Mitigation Actions

1. Emergency Response Protocols Development

- **Description**: Develop comprehensive emergency response protocols for recreational facilities addressing multiple hazard scenarios.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Emergency Management
- **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, Local funds
- **Estimated Cost**: $20,000
- **Timeframe**: 2024-2026
- **Priority Level**: High
- **Justification**: Standardized protocols ensure consistent, effective response to emergencies regardless of the specific hazard, improving visitor safety.
- **Status**: Upcoming

2. Staff Training Program for Hazard Recognition and Response

- **Description**: Implement regular training program for recreational facility staff on hazard recognition, emergency procedures, and visitor management during hazard events.
- **Responsible Party**: Emery County Recreation SSD (Lead), County Emergency Management
- **Potential Funding Source**: District funds
- **Estimated Cost**: $10,000 annually
- **Timeframe**: 2024-ongoing

- **Priority Level**: High
- **Justification**: Well-trained staff can identify developing hazards early, implement appropriate emergency procedures, and effectively direct visitors during emergencies.
- **Status**: Planning phase

8.3.10 Information Integration

Information from the previous plan was not integrated into this plan as the District was not specifically called out in it. The District's work will be incorporated into this plan moving forward. Future integration will focus on incorporating hazard mitigation considerations into the District's facility planning, programming decisions, and capital improvement plans to ensure recreational resources remain safe and accessible during and after hazard events.

8.4 Emery School District

8.4.1 Background

The Emery School District is an educational entity that has been long serving students in Emery County. The district's primary focus is to provide quality education and support the academic and personal growth of its students. It operates multiple schools within its jurisdiction, including elementary, middle, and high schools.

The district's curriculum aligns with state standards and emphasizes core subjects such as English, mathematics, science, and social studies. Additionally, the district offers a range of elective courses, including fine arts, physical education, technology, and vocational education, to provide students with diverse learning opportunities.

In addition to academic instruction, the Emery School District prioritizes the well-being and development of students. It offers various support services, including counseling, special education, and extracurricular activities, to ensure that students have access to a comprehensive educational experience.

The district is governed by a school board composed of elected officials who oversee the policies, budgeting, and general administration of the Emery School District. The board members work in collaboration with school administrators, teachers, parents, and community members to provide the best possible education for students.

8.4.2 Location & Extent

Not directly applicable to the District. (See County-level statistics).

8.4.3 Demographic & Population Growth

Not directly applicable to the District. (See County-level statistics).

8.4.4 Vulnerable Populations

Emery School District educates children in our community from ages 3 to 18. The two URM schools are both elementary and consist of ages 3-10. While all schools practice reunification drills annually, emergencies in our area will produce great fear and anxiety for the young. In the event of an earthquake, these two elementary schools may not be adequate for protection and may cause injuries and possible deaths for those in occupancy. These schools are currently at 58% and 49% population qualifying for Free or Reduced Lunches.

8.4.5 Specific Stakeholder Hazards and Vulnerabilities

- **DAM FAILURE (DF):** National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for 34% of all dam failures. Foundation defects, including settlement and slope instability, account for 30% of all failures. Piping and seepage cause 20% of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows, and cracks in the dam. The remaining 16% of failures are caused by other means.
- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources.
- **EARTHQUAKE (E):** The district has two remaining unreinforced masonry (URM) school buildings

that present significant seismic vulnerability. Potential impacts include building collapse or severe structural damage, risk of serious injury or fatalities to students and staff, prolonged educational disruption, loss of emergency shelter capability for the community, psychological trauma to the school community, and substantial financial burden for reconstruction.

- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow.
- **LANDSLIDE (L):** There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas.
- **PROBLEM SOILS (PS):** Problem soils are a risk to property and life due to its instability.
- **SEVERE WEATHER (SW):** Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.
- **WILDLAND FIRES (WF):** Wildfire can significantly impact identified areas of Emery County. Urban contiguous fire impacts lives and property in the County.

8.4.6 Changes Since 2018 Plan

The Emery School District has experienced several notable changes affecting hazard vulnerability:

1. **Infrastructure Changes**:
    - Replacement of two URM (unreinforced masonry) school buildings.
    - Implementation of enhanced security measures at all facilities.
    - Upgraded emergency communication systems.
2. **Service Population**:
    - Shifting student demographics requiring modified emergency planning.
    - Updated needs assessment for students with disabilities.
    - Enhanced coordination with transportation services.
3. **Operational Updates**:
    - Implementation of new emergency response protocols.
    - Enhanced staff training for hazard identification and response.
    - Updated evacuation and shelter-in-place procedures.
4. **Risk Assessment**:
    - Updated analysis of facility vulnerabilities.
    - Enhanced evaluation of earthquake risks at remaining URM buildings.
    - Modified assessment of hazardous materials procedures.

These changes directly informed the development of Emery School District's section in this plan update. Specifically:

1. Seismic retrofit prioritization for the two remaining unreinforced masonry schools was emphasized based on vulnerability assessments conducted since 2018.
2. Emergency notification systems were enhanced based on communication challenges identified during recent emergency response exercises.
3. Evacuation planning was expanded to address transportation coordination gaps revealed during severe weather events affecting school operations.
4. Defensible space implementation for schools in wildland-urban interface areas was prioritized following fire risk assessments conducted since the previous plan.
5. Multi-hazard emergency operations planning received greater emphasis to address the district's responsibility for protecting vulnerable student populations during diverse hazard events.

8.4.7 Development in Hazard Prone Areas - Emery School District

Not directly applicable to the District. (See County-level statistics).

8.4.8 Status of 2018 Mitigation Actions - Emery School District

The 2018 plan did not assign specific actions to the School District. However, the District has implemented significant mitigation measures:

2018 Action	Role	Current Status	Explanation
E1: Structural assessment of critical facilities	Lead	Partially Complete	Replaced two of four URM buildings identified as high-risk.
SW1: StormReady participation	Participant	Completed	Emergency protocols updated at all school facilities.
WF5: Review building codes	Participant	Ongoing	Regular coordination with County building officials.

8.4.9 Emery School District Mitigation Strategy

8.4.9.1 Emery School District Strategy Overview

The Emery School District employs a comprehensive hazard mitigation approach focused on protecting students, staff, and educational infrastructure. The strategy emphasizes three primary components: infrastructure resilience through building upgrades and retrofits; emergency preparedness through training, drills, and protocol development; and educational initiatives that promote hazard awareness among the school community. As a steward of multiple school facilities serving vulnerable populations, the District prioritizes actions that address seismic vulnerabilities in unreinforced masonry buildings while also implementing measures to mitigate impacts from flooding, severe weather, drought, wildfire, and other identified hazards. The District's approach balances immediate safety concerns with long-term resilience planning to ensure continuity of educational services during and after hazard events.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also

indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

The Emery School District employs a comprehensive mitigation strategy that includes:

- Infrastructure Projects:
    - School facility seismic improvements
    - Emergency power systems
    - Building access and security upgrades
- Planning & Regulations:
    - Emergency response procedures
    - Evacuation protocols
    - Student reunification plans
- Natural Systems:
    - Grounds maintenance for fire prevention
    - Site drainage improvements
    - Watershed awareness
- Education/Awareness:
    - Student safety drills
    - Family emergency preparedness
    - Staff hazard training

Note: *Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible.*

8.4.9.2 Earthquake Mitigation Actions

1. Complete Seismic Assessment and Retrofit Plans for Remaining URM Buildings

- **Description**: Develop comprehensive seismic assessment and retrofit plans for the two remaining unreinforced masonry school buildings, identifying structural vulnerabilities and necessary improvements.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, Utah State School Building Fund, Local Bonds
- **Estimated Cost**: $150,000
- **Timeframe**: 2024-2026
- **Priority Level**: High
- **Justification**: Unreinforced masonry buildings represent the District's greatest seismic vulnerability. Assessment is the critical first step toward improving student safety in these structures, which serve young children with limited mobility in emergency situations.
- **Status**: Upcoming

2. Conduct Annual Earthquake Training and Drills

- **Description**: Implement regular training and practice drills for earthquake response at all school facilities, including drop-cover-hold protocols, evacuation procedures, and communications systems testing.
- **Responsible Party**: Emery School District Safety Coordinator
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $5,000 annually
- **Timeframe**: Ongoing
- **Priority Level**: High
- **Justification**: Regular training ensures students and staff develop and maintain appropriate emergency response skills, particularly crucial for the District's vulnerable student population.
- **Status**: Ongoing

3. Replace Remaining URM School Buildings

- **Description**: Secure funding for and complete replacement of the two remaining unreinforced masonry school buildings with seismically designed modern facilities.
- **Responsible Party**: Emery School District Board and Administration
- **Potential Funding Source**: State School Building Fund, FEMA grants, Local Bonds
- **Estimated Cost**: $18,000,000
- **Timeframe**: 2026-2032
- **Priority Level**: High
- **Justification**: Two of four previously identified URM buildings have been replaced, but the remaining two still pose significant risk to student safety during seismic events.
- **Status**: Planned - dependent on funding availability

8.4.9.3 Flood Mitigation Actions

1. Improve Stormwater Management at School Facilities

- **Description**: Upgrade drainage systems at school facilities in flood-prone areas, including installation of improved culverts, detention basins, and permeable surfaces where appropriate.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: FEMA Flood Mitigation Assistance Program, State School Building Fund
- **Estimated Cost**: $50,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Several school facilities experience localized flooding during heavy precipitation events, disrupting school operations and potentially damaging infrastructure.

- **Status**: Upcoming

2. Develop Flood Response Protocols

- **Description**: Create specific protocols for school facility operation during flood events, including transportation adjustments, facility protection measures, and communication procedures.
- **Responsible Party**: Emery School District Emergency Manager
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $8,000
- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: Clear protocols enable coordinated response during flood events, ensuring student safety particularly when transportation routes may be compromised.
- **Status**: Upcoming

8.4.9.4 Landslide Mitigation Actions

1. Assess and Mitigate Landslide Risks

- **Description**: Conduct geological assessment of school properties near canyon areas or steep slopes to identify landslide risks, followed by implementation of appropriate stabilization measures.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: State School Building Fund, FEMA grants
- **Estimated Cost**: $75,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Several school facilities are located near potential landslide zones, particularly those near canyon areas that could affect school access routes.
- **Status**: Upcoming

2. Include Landslide Risk in Transportation Emergency Plans

- **Description**: Develop alternate transportation routing plans for school buses during periods of increased landslide risk or after landslide events affecting regular routes.
- **Responsible Party**: Emery School District Transportation Director
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $5,000
- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: Transportation route planning ensures continued safe student access to schools when primary routes may be compromised by landslide events.

- **Status**: Upcoming

8.4.9.5 Wildfire Mitigation Actions

1. Implement Defensible Space Around Schools

- **Description**: Create and maintain appropriate defensible space around school facilities in wildland-urban interface areas, including vegetation management and fire-resistant landscaping.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC), State Fire Mitigation Grants
- **Estimated Cost**: $40,000
- **Timeframe**: 2024-2025
- **Priority Level**: High
- **Justification**: Several school facilities are located in or near wildland-urban interface zones, creating vulnerability to wildfire impacts, particularly to air quality and evacuation needs.
- **Status**: Upcoming

2. Develop Smoke and Air Quality Response Plan

- **Description**: Create protocols for school operations during wildfire smoke events, including indoor air quality monitoring, activity restrictions, and cancellation guidelines.
- **Responsible Party**: Emery School District Safety Coordinator
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $10,000
- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: Wildfire smoke can significantly impact student health, particularly for those with respiratory conditions. Clear protocols ensure appropriate protective measures are implemented.
- **Status**: Upcoming

8.4.9.6 Problem Soils Mitigation Actions

1. Conduct Soil Stability Assessments

- **Description**: Perform comprehensive soil stability assessments for all school facilities, with particular attention to expansive soils and hydrocompaction potential.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: District Capital Improvement Fund
- **Estimated Cost**: $35,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium

- **Justification**: Problem soils in Emery County can cause structural issues in buildings, affecting the long-term stability of school facilities and creating potential safety hazards.
- **Status**: Upcoming

2. Implement Soil Remediation at Vulnerable Sites

- **Description**: Based on assessment findings, implement appropriate soil remediation measures at school facilities identified as high-risk for problem soil impacts.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: State School Building Fund, District Capital Improvement Fund
- **Estimated Cost**: $200,000
- **Timeframe**: 2026-2028
- **Priority Level**: Medium
- **Justification**: Proactive remediation of problem soil conditions prevents structural damage to school buildings and reduces long-term maintenance costs.
- **Status**: Planned, dependent on assessment findings

8.4.9.7 Dam Failure Mitigation Actions

1. School Infrastructure Protection and Land Use Planning

- **Description**: Implement permanent protective measures for school facilities in dam inundation zones including elevated utilities, flood-resistant building modifications, and reinforced structures. Establish policy restricting new school construction in dam inundation areas and prioritize future school development in areas outside identified risk zones. These measures permanently reduce vulnerability of educational facilities and student populations to dam failure impacts.
- **Responsible Party**: Emery School District Emergency Manager
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $10,000
- **Timeframe**: 2024-2025
- **Priority Level**: High
- **Justification**: While rare, dam failure events require immediate response due to potential for rapid inundation, making clear evacuation procedures essential for student safety.
- **Status**: Upcoming

2. Coordinate with County Dam Safety Officials

- **Description**: Establish regular communication protocols with County Emergency Management officials regarding dam safety inspections, early warning systems, and emergency notification procedures.
- **Responsible Party**: Emery School District Safety Coordinator
- **Potential Funding Source**: District Operational Budget

- **Estimated Cost**: Staff time
- **Timeframe**: 2024 (establishment), Ongoing (maintenance)
- **Priority Level**: Medium
- **Justification**: Integration with County emergency systems ensures schools receive timely notifications regarding potential dam failures affecting school facilities.
- **Status**: Upcoming

8.4.9.8 Drought Mitigation Actions

1. Implement Water Conservation Measures

- **Description**: Install water-efficient fixtures, adopt xeriscaping practices, and implement water management systems at all school facilities to reduce consumption and increase drought resilience.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: State Division of Water Resources, District Capital Improvement Fund
- **Estimated Cost**: $75,000
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: Reduces operational vulnerability to drought conditions while demonstrating resource stewardship and sustainability practices to students.
- **Status**: Upcoming

2. Develop School Drought Response Plan

- **Description**: Create specific operational protocols for school facilities during drought conditions, including water use restrictions, playing field management, and educational programming adjustments.
- **Responsible Party**: Emery School District Administration
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $5,000
- **Timeframe**: 2025
- **Priority Level**: Medium
- **Justification**: Enables the District to maintain educational operations while complying with community water restrictions during drought periods.
- **Status**: Upcoming

8.4.9.9 Severe Weather Mitigation Actions

1. Enhance Emergency Notification System

- **Description**: Implement a comprehensive emergency notification system for severe weather events, including both internal communications and parent/guardian alerts.

- **Responsible Party**: Emery School District Technology Department
- **Potential Funding Source**: Utah School Safety Grants, District Operational Budge
- **Estimated Cost**: $50,000
- **Timeframe**: 2023-2025
- **Priority Level**: High
- **Justification**: Enables rapid notification and response to severe weather events, reducing risk to students both on-campus and during transportation to/from school.
- **Status**: Ongoing

2. Develop Severe Weather Safety Protocols

- **Description**: Establish and regularly update protocols for school operations during various severe weather conditions including winter storms, high winds, heat or cold waves, and lightning.
- **Responsible Party**: Emery School District Safety Coordinator
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $8,000
- **Timeframe**: 2024 (development), Ongoing (maintenance)
- **Priority Level**: High
- **Justification**: Clear procedures ensure consistent response to severe weather events, protecting student safety during both regular operations and extracurricular activities.
- **Status**: Ongoing

3. Install Weather Monitoring Equipment

- **Description**: Install on-site weather monitoring stations at key school facilities to provide real-time data on local conditions for decision-making purposes.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: NOAA Weather-Ready Nation grants, District Capital Improvement Fund
- **Estimated Cost**: $20,000
- **Timeframe**: 2025-2026
- **Priority Level**: Medium
- **Justification**: Local weather monitoring provides site-specific data for informed decision-making during severe weather events, accounting for microclimates across the District.
- **Status**: Planned

4. **Critical Infrastructure Protection in Dam Inundation Zones**

- **Description**: Implement permanent protective measures for county facilities and infrastructure within dam inundation zones, including elevated utilities at the County Courthouse complex, flood-resistant modifications to emergency services buildings, reinforced structures for critical

county operations, and land use policies restricting new critical infrastructure development in high-risk inundation areas. These permanent modifications reduce long-term vulnerability of county assets and ensure continued governmental operations following dam failure events.

- **Responsible Party:** Emery County Engineering Department (Lead), County Emergency Management
- **Potential Funding Source:** FEMA Hazard Mitigation Grant Program (HMGP), FEMA Building Resilient Infrastructure and Communities (BRIC)
- **Estimated Cost:** $250,000
- **Timeframe:** 2025-2028
- **Priority Level:** High
- **Justification:** Chapter 6.11 identifies significant county assets in dam inundation zones, including the Castle Dale Courthouse complex and emergency services facilities. Permanent protective measures reduce long-term vulnerability and ensure continuity of governmental operations.
- **Status:** Planned

8.4.9.10 Infestation Mitigation Actions

1. Develop Integrated Pest Management Plan

- **Description**: Create a comprehensive integrated pest management plan for all school facilities, addressing both common pests and potential invasive species that could impact school operations.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $12,000
- **Timeframe**: 2025-2026
- **Priority Level**: Low
- **Justification**: Proactive pest management protects student health and facility integrity while reducing the need for reactive treatments that may disrupt school operations.
- **Status**: Upcoming

2. Establish Invasive Species Monitoring Protocols

- **Description**: Develop monitoring protocols to detect invasive species on school grounds that could pose health risks or damage school infrastructure, particularly focusing on grounds maintenance activities.
- **Responsible Party**: Emery School District Facilities Department
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: $5,000
- **Timeframe**: 2025-2027
- **Priority Level**: Low

- **Justification**: Early detection enables rapid response to potentially harmful infestations before they become widespread and difficult to control.
- **Status**: Upcoming

8.4.9.11 Multi-Hazard Mitigation Actions

1. Integrate Hazard Mitigation in Facility Planning

- **Description**: Incorporate hazard mitigation considerations into all future facility planning and construction projects, ensuring new structures and renovations enhance resilience to multiple hazards.
- **Responsible Party**: Emery School District Administration (lead) and Facilities Department
- **Potential Funding Source**: District Operational Budget
- **Estimated Cost**: Staff time
- **Timeframe**: 2024-2028 and ongoing
- **Priority Level**: High
- **Justification**: Proactive integration of hazard mitigation in planning ensures new investments enhance rather than compromise district resilience to multiple hazards.
- **Status**: Upcoming

2. Develop Comprehensive Emergency Operations Plan

- **Description**: Create an all-hazards emergency operations plan that addresses multiple hazard scenarios, coordinates with County emergency management, and establishes clear roles and responsibilities.
- **Responsible Party**: Emery School District Safety Coordinator
- **Potential Funding Source**: FEMA Emergency Management Performance Grant Program, District Operational Budget
- **Estimated Cost**: $25,000
- **Timeframe**: 2024-2025
- **Priority Level**: High
- **Justification**: A comprehensive plan ensures coordinated response to all hazard types, protecting student safety regardless of the specific emergency encountered.
- **Status**: Upcoming

8.4.10 Information Integration

Information from the previous plan was not integrated into this plan as the District was not specifically called out in it. The District's work will be incorporated into this plan moving forward. Future integration will focus on incorporating hazard mitigation considerations into the District's facility planning, educational programming, and capital improvement plans to ensure school resources remain safe and accessible during and after hazard events.

A particular focus will be placed on addressing the remaining two URM buildings, which present significant seismic risk. However, local funding is not available to address these structures. The district is at 80% bonding capacity and will not be able to replace or upgrade the structures without state or federal funding for approximately 18 more years.

8.5 Emery Special Service District (SSD) #1

8.5.1 Background

The Board of Emery County Special Service District #1 determines how a percentage of mineral lease funds will be disbursed. They provide the following services to Emery County: transportation, flood control, snow removal, water, sewerage, drainage, garbage, and street lighting.

8.5.2 Location & Extent

Emery County Special Service District #1's boundaries include all of Emery County except inside the limits of incorporated towns or cities.

8.5.3 Demographic & Population Growth

Not directly applicable to the District. (See County-level statistics).

8.5.4 Vulnerable Populations

Not directly applicable to the District. (See County-level statistics).

8.5.5 Specific Stakeholder Hazards & Vulnerabilities

Analysis of natural hazards in the service area of Emery County Special Service District #1 revealed that there could be potential losses associated with flooding, problem soils, and extreme weather events. These hazards have varied potential to impact life, property, infrastructure, and other amenities within jurisdictional boundaries.

- **FLOODING (F):** The lands along river corridors and drainage areas have been identified with potential flood extents. The drainages from the foothills also present the potential for flooding during extreme storm events. Potential impacts include washout of road infrastructure in unincorporated areas, stranding of rural residents, damage to culverts and drainage structures, extensive erosion requiring substantial repairs, and repair costs exceeding available district resources.
- **PROBLEM SOILS (PS):** Expansive soils and other problem soil conditions affect infrastructure maintenance and longevity throughout unincorporated areas. Potential impacts include accelerated deterioration of road surfaces, recurring pavement failures requiring frequent repairs, damage to buried utilities, increased maintenance costs for affected infrastructure, and shortened infrastructure lifespan requiring more frequent replacement.
- **SEVERE WEATHER (SW):** Heavy snow events and severe storms impact transportation systems and create maintenance challenges for District-managed infrastructure. Potential impacts include

temporary road closures isolating rural residents, increased snow removal costs depleting district budgets, damage to road surfaces from freeze-thaw cycles, dangerous travel conditions for district maintenance vehicles, and overwhelmed maintenance resources during extended weather events.

8.5.6 Changes Since 2018 Plan

Emery County Special Service District #1 has experienced several notable changes affecting hazard vulnerability:

1. **Infrastructure Changes**:
    - Completion of major transportation facility upgrades.
    - Implementation of new stormwater management systems.
    - Enhanced emergency equipment and capabilities.
2. **Service Population**:
    - Modified service area requirements due to changing development patterns.
    - Updated emergency response protocols for unincorporated areas.
    - Enhanced coordination with municipal service providers.
3. **Operational Updates**:
    - Implementation of new maintenance management systems.
    - Enhanced extreme weather response capabilities.
    - Modified emergency response protocols.
4. **Risk Assessment**:
    - Updated analysis of infrastructure vulnerabilities.
    - Enhanced evaluation of flood impacts on transportation systems.
    - Modified assessment of wildfire risks to facilities in unincorporated areas.

These changes directly informed the development of Emery Special Service District #1's section in this plan update. Specifically:

1. Stormwater management system improvements were prioritized based on flooding impacts to transportation infrastructure observed since 2018.
2. Problem soil mitigation measures were expanded based on ongoing infrastructure maintenance challenges in affected areas.
3. Winter storm response protocols were enhanced following severe weather events that affected transportation access in unincorporated areas.
4. Infrastructure vulnerability assessment was included to address identified gaps in hazard impact information for critical district facilities.
5. Infrastructure standards for development in hazard-prone areas were incorporated following observed impacts to recently constructed facilities in vulnerable locations.

8.5.7 Development in Hazard Prone Areas - Emery SSD #1

This issue is not directly applicable to the District. See County and municipal profiles for development expectations.

8.5.8 Status of 2018 Mitigation Actions - Emery Special Service District #1

While the 2018 plan primarily took a countywide approach, Emery Special Service District #1 participated in or led the following actions:

2018 Action	Role	Current Status	Explanation
PS1: Increase width of slope adjacent to roadways	Lead	Ongoing	Continuous work during maintenance.
PS2: Provide soil hazard fact sheets	Participant	Ongoing	Distribution through county offices.
PS3: Monitor and control water on alkali soils	Participant	Modified	Updated approach through NRCS.
F2: Build catch pond on Cardinal Wash	Participant	Modified	Part of the clean-out project completed.
SW1: StormReady program participation	Participant	Completed	Certification achieved in 2023.

8.5.9 Emery County SSD #1 Mitigation Strategy

8.5.9.1 Emery County SSD #1 Strategy Overview

Emery County Special Service District #1 employs a comprehensive approach to hazard mitigation focused on protecting critical infrastructure and public safety in unincorporated areas of the county. The district prioritizes strategies that enhance transportation infrastructure resilience, improve stormwater management, address soil impacts, and implement appropriate maintenance protocols. These strategies focus particularly on the three primary hazards identified for the district: flooding, problem soils, and severe weather. Through targeted actions addressing these key vulnerabilities, the district aims to reduce infrastructure damage, maintain essential services, and ensure public safety throughout unincorporated areas of the county.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

Emery County Special Service District #1 employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Transportation system improvements
    - Drainage facility upgrades

    - Utility protection measures
- **Planning & Regulations**:
    - Emergency response procedures
    - System maintenance standards
    - Operating protocols
- **Natural Systems**:
    - Watershed protection
    - Natural drainage maintenance
    - Erosion control measures
- **Education/Awareness**:
    - Public safety information
    - Emergency notifications
    - Maintenance schedules

***Note**: Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible.*

8.5.9.2 Flooding Mitigation Actions

1. **Description**: Enhance stormwater management systems throughout unincorporated areas
    - **Responsible Party**: Emery County SSD #1 Board (Lead) with Emery County Engineering Department and Road Department (supporting)
    - **Potential Funding Source**: FEMA Flood Mitigation Assistance Program; CIB grants
    - **Estimated Cost**: $750,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: High
    - **Justification**: Improved stormwater management systems reduce flood damage to transportation infrastructure and property in unincorporated areas while enhancing public safety during storm events.
    - **Status**: Ongoing, phased implementation
2. **Description**: Conduct hydraulic analysis for critical drainage crossings on county roads
    - **Responsible Party**: Emery County SSD #1 Board with Emery County Engineering Department (supporting)
    - **Potential Funding Source**: FEMA Emergency Management Performance Grants, County Emergency Management; County Public Works budget
    - **Estimated Cost**: $65,000
    - **Timeframe**: 2025-2026
    - **Priority Level**: Medium

- **Justification**: Undersized culverts and drainage structures frequently cause road washouts during storm events. Hydraulic analysis identifies priority locations for upgrades.
- **Status**: Planned, awaiting funding

3. **Description**: Implement culvert replacement program for flood-prone road segments
    - **Responsible Party**: Emery County SSD #1 Board (Lead) with Emery County Road Department and Engineering Department (supporting)
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program; County Road funds
    - **Estimated Cost**: $450,000
    - **Timeframe**: 2025-2028
    - **Priority Level**: High
    - **Justification**: Undersized culverts are a primary cause of road damage during flood events in unincorporated areas. Strategic replacement reduces maintenance costs and improves public safety.
    - **Status**: Planned, pending hydraulic analysis completion

8.5.9.3 Problem Soils Mitigation Actions

1. **Description**: Increase width of slope adjacent to roadways to provide adequate buffer zones against problem soil impacts
    - **Responsible Party**: Emery County SSD #1 Board (Lead) with Emery County Road Department and Engineering Department (supporting)
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program; Utah Department of Transportation; County Road funds
    - **Estimated Cost**: $15,000,000 (long-term, multi-year implementation)
    - **Timeframe**: Ongoing, continued implementation through 2030
    - **Priority Level**: Medium
    - **Justification**: Problem soils throughout unincorporated areas cause continuous damage to transportation infrastructure, requiring repeated maintenance and repairs. Widened road shoulders provide stability and reduce the frequency of emergency repairs.
    - **Status**: Ongoing, implemented as part of routine road maintenance projects
2. **Description**: Monitor and control water on alkali soils to prevent infrastructure damage
    - **Responsible Party**: Emery County SSD #1 Board with Emery County Engineering Department and Natural Resources Conservation Service (supporting)
    - **Potential Funding Source**: NRCS grants; County Public Works budget
    - **Estimated Cost**: $100,000
    - **Timeframe**: Ongoing, annual monitoring program

- **Priority Level**: Medium
- **Justification**: Water interaction with alkali soils accelerates deterioration of infrastructure foundations and surfaces. Monitoring helps identify problem areas before significant damage occurs.
- **Status**: Ongoing, with annual assessment reports

3. **Description**: Develop enhanced resource mapping to identify problem soil areas requiring special engineering solutions.
    - **Responsible Party**: Emery County GIS Department (Lead); Emery County Engineering Department (supporting)
    - **Potential Funding Source**: Utah Geological Survey grants; County Public Works budget
    - **Estimated Cost**: $75,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Comprehensive mapping enables proactive planning and appropriate design standards for infrastructure in problem soil areas, reducing long-term maintenance costs.
    - **Status**: Planned, awaiting funding

8.5.9.4 Severe Weather Mitigation Actions

1. **Description**: Develop winter storm response protocols for unincorporated areas
    - **Responsible Party**: Emery County Road Department (Lead); Emery County Emergency Management (supporting)
    - **Potential Funding Source**: County Public Works budget
    - **Estimated Cost**: $15,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: High
    - **Justification**: Rural residents in unincorporated areas are particularly vulnerable to isolation during severe winter storms. Enhanced protocols ensure maintained access to essential services.
    - **Status**: Planned
2. **Description**: Install snow fencing at critical drift-prone locations on county roads
    - **Responsible Party**: Emery County SSD #1 Board (lead) with Emery County Road Department (supporting)
    - **Potential Funding Source**: County Road funds; Utah Department of Transportation
    - **Estimated Cost**: $85,000
    - **Timeframe**: 2025-2027

- **Priority Level**: Medium
- **Justification**: Strategic snow fencing reduces maintenance costs and increases road availability during winter storms, improving public safety and access.
- **Status**: Planned

3. **Description**: Upgrade road maintenance equipment for improved severe weather response
    - **Responsible Party**: Emery County SSD #1 Board with Emery County Road Department (supporting)
    - **Potential Funding Source**: County capital improvement funds; CIB grants
    - **Estimated Cost**: $350,000
    - **Timeframe**: 2026-2028
    - **Priority Level**: Medium
    - **Justification**: Modernized equipment enables more efficient response to severe weather events, reducing road closure durations and improving public safety in remote areas.
    - **Status**: Planned, pending funding

8.5.9.5 Multi-hazard Mitigation Actions

1. **Description**: Establish infrastructure standards for development in hazard-prone areas
    - **Responsible Party**: Emery County SSD #1 Board (Lead) with Emery County Planning Department and Engineering Department (supporting)
    - **Potential Funding Source**: County general funds
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Standardized requirements for new infrastructure in hazard-prone areas ensure appropriate resilience while reducing long-term maintenance costs.
    - **Status**: Upcoming
2. **Description**: Develop comprehensive infrastructure vulnerability assessment for District facilities
    - **Responsible Party**: Emery County SSD #1 Board with Emery County Engineering Department (supporting)
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program
    - **Estimated Cost**: $60,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: High

- **Justification**: A comprehensive assessment will identify critical vulnerabilities across multiple hazard types, enabling strategic prioritization of limited mitigation resources.
- **Status**: Planned

8.5.9.6 Justification for Hazards Not Included

- **Earthquake**: While seismic risks to transportation infrastructure exist in unincorporated areas, Emery County SSD #1 does not maintain independent earthquake mitigation programs. Seismic resilience for roadways, bridges, and drainage structures is addressed through the District's collaboration with Emery County Emergency Management and compliance with Utah Department of Transportation (UDOT) seismic standards for infrastructure design and construction. The multi-hazard vulnerability assessment action (Section 8.5.9.5) will evaluate seismic concerns for critical transportation infrastructure and identify specific actions if significant vulnerabilities are found. Additionally, the County leads seismic preparedness initiatives that the District supports, including emergency response planning and post-earthquake infrastructure assessment protocols.
- **Landslide**: Landslide hazards to transportation corridors in unincorporated areas are addressed through ongoing coordination with Emery County Road Department, Utah Department of Transportation (UDOT), and the County Emergency Manager. The District does not maintain independent landslide mitigation programs because jurisdictional responsibility for slope stabilization and rockfall protection on county roads rests with the County Road Department, while state highways fall under UDOT jurisdiction. The District's role is limited to supporting debris removal and maintaining drainage infrastructure that may reduce landslide triggers. The multi-hazard infrastructure vulnerability assessment (Section 8.5.9.5) will identify any District-owned facilities located in landslide-prone areas, and specific mitigation actions will be developed if significant risks to District assets are identified.
- **Wildfire**: Wildfire management falls primarily under the jurisdiction of fire authorities and land management agencies. The District's role is limited to maintaining access during wildfire events and supporting post-fire recovery efforts rather than leading direct mitigation activities.
- **Dam Failure**: Emery County SSD #1's transportation infrastructure (roads, bridges, and related facilities) is located outside of mapped dam inundation zones based on current dam failure modeling. The District has no critical facilities or significant assets within potential inundation areas that would require specific mitigation actions beyond the multi-hazard infrastructure resilience measures already identified in this plan. Dam safety and structural integrity fall under the jurisdiction of dam owners and the Utah Division of Water Rights, not the transportation district.
- **Drought**: As a special service district focused primarily on transportation infrastructure and related services, Emery County SSD #1 has limited direct vulnerability to drought conditions beyond potential impacts to roadway stability from extended dry conditions, which are addressed under problem soils mitigation actions.
- **Infestation**: While infestations can indirectly impact the district's operations through effects on vegetation along roadways, this hazard primarily falls under the jurisdiction of the County Weed and Mosquito Department rather than Emery County SSD #1.

8.5.10 Information Integration

Information from the previous plan was not integrated into this plan as the District was not specifically called out in it. The District will incorporate relevant elements of the updated plan into its infrastructure planning and capital improvements program. Future planning efforts will explicitly address hazard mitigation priorities identified in this plan to ensure consistent implementation of mitigation strategies across all District operations and services.

8.6 North Emery Water Special Service District (SSD)

8.6.1 Background

The North Emery Water Special Service District (NEWSSD) is a local governmental entity focused on providing water services to residents within its jurisdiction (to residents in the north end of Emery County outside city limits). The district's primary objective is to ensure the reliable and sustainable supply of clean and safe drinking water to the communities it serves.

NEWSSD is responsible for the management and maintenance of water infrastructure, including water treatment facilities, distribution systems, and storage tanks. It oversees the delivery of water to residential, commercial, and agricultural properties, ensuring adequate water pressure and quality.

The district works diligently to comply with state and federal regulations regarding water quality and safety standards. It conducts regular testing and monitoring of water sources to ensure compliance with established guidelines, safeguarding public health.

In addition to water distribution, NEWSSD may also be involved in water conservation efforts and promoting responsible water usage within the community. This can include implementing programs to educate residents on water conservation practices, offering incentives for water-efficient technologies, and supporting water-saving initiatives.

The governance of NEWSSD typically involves a board of directors or trustees who are responsible for making decisions regarding policy, budgeting, and overall management of the district. These board members are often elected or appointed officials representing the interests of the community.

8.6.2 Location & Extent

The District serves all residents in the north end of Emery County outside city limits.

8.6.3 Demographic & Population Growth

The District serves all residents in the north end of Emery County outside city limits.

8.6.4 Vulnerable Populations

Not directly applicable to the District. (See County-level statistics).

8.6.5 Specific Stakeholder Hazards & Vulnerabilities

Analysis of natural hazards in the service area of North Emery Water Special Service District revealed that there could be potential losses associated with drought, earthquake, and wildfire. These hazards have varied potential to impact water quality, infrastructure, and service delivery within the District's boundaries.

- **DROUGHT (D):** Extended dry periods threaten water source capacity and quality, potentially compromising the District's ability to meet customer demand. Potential impacts include insufficient water supply for residential customers, declining water quality as source levels decrease, implementation of strict conservation measures affecting quality of life, increased costs for water hauling to supplement supplies, and loss of system pressure creating potential for contamination.
- **EARTHQUAKE (E):** Seismic events pose significant risk to water distribution infrastructure, potentially resulting in system failures and service interruptions. Potential impacts include widespread pipe breakage throughout the distribution system, damage to water storage tanks causing complete supply loss, water contamination from pipe breaks and cross-connections, insufficient water for fire suppression in rural areas, and repair costs potentially exceeding district financial reserves.
- **WILDLAND FIRES (WF):** Wildfires in watershed areas can degrade source water quality and damage above-ground infrastructure components. Potential impacts include contamination of water sources from ash and fire retardants, destruction of pumping and treatment equipment, melted PVC components in the distribution system, service interruptions during active fire events, and increased treatment costs to address degraded water quality after fires.

8.6.6 Changes Since 2018 Plan

North Emery Water Special Service District has experienced several notable changes affecting hazard vulnerability:

1. **Infrastructure Changes:**
    - Completion of major water distribution system upgrades.
    - Implementation of new water quality monitoring systems.
    - Enhanced emergency power backup capabilities at key facilities.
2. **Service Population**:
    - Modified service area requirements due to evolving development patterns.
    - Updated emergency response protocols for vulnerable customers.
    - Enhanced coordination with neighboring water providers.
3. **Operational Updates**:
    - Implementation of new water conservation measures.
    - Enhanced drought response capabilities and contingency planning.
    - Modified emergency notification protocols for service disruptions.
4. **Risk Assessment:**
    - Updated analysis of infrastructure vulnerabilities to natural hazards.
    - Enhanced evaluation of drought impacts on source water.

- Modified assessment of seismic risks to water distribution systems.

These changes directly informed the development of North Emery Water Special Service District's section in this plan update. Specifically:

1. Seismic vulnerability assessment for water infrastructure was prioritized based on aging system components identified during recent maintenance activities.
2. Water source redundancy development was included due to supply vulnerabilities revealed during extended drought conditions.
3. Source water protection measures were incorporated to address wildfire-related water quality impacts observed in nearby watersheds.
4. Emergency power systems were prioritized following disruptions during severe weather events that affected water service reliability.
5. Water system efficiency improvements were emphasized based on increased water conservation needs identified during drought conditions since 2018.

8.6.7 Development in Hazard Prone Areas - North Emery Water SSD

This issue is not directly applicable to this stakeholder. See County and municipal profiles for development expectations.

8.6.8 Status of 2018 Mitigation Actions - North Emery Water SSD

The 2018 plan did not assign specific actions to the Water District. However, the District implemented several initiatives that aligned with countywide hazard mitigation priorities:

2018 Action	Role	Current Status	Explanation
D1: Promote water conservation	Participant	Ongoing	Public education and outreach efforts.
D2: Design silt control measures	Participant	Modified	Adapted to focus on source water protection.
SW4: Install/relocate generators	Participant	Completed	Emergency power systems now in place at critical facilities.

8.6.9 North Emery Water SSD Mitigation Strategy

8.6.9.1 North Emery Water SSD Strategy Overview

North Emery Water Special Service District employs a comprehensive approach to hazard mitigation focusing on infrastructure resilience, operational redundancy, and emergency preparedness. The District prioritizes water system reliability during disaster events through strategic infrastructure hardening, emergency power backup systems, and advanced monitoring technologies. By addressing vulnerabilities in water sources, treatment facilities, and distribution networks, the District aims to maintain continuous water service during hazard events while protecting water quality and public health. The strategy balances

immediate protective measures with long-term resilience planning to address the most significant threats to the District's operations, particularly drought, earthquake, and wildfire impacts.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

North Emery Water Special Service District employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Water system redundancy improvements
    - Treatment facility hardening
    - Emergency power systems
    - Distribution system upgrades
- **Planning & Regulations**:
    - Emergency response procedures
    - Water conservation standards
    - Source water protection measures
    - Operating protocols
- **Natural Systems**:
    - Watershed protection
    - Source water management
    - Natural infrastructure preservation
    - Recharge area conservation
- **Education/Awareness**:
    - Water conservation education
    - Emergency notifications
    - Public safety information
    - Customer preparedness guidance

Note: *Each action was selected based on its effectiveness, feasibility, and ability to address multiple hazards where possible.*

8.6.9.2 Earthquake Mitigation Actions

1. **Description**: Conduct seismic vulnerability assessment of critical water infrastructure components including treatment facilities, distribution pipelines, and pump stations to identify specific retrofit needs.
    - **Responsible Party**: North Emery Water SSD Engineering Department
    - **Potential Funding Source**: FEMA Hazard Mitigation Grant Program, State Division of Water Resources
    - **Estimated Cost**: $50,000

- **Timeframe**: 2024-2025
- **Priority Level**: Medium
- **Justification**: Seismic events pose significant risk to water distribution infrastructure with potential for system-wide failures that could leave communities without water service for extended periods.
- **Status**: Upcoming

2. **Description**: Implement seismic retrofitting of identified vulnerable water system components, with priority given to critical pump stations and main transmission lines.
    - **Responsible Party**: North Emery Water SSD Operations Department
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, CIB
    - **Estimated Cost**: $250,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: High
    - **Justification**: Aging infrastructure in the District's service area was not built to current seismic standards, creating vulnerability to system failure during earthquake events.
    - **Status**: Planning phase

8.6.9.3 Wildfire Mitigation Actions

1. **Description**: Implement advanced water quality monitoring systems to detect contamination from wildfires and other hazard events affecting source water quality.
    - **Responsible Party**: North Emery Water SSD Water Quality Department
    - **Potential Funding Source**: EPA Water Infrastructure Improvements Grant, State Division of Drinking Water
    - **Estimated Cost**: $125,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Wildfires in watershed areas can significantly degrade source water quality through ash, debris, and increased turbidity, threatening the District's ability to maintain water treatment effectiveness.
    - **Status**: Upcoming
2. **Description**: Implement source water protection measures in watershed areas, including coordination with land management agencies on forest health initiatives.
    - **Responsible Party**: North Emery Water SSD Management
    - **Potential Funding Source**: EPA Clean Water State Revolving Fund, Utah Division of Drinking Water

- **Estimated Cost**: $75,000
- **Timeframe**: 2024-2026
- **Priority Level**: Medium
- **Justification**: Proactive watershed management reduces wildfire severity and post-fire impacts on water quality, protecting treatment capabilities and reducing operational costs.
- **Status**: Ongoing

8.6.9.4 Drought Mitigation Actions

1. **Description**: Develop and maintain a robust water conservation program to mitigate drought impacts, including public education, incentive programs, and usage restrictions.
    - **Responsible Party**: North Emery Water SSD Management
    - **Potential Funding Source**: State Division of Water Resources, District funds
    - **Estimated Cost**: $25,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Extended dry periods threaten water source capacity and quality, requiring demand management strategies to ensure service continuity during drought conditions.
    - **Status**: Ongoing
2. **Description**: Develop redundant water source capability to ensure service continuity during drought and other emergencies affecting primary water sources.
    - **Responsible Party**: North Emery Water SSD Engineering Department
    - **Potential Funding Source**: Utah Community Impact Board, USDA Rural Development Water and Environmental Programs
    - **Estimated Cost**: $1,500,000
    - **Timeframe**: 2025-2028
    - **Priority Level**: High
    - **Justification**: The District's reliance on limited water sources creates vulnerability during extended drought conditions, requiring source diversification to ensure water availability.
    - **Status**: Planning phase
3. **Description**: Implement water system efficiency improvements including leak detection, pressure management, and infrastructure upgrades to maximize available water resources.
    - **Responsible Party**: North Emery Water SSD Operations Department
    - **Potential Funding Source**: Utah Division of Water Resources, USDA Rural Development Water and Environmental Programs
    - **Estimated Cost**: $350,000

- **Timeframe**: 2024-2028
- **Priority Level**: High
- **Justification**: System inefficiencies exacerbate drought impacts by wasting limited water resources, making efficiency improvements a cost-effective drought mitigation strategy.
- **Status**: Ongoing

8.6.9.5 Severe Weather Mitigation Actions

1. **Description**: Complete installation of emergency power generation at critical pump stations and treatment facilities to maintain operations during power outages.
    - **Responsible Party**: North Emery Water SSD Operations Department
    - **Potential Funding Source**: FEMA Building Resilient Infrastructure and Communities (BRIC) Program, State CIB, District funds
    - **Estimated Cost**: $250,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: High
    - **Justification**: Power outages from severe weather events can disable pumping and treatment operations, making backup power essential for maintaining water service during emergencies.
    - **Status**: Partially completed, expansion ongoing
2. **Description**: Develop emergency water distribution plans for extended service interruptions, including procedures for alternative water delivery methods and coordination with emergency management agencies.
    - **Responsible Party**: North Emery Water SSD Management
    - **Potential Funding Source**: District funds, County Emergency Management
    - **Estimated Cost**: $15,000
    - **Timeframe**: 2024
    - **Priority Level**: High
    - **Justification**: Severe weather events can cause extended service disruptions requiring alternative water delivery methods to meet essential community needs.
    - **Status**: Upcoming

8.6.9.6 Multi-Hazard Mitigation Actions

1. **Description**: Develop a comprehensive GIS mapping system of all water infrastructure with hazard overlay data to support vulnerability assessments and mitigation planning.
    - **Responsible Party**: North Emery Water SSD Engineering Department
    - **Potential Funding Source**: District funds, State Division of Emergency Management

- **Estimated Cost**: $45,000
- **Timeframe**: 2024-2026
- **Priority Level**: High
- **Justification**: Accurate infrastructure mapping with hazard overlays enables targeted mitigation investments and more effective emergency response planning across all identified hazards.
- **Status**: In progress

8.6.9.7 Justification for Hazards Not Included

- **Flooding**: While flooding can impact water infrastructure, North Emery Water SSD's service area has minimal direct flood vulnerability based on existing floodplain mapping and historical events. The District's infrastructure is generally located outside of identified flood hazard areas, and impacts would primarily be limited to localized erosion around pipeline crossings. Multi-hazard planning efforts address these limited vulnerabilities.
- **Landslide**: The District's main transmission lines and facilities are primarily located in areas with low landslide susceptibility based on geological assessments. The limited infrastructure that crosses landslide-prone terrain is addressed through the District's routine maintenance program and general infrastructure resilience measures included in multi-hazard planning.
- **Problem Soils**: While expansive soils exist within the service area, the District has adapted its operations and infrastructure planning to account for these conditions and minimize disruption to water service. The District experiences approximately $30,000 in annual repair costs for soil-related pipeline damage, which represents a manageable operational expense relative to overall system costs. The District addresses problem soil impacts through: (1) designing new infrastructure with appropriate foundations and flexible pipe connections to accommodate soil movement, (2) implementing proactive pipeline inspection and replacement programs that prioritize sections in areas with the most severe soil conditions, (3) incorporating soil considerations into capital improvement planning and budgeting processes, and (4) coordinating with the Natural Resources Conservation Service and Utah Geological Survey on soil mapping and best practices for construction in expansive soil areas. The multi-hazard infrastructure mapping initiative (Section 8.6.9.6) will identify additional vulnerable pipeline segments for prioritized maintenance or replacement. The District determined this integrated infrastructure management approach provides cost-effective long-term resilience to problem soil hazards without requiring standalone mitigation projects separate from ongoing system improvements.
- **Dam Failure**: The District's water infrastructure, including transmission lines and treatment facilities, is located outside of mapped dam inundation zones based on current inundation modeling from the Utah Division of Water Rights. This positioning limits direct vulnerability to dam failure events, with only minor potential for localized impacts to pipeline crossings, which are addressed through routine maintenance and the District's multi-hazard infrastructure resilience planning.
- **Infestation**: While certain invasive species can affect watershed health, the District's water sources are primarily from deep groundwater that is naturally filtered and less susceptible to surface infestation impacts. Watershed management concerns are addressed within the wildfire mitigation actions that include broader ecosystem health considerations.

8.6.10 Information Integration

Information from the previous plan was not integrated into this plan as the District was not specifically called out in it. Moving forward, the District will incorporate relevant elements of this updated plan into its capital improvement program, emergency response planning, and operational procedures. The District will also ensure that future infrastructure investments align with hazard mitigation priorities identified in this plan, particularly those related to drought resilience, seismic protection, and wildfire impact mitigation.

8.7 San Rafael Special Service District (SSD)

8.7.1 Background

The San Rafael Special Service District (SRSSD) is a local governmental entity with a primary focus to provide essential services to residents within its jurisdiction. Specifically, the SRSSD is responsible for receiving federal mineral lease funds as a means for mitigating impacts from extractive mineral industries, and also for an energy efficiency upgrade, energy research, a renewable energy system, or electric vehicle charging infrastructure, together with all services and functions necessary to provide these services within the District's boundaries.

8.7.2 Location & Extent

Not directly applicable to the District. (See County-level statistics).

8.7.3 Demographic & Population Growth

Not directly applicable to the District. (See County-level statistics).

8.7.4 Vulnerable Populations

Not directly applicable to the District. (See County-level statistics).

8.7.5 Specific Stakeholder Hazards & Vulnerabilities

Analysis of natural hazards affecting the San Rafael Special Service District revealed that there could be potential losses associated with severe weather, energy supply disruptions, and economic impacts from resource extraction transitions. These hazards have varied potential to impact the District's funding streams, project implementation, and service delivery.

- **DAM FAILURE (DF):** National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for 34% of all dam failures. Foundation defects, including settlement and slope instability, account for 30% of all failures. Piping and seepage cause 20% of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows, and cracks in the dam. The remaining 16% of failures are caused by other means. Potential impacts include destruction of energy infrastructure in inundation pathways, disruption of power generation and transmission affecting regional energy security, damage to district-funded renewable energy projects, and substantial financial losses from damaged infrastructure that received district

investment.

- **DROUGHT (D):** Cyclical periods of drought place a strain on community culinary water resources. Potential impacts include reduced hydroelectric generation capacity from water shortages, cooling water limitations for thermal power plants, restricted water availability for energy development projects, and increased operational costs for water-intensive energy facilities.
- **EARTHQUAKE (E):** Earthquakes may strike at any time in this region or regions that are geographically close to the County; therefore, it is vital to educate the public on how to prepare for such an event. Potential impacts include structural damage to energy generation and transmission infrastructure, power outages affecting public safety and economic activity, leakage from damaged fuel storage facilities, disruption of district-funded renewable energy systems, and substantial repair costs for damaged energy infrastructure.
- **FLOODING (F):** Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round. Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance. Thunderstorms produce torrential rains that cause the canal system to overflow. Potential impacts include inundation of low-lying energy infrastructure, damage to electrical systems from water infiltration, erosion exposing buried power and fuel lines, contamination from flooded fuel storage areas, and electrical safety hazards during flood events.
- **LANDSLIDE (L):** There is a potential risk to structures located in areas identified Federal and state agencies and depicted in GIS as landslide risk areas. Potential impacts include destruction of transmission infrastructure on hillsides, damage to access roads for energy facilities, disruption of fuel delivery systems, unstable foundations for renewable energy systems in sloped areas, and repair costs exceeding available funding.
- **SEVERE WEATHER (SW):** Extreme weather events can disrupt energy infrastructure that the District supports, potentially resulting in service interruptions and increased mitigation costs. Potential impacts include damage to above-ground transmission systems, ice loading on power lines causing failures, wind damage to solar and other renewable infrastructure, transportation disruptions affecting fuel delivery, and increased emergency response costs during weather-related outages.
- **WILDLAND FIRES (WF):** Wildfire can significantly impact identified areas of Emery County. Urban contiguous fire impacts lives and property in the County. Potential impacts include destruction of wooden utility poles and structures, damage to renewable energy installations in remote areas, direct impacts to transmission lines causing regional outages, destruction of district-funded energy projects, and increased insurance costs for infrastructure in high-risk areas.

8.7.6 Changes Since 2018 Plan

San Rafael Special Service District has experienced several notable changes affecting hazard vulnerability:

1. **Infrastructure Changes**:
    - Implementation of energy efficiency upgrades at multiple facilities.
    - Installation of renewable energy systems to enhance resilience.
    - Enhanced emergency power capabilities at critical infrastructure.
2. **Service Population**:

- Modified service delivery approach to address changing resource extraction impacts.
- Updated priorities for funding allocation based on community needs assessment.
- Enhanced coordination with other service providers and local governments.

3. **Operational Updates**:
   - Implementation of new project evaluation criteria incorporating hazard mitigation.
   - Enhanced financial management systems for emergency funding.
   - Modified strategic planning to address changing energy landscape.
4. **Risk Assessment**:
   - Updated analysis of infrastructure vulnerabilities related to energy systems.
   - Enhanced evaluation of climate-related impacts on District operations.
   - Modified assessment of economic risks associated with energy transition.

These changes directly informed the development of San Rafael Special Service District's section in this plan update. Specifically:

1. Seismic resilience standards for energy infrastructure were incorporated based on vulnerability assessments of critical power facilities.
2. Wildfire protection measures for energy systems were prioritized due to increased fire risk in areas containing district-funded infrastructure.
3. Drought-resilient renewable energy development was emphasized based on water availability challenges affecting traditional energy generation.
4. Battery storage integration was included to address power continuity concerns identified during recent severe weather events.
5. Economic diversification initiatives were incorporated to enhance community resilience during energy transition impacts affecting district funding sources.

8.7.7 Development in Hazard Prone Areas - San Rafael SSD

This issue is not directly applicable to the District. See County and municipal profiles for development expectations.

8.7.8 Status of 2018 Mitigation Actions - San Rafael SSD

The 2018 plan did not assign specific actions to the San Rafael Special Service District. However, the District contributed to broader county initiatives through its funding mechanisms:

2018 Action	Role	Current Status	Explanation
D3: Build Garley Wash Dam	Financial Supporter	Modified	Provided partial funding for feasibility studies.
SW3: Install Doppler Radar	Financial Supporter	Deferred	Committed funding pending federal match.
PS3: Monitor problem soils	Financial Supporter	Ongoing	Provided equipment funding through grants.

8.7.9 San Rafael SSD Mitigation Strategy

8.7.9.1 San Rafael Strategy Overview

The San Rafael Special Service District employs a comprehensive mitigation strategy focused on its primary role of receiving and distributing federal mineral lease funds while supporting energy infrastructure resilience. The District's approach includes funding energy efficiency upgrades, renewable energy systems, and infrastructure hardening projects that enhance community resilience against multiple hazards. By strategically allocating resources, the District aims to mitigate impacts from extractive industries while promoting sustainable energy solutions that can withstand various natural hazards. This multi-faceted approach addresses both direct infrastructure vulnerabilities and longer-term economic resilience needs as the region navigates changing energy landscapes.

The following mitigation actions include all required implementation information: responsible party, potential funding sources, estimated costs, implementation timeframes, and priority levels. Each action also indicates its status. These elements provide a clear roadmap for implementation and will facilitate tracking progress during the five-year planning cycle.

San Rafael Special Service District employs a comprehensive mitigation strategy that includes:

- **Infrastructure Projects**:
    - Energy efficiency upgrades
    - Renewable energy systems
    - Resilient power infrastructure
    - Electric vehicle charging network
- **Planning & Regulations**:
    - Funding criteria development
    - Project evaluation standards
    - Resource allocation policies
    - Investment prioritization frameworks
- **Natural Systems**:
    - Reclamation projects
    - Mining impact mitigation
    - Environmental remediation
    - Ecosystem restoration funding
- **Education/Awareness**:
    - Energy efficiency education
    - Community engagement
    - Sustainability information
    - Transition planning resources

***Note**: Each action was selected based on its effectiveness, feasibility, and alignment with the District's mission to mitigate impacts from extractive industries while promoting sustainable energy solutions.*

8.7.9.2 Earthquake Mitigation Actions

1. **Implement seismic resilience standards for energy infrastructure projects**
    - **Description**: Develop and implement comprehensive seismic standards for all energy infrastructure projects receiving District funding to ensure resilience during earthquake events.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, FEMA Building Resilient Infrastructure and Communities (BRIC)
    - **Estimated Cost**: $100,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Seismic events could damage critical energy infrastructure that receives District funding, potentially disrupting power supply during emergencies.
    - **Status**: Planning phase
2. **Conduct seismic vulnerability assessments for existing energy facilities**
    - **Description**: Fund comprehensive assessments of existing energy facilities to identify seismic vulnerabilities and develop retrofit priorities.
    - **Responsible Party**: San Rafael Special Service District Board (Lead), contracted engineering firms
    - **Potential Funding Source**: District funds, Utah Public Service Commission Infrastructure grants
    - **Estimated Cost**: $75,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Many existing energy facilities were built before current seismic standards and may have vulnerabilities that could lead to service disruptions.
    - **Status**: Upcoming

8.7.9.3 Flood Mitigation Actions

1. **Support flood mitigation measures for critical energy infrastructure**
    - **Description**: Provide funding for flood protection measures at vulnerable energy facilities, including elevation of critical components and improved drainage systems.
    - **Responsible Party**: San Rafael Special Service District Board

- **Potential Funding Source**: District funds, Utah Department of Environmental Quality
- **Estimated Cost**: $150,000
- **Timeframe**: 2025-2027
- **Priority Level**: Medium
- **Justification**: Energy infrastructure in low-lying areas faces significant flood risk that could cause widespread service disruptions.
- **Status**: Upcoming

2. **Develop flood risk assessment protocols for new energy projects**
    - **Description**: Establish requirements for flood risk assessments prior to District funding approval for new energy projects.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds
    - **Estimated Cost**: $40,000
    - **Timeframe**: 2024-2025
    - **Priority Level**: Medium
    - **Justification**: Proper siting and design of new energy infrastructure can significantly reduce flood vulnerabilities.
    - **Status**: Planning phase

8.7.9.4 Landslide Mitigation Actions

1. **Develop risk assessment protocols for energy projects in landslide-prone areas**
    - **Description**: Create standardized geotechnical assessment requirements for projects in areas with slope stability concerns.
    - **Responsible Party**: San Rafael Special Service District Board (Lead), contracted geological consultants
    - **Potential Funding Source**: District funds
    - **Estimated Cost**: $75,000
    - **Timeframe**: 2025-2027
    - **Priority Level**: Medium
    - **Justification**: Energy infrastructure in canyon areas and steep terrain faces landslide risks that could damage equipment and disrupt service.
    - **Status**: Upcoming
2. **Support slope stabilization projects near critical energy facilities**

- **Description**: Provide matching funds for slope stabilization efforts protecting existing energy infrastructure.
- **Responsible Party**: San Rafael Special Service District Board
- **Potential Funding Source**: District funds, FEMA Hazard Mitigation Grant Program (HMGP)
- **Estimated Cost**: $200,000
- **Timeframe**: 2025-2028
- **Priority Level**: Medium
- **Justification**: Proactive slope stabilization can prevent costly infrastructure damage and service disruptions.
- **Status**: Upcoming

8.7.9.5 Wildfire Mitigation Actions

1. **Implement wildfire protection measures for energy infrastructure**
    - **Description**: Fund defensive space creation, fire-resistant material upgrades, and vegetation management around critical energy facilities.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, USDA Forest Service Community Wildfire Defense Grant
    - **Estimated Cost**: $200,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Wildfires pose significant threats to above-ground energy infrastructure components, particularly in rural and wildland-urban interface areas.
    - **Status**: Upcoming
2. **Support development of wildfire-resilient renewable energy systems**
    - **Description**: Prioritize funding for renewable energy projects designed with fire-resistant components and ember protection.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, U.S. Department of Energy Solar Energy Technologies Office
    - **Estimated Cost**: $350,000
    - **Timeframe**: 2024-2027
    - **Priority Level**: High

- **Justification**: Renewable energy infrastructure, particularly solar arrays, requires specific wildfire resilience measures to prevent damage and reduce ignition potential.
- **Status**: Planning phase

8.7.9.6 Dam Failure Mitigation Actions

1. **Support dam safety and resilience projects through district funding**
    - **Description**: Provide financial support for dam safety assessments, monitoring systems, and retrofits for structures that support or protect energy infrastructure.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, Utah Water Resources Dam Safety Program
    - **Estimated Cost**: $300,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Dam failures could cause catastrophic damage to downstream energy infrastructure and disrupt service to large populations.
    - **Status**: Planning phase
2. **Develop energy infrastructure resilience plans for dam inundation zones**
    - **Description**: Fund the development of specific resilience measures for energy infrastructure located in potential dam failure inundation areas.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, FEMA Hazard Mitigation Grant Program (HMGP)
    - **Estimated Cost**: $80,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Strategic hardening and protection of energy infrastructure in dam inundation zones can minimize service disruptions during emergencies.
    - **Status**: Upcoming

8.7.9.7 Drought Mitigation Actions

1. **Develop a strategic plan for sustainable water use in energy initiatives**
    - **Description**: Create comprehensive water conservation and management strategies for water-dependent energy projects.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds
    - **Estimated Cost**: $50,000

- **Timeframe**: 2024-2025
- **Priority Level**: High
- **Justification**: Water availability impacts energy generation capacity, particularly for hydroelectric and thermal facilities that require significant water resources.
- **Status**: Upcoming

2. **Support drought-resilient renewable energy development**
    - **Description**: Prioritize funding for renewable energy technologies with minimal water requirements.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, State water conservation grants
    - **Estimated Cost**: $250,000
    - **Timeframe**: 2024-2027
    - **Priority Level**: High
    - **Justification**: Transitioning to less water-intensive energy production methods helps maintain power generation capacity during drought conditions.
    - **Status**: Planning phase

8.7.9.8 Severe Weather Mitigation Actions

1. **Establish microgrid feasibility studies for critical facilities**
    - **Description**: Fund analysis for implementing microgrids that can maintain power to essential services during severe weather events.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: DOE grants, District funds
    - **Estimated Cost**: $125,000
    - **Timeframe**: 2024-2026
    - **Priority Level**: Medium
    - **Justification**: Microgrids provide energy resilience during severe weather events that might otherwise cause widespread power outages.
    - **Status**: Upcoming
2. **Support integration of battery storage systems with existing renewable infrastructure**
    - **Description**: Provide funding for battery storage technologies that enhance grid stability during severe weather events.
    - **Responsible Party**: San Rafael Special Service District Board

- **Potential Funding Source**: District funds, Utah Public Service Commission Energy Storage Program
- **Estimated Cost**: $850,000
- **Timeframe**: 2024-2027
- **Priority Level**: High
- **Justification**: Battery storage systems help maintain power continuity during weather-related grid disruptions, particularly for critical facilities.
- **Status**: Planning phase

3. **Create a comprehensive electric vehicle charging infrastructure plan**
    - **Description**: Develop and implement a strategic network of resilient EV charging stations throughout the district.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: U.S. Department of Energy Vehicle Technologies Office, District funds
    - **Estimated Cost**: $400,000
    - **Timeframe**: 2025-2028
    - **Priority Level**: Medium
    - **Justification**: Weather-resilient charging infrastructure supports transportation continuity during severe weather events and power disruptions.
    - **Status**: Upcoming

8.7.9.9 Multi-hazard Mitigation Actions

1. **Establish financial reserves dedicated to hazard mitigation and emergency response**
    - **Description**: Create a dedicated funding mechanism for rapid response to hazard impacts on energy infrastructure.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds
    - **Estimated Cost**: $300,000 annually
    - **Timeframe**: 2024-2026
    - **Priority Level**: High
    - **Justification**: Dedicated financial resources enable rapid response and recovery following hazard events, minimizing service disruptions.
    - **Status**: Planning phase
2. **Develop a strategic plan for transitioning from mineral lease funding dependencies**

- **Description**: Create a comprehensive strategy for diversifying funding sources to maintain mitigation capabilities during changes in extractive industry revenues.
- **Responsible Party**: San Rafael Special Service District Board
- **Potential Funding Source**: District funds, Utah Governor's Office of Economic Opportunity
- **Estimated Cost**: $75,000
- **Timeframe**: 2024-2027
- **Priority Level**: High
- **Justification**: Long-term resilience requires financial stability independent of fluctuations in mineral lease revenues.
- **Status**: Upcoming

3. **Develop economic diversification initiatives to address mineral revenue fluctuations**
    - **Description**: Create programs supporting the development of alternative industries to build economic resilience during changes in energy production.
    - **Responsible Party**: San Rafael Special Service District Board
    - **Potential Funding Source**: District funds, EDA grants
    - **Estimated Cost**: $200,000
    - **Timeframe**: 2024-2028
    - **Priority Level**: High
    - **Justification**: Economic diversity provides community resilience against revenue fluctuations and changing energy production patterns.
    - **Status**: Ongoing

8.7.9.10 Justification for Hazards Not Included

- **Problem Soils**: Problem soils were not identified as a significant hazard for the San Rafael Special Service District because the District's primary responsibilities involve administering funding rather than directly operating facilities. While infrastructure funded by the District may be affected by problem soils, the design and engineering specifications for addressing these conditions fall under the responsibility of the implementing agencies and project developers. The District's funding mechanisms support proper engineering assessments that would identify and address problem soil concerns during project development.
- **Infestation**: Infestation was not identified as a priority hazard for the San Rafael Special Service District because the District's focus on energy infrastructure and mineral lease fund administration has limited direct vulnerability to pest and invasive species impacts. While vegetation management is incorporated into broader project considerations, the primary responsibility for infestation management falls to land management agencies and specific project operators rather than the District itself. The District's funding priorities address more significant and direct threats to energy systems and community economic resilience.

8.7.10 Information Integration

Information from the previous plan was not integrated into this plan as the District was not specifically called out in it. Moving forward, the San Rafael Special Service District will incorporate relevant elements of this updated plan into its strategic planning, funding allocation criteria, and project selection processes. The District will ensure that investments and initiatives align with hazard mitigation priorities identified in this plan, particularly those related to energy resilience, economic diversification, and sustainable infrastructure development. This integration will create a more consistent and effective approach to hazard mitigation throughout the District's operations.

9.0 Implementation Resources

9.1 Funding Sources

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. County jurisdictions shall continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. This portion of the PDM identifies the primary Federal and State grant programs for County jurisdictions to consider, and briefly discusses local and non-governmental funding sources.

9.1.1 Federal Programs

The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects.

Title: BRIC and LPDM (Disaster Mitigation Program)

Agency: Federal Emergency Management Agency

Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to It should be noted that FEMA's mitigation funding landscape has evolved since previous plan iterations. The Pre-Disaster Mitigation (PDM) program referenced in earlier versions has been replaced by two primary funding mechanisms:

1. Building Resilient Infrastructure and Communities (BRIC) - A competitive grant program supporting states, local communities, tribes, and territories as they undertake hazard mitigation projects reducing risks from disasters and natural hazards.
2. Legislative Pre-Disaster Mitigation (LPDM) - Formerly known as PDM, this program now operates through Congressionally Directed Spending and provides funding for mitigation planning and projects that reduce overall risk to the population and structures from future hazard events, while also reducing reliance on federal funding in future disasters.

Throughout this plan, references to potential funding sources reflect these current program structures. For the most up-to-date information on FEMA mitigation funding opportunities, stakeholders should visit https://www.fema.gov/grants/mitigation.

Title: Flood Mitigation Assistance Program

Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75% Federal

share/25% non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applications submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.

Title: Hazard Mitigation Grant Program

Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75% of the eligible costs of each project. The state or local cost- share match does not need to be cash; in-kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on 15% of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local governments overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retro-fitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406

Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure.

The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- Roads, bridges & culverts schools
- Draining & irrigation channels
- Schools, city halls & other buildings
- Water, power & sanitary systems
- Airports & parks

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- Universities and other schools
- Hospitals & clinics
- Volunteer fire & ambulance
- Power cooperatives & other utilities
- Custodial care & retirement facilities
- Museums & community centers

Title: Small Business Administration (SBA) Disaster Assistance Program

Agency: US SBA

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grants

Agency: US Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low- and moderate-income people. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration.

Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

9.1.2 State Programs

9.1.3 Local

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the

general public. If local budgets allow, these funds are used to match Federal or State grant programs when required for large-scale projects.

9.1.4 Non-Governmental

Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the American Red Cross, hospitals, land trusts and other non-profit organizations. Paramount to having a Plan deemed to be valid is its implementation. There is currently no new fiscal note attached to the implementation of this Plan.

9.2 Policy Considerations

Natural disasters are naturally occurring phenomena. They play an integral part in maintaining balance in our world. Meteorological, geological, or hydrological processes have shaped Utah for millions of years and will continue to shape Emery County for millions more. These unique phenomena only cause disasters when they affect humans and their structures. Modern engineering has made it possible to mitigate damage from natural hazards. However, the economic and environmental costs can be rather high. Tampering with natural systems can also create an imbalance in the natural environment. Nature provides its own mitigation and measures that need to be identified, protected and/or strengthened. To ensure that our environment is not harmed through mitigation measures, all applicable City/County ordinances and state/federal laws pertaining to the environment must be followed. The majority of the proposed mitigation programs in this Plan will be funded through federal programs, and thus tied to federal funding.

“44 CFR 10.8(d)(2)(iii) excludes this rule from the preparation of an environmental assessment or environmental impact statement, where the rule relates to actions that qualify for categorical exclusions under 44 CFR 10.8(d) (2)(iii), such as the development of plans under this section” (United States 2002).

The following acts will be taken into consideration and will be incorporated when needed while organizing and implementing the PDM Plan: Clean Air Act, Clean Water Act, Endangered Species Act, Floodplain Management, National Historic Preservation Act.

9.3 Clean Air Act (CAA) 1970

The Clean Air Act is the comprehensive Federal Law that covers the entire country under the Environmental Policy Act regulating air emissions from area, stationary, and mobile sources. This law sets limits or National Ambient Air Quality Standards (NAAQS), on how much of a pollutant can be in the air anywhere in the United States and the emissions of air pollutants. These limits ensure that all Americans have the same basic health and environmental protections. Maximum pollutant standards were set, though states may have stronger pollution controls than the national standards. Each state explains how it will do its job under the Clean Air Act by developing a mandated “state implementation plan” (SIP) that must be approved by the Environmental Protection Agency (EPA). The 1977 amendment set new dates for areas of the country that failed to meet the initial deadlines for achieving NAAQS. The 1990 amendments addressed problems such as acid rain, ground- level ozone, stratospheric ozone depletion, and air toxins. This act required facilities with large amounts of certain hazardous chemicals to have a special emergency planning requirement. Based on a facilities potential threat or risk from chemical spills, fires, explosions, etc., facilities prepare a Risk Management Plan (RMP) that includes hazard identification, assessments, design and maintenance of a

safe facility, necessary steps to prevent releases and ways to minimize the consequences from an accidental release (United States 1970).

9.4 Clean Water Act, Section 404 - Wetland Preservation

This section regulates activities in wetland areas and authorizes the EPA to restrict or prohibit the use of an area as a disposal site for dredged or fill material if the discharge will have adverse effects on municipal water supplies, shellfish beds and fishery areas, wildlife or recreational areas. A permit must be issued that is based on regulatory guidelines developed in conjunction with the U.S. Army Corps of Engineers and the EPA. (United States 1977a).

9.5 Clean Water Act (CWA)

The Federal Water Pollution Control Act Amendments of 1972 came about because of the growing awareness for the need to control water pollution. As amended in 1977, this law became known as the Clean Water Act, whose mission is to establish the basic structure for regulating discharges of pollutants into the waters of the United States, and to reduce and maintain the chemical, biological, and physical environments. The act gave the EPA the authority to set wastewater standards for industry. The act also requires that each state adopt water quality standards, act to protect wetlands, and limit industrial and municipal discharges into navigable waters unless permitted. It funded the construction of wastewater treatment plants for nearly every county in the United States through construction grant programs from the EPA and recognized the need for planning for future threats from nonpoint source pollution. (United States 1977a).

9.6 Endangered Species Act of 1973

This act provides a plan for the protection of threatened or endangered plants and animals and the habitats in which they are found. Congress declared that various species of fish, wildlife, and plants in the United States have been caused to become extinct, or are so depleted in numbers they are in danger of becoming extinct as a result of economic development and expansion without adequate concern for conservation. Aesthetic, ecological, educational, historical, recreational, and scientific importance come from these species and are a value to our nation and its people. The U.S. will conserve, to a practicable extent, the species that face extinction and will encourage the States through federal assistance to develop and maintain conservation programs. The reason for the Act is to provide a means by which ecosystems with endangered and threatened species will be conserved. It is also declared that all state and local agencies resolve water resource issues in connection with conservation of endangered species (United States 1973).

9.7 Floodplain Management Policy

The main points of this policy are to reduce the loss of life and property and the disruption of societal and economic pursuits caused by flooding or facility operations as well as to restore, sustain and enhance the natural resources, ecosystems and other functions of the floodplains. Activities will search for a balance between the sometimes competing uses of floodplains in a way that provides the most benefit to society. Activities will pursue and encourage the appropriate use of floodplains, avoid long and short term negative impacts associated with the development and modification of floodplains, and avoid direct and indirect support of floodplain development whenever there is a practicable alternative. “Functions of floodplains include natural moderation of floods; fish, wildlife, and plant resources and habitat; groundwater recharge;

and water quality maintenance. Uses of floodplains include stormwater management, erosion control, open space, natural beauty, opportunity for scientific study, outdoor education, recreation, and cultural preservation, and compatible economic utilization of floodplain resources by human society." (United States 1977b).

9.8 National Historic Preservation Act of 1996 (NHPA)

This act was enacted by Congress because "the spirit and direction of the Nation are founded upon and reflected in its historic heritage…the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people." Another main point of the act mandates the awareness of historic properties that are being lost or substantially altered. The preservation will continue a legacy of cultural, educational, aesthetic, inspirational, economic and energy benefits for future generations. The knowledge of historic resources and the encouragement of their preservations will improve the planning and execution of Federal and federally-assisted projects and will assist economic growth and development. The act uses measures that will foster conditions in which historic resources can exist in productive harmony with present and future generations (United States 2000).

Section 106 of NHPA "requires all Federal agencies to take into account the effects of their actions on historic properties, and provide ACHP with a reasonable opportunity to comment on those actions and the manner in which Federal agencies are taking historic properties into account in their decisions" beginning at the early stages of planning to mitigate any adverse effects on historic properties (United States 2000).

9.9 Public Policy

Under Utah State law, local cities and counties are responsible for setting land use policy in their areas. Utah State Statute provides for the development of County-level plans under Title 17-27a-401. Components which are required to be addressed within these plans include: land use, transportation, environmental issues, public services and facilities, rehabilitation and redevelopment, economic concerns, recommendations for plan implementation, and "any other elements that the County considers appropriate". In 2015, the Utah Legislature amended Title 17-27a-401 to also require that County general plans include a "resource management plan" to provide a basis for communicating and coordinating with the federal government on land and resource management issues.

A significant portion of Emery County is currently zoned for low-density agriculture and residential development. Additional commercial land use nodes are dispersed throughout Emery County to serve adjoining residential communities.

Public policy is the greatest contributing factor in development. This report has briefly mentioned the general development trends in the region and County as well as the contributing and limiting influences on development. Ultimately, the many development constraints and influences are measured, weighed, compared, and balanced in public policy.

Development public policy is articulated in Master Plans (sometimes referred to as General Plans, Land Use Management Codes, and other planning documents). Master Plans and Land Use Management Codes are formally adopted by City or County councils whereas other planning documents may not receive formal adoption. All Region counties continue to update their Master Plans and Land Use Management Codes. This Plan gives each County guidelines for the responsible use of currently open spaces.

9.10 Severe Weather Mitigation Programs

9.10.1 StormReady

The National Weather Service, in partnership with emergency management officials, businesses, volunteer organizations, academia, and the media is focused on fostering a Weather-Ready Nation, where society is prepared for and responds appropriately to weather- dependent events. A key component of this is ensuring that community leaders make informed decisions, and that is where the StormReady program comes into play.

StormReady encourages communities to take a proactive approach to improving local hazardous weather operations and public awareness. Of course, the end result being the protection of lives and livelihoods.

To be recognized as StormReady, a community must: 1) establish an effective communications system, complete with a 24-hour warning point and emergency operations center; 2) have multiple ways to receive severe weather forecasts and warnings; 3) create a network for monitoring local weather and water events; 4) have multiple ways to disseminate weather and weather-related information; 5) engage in community preparedness efforts, including the promotion of public readiness and response through community seminars; and 6) develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

9.10.2 Weather-Ready Nation Ambassador

NOAA's Weather-Ready Nation (WRN) initiative is about helping our nation become more resilient to increasing extreme weather, water, and climate events. NOAA is working to keep these threats from becoming disasters with greater accuracy in forecasts and warnings, evolving services to community decision makers, and better ways to communicate risk to stakeholders and the public. As part of the WRN initiative, NOAA partners with emergency management officials, businesses, volunteer organizations, academia, and the media to motivate individuals and communities to prepare for potential weather disasters. And these actions can save lives – at home, in schools, and in the workplace.

Building a WRN requires the participation and commitment of a vast nationwide network of "Ambassadors" – organizations contributing in the best ways they can:

- Broadcasters advocating preparedness on-air.
- Schools/universities teaching about the risks associated with severe weather and resiliency best practices.
- Companies within the weather enterprise building the technological infrastructure for weather information and alerts.
- Insurance companies provide discount incentives to policyholders who meet certain mitigation criteria.

WRN Ambassadors partner with the National Weather Service to improve readiness, responsiveness, and overall resilience against extreme weather, water, and climate events in their communities. WRN Ambassadors agree to promote WRN messages, collaborate on outreach and education efforts, share success stories, and serve as an example.

To learn more about the WRN initiative or becoming a WRN Ambassador, visit the Weather- Ready Nation page at http://www.weather.gov/wrn or e-mail NOAA's Weather-Ready Nation team at wrn.feedback@noaa.gov.

To register, visit the Welcome to the WRN Ambassador Submission Process page at https://www.weather.gov/wrn/amb-tou. NWS National Seasonal Safety Campaign: Preparing the public for hazardous weather year-round.

A.0 APPENDIX (A) - Glossary of Terms

A.1 Glossary

Abutment (dam) – the valley side against which a dam is constructed.

Acre-foot of Water – approximately 326,000 gallons of water, or approximately a football field covered by one foot of water.

Active Faults – an active fault is defined as a fault displaying evidence of displacement along one or more of its traces during Holocene time (about the last 11,000 years).

Aftershocks – earthquakes during the seconds, hours, days to months following a larger earthquake (main shock) in the same general region.

Alluvial Fan – a cone-shaped deposit of stream sediments, generally deposited at the base of a mountain where a stream encounters flatter terrain.

Amplitude (seismic waves) - the maximum height of a wave crest or depth of a trough. The amount of ground moves as a seismic wave passes, as measured from a seismogram.

Avalanche Path – the area in which a snow avalanche runs; generally divided into starting zone, track, and runout zone.

Basin and Range Physiographic Province – consists of north-south-trending mountain ranges separated by valleys, bounded by the Rocky Mountains and the Colorado Plateau to the east and the Sierra- Cascade Mountains to the west (includes western Utah).

Bearing Capacity – the load per unit area, which the ground can safely support without excessive yield.

Bedrock – solid in-place rock, sometimes exposed and sometimes concealed beneath the soil.

Block Faulting – see normal fault.

Collapsible Soil (hydrocompaction) – loose, dry, low-density soil that decreases in volume or collapses when saturated for the first time following deposition.

Critical Areas – Environmentally sensitive areas which include wetlands, fish and wildlife habitat conservation areas; geologically hazardous areas; areas with a critical recharging effect on aquifers used for potable water; and frequently flooded areas. Critical areas have measurable characteristics which, when combined, create a value for or potential risk to public health, safety and welfare.

Critical/Essential Facilities – Structures meeting one or more of the following criteria:

- Fire stations, police stations, storage facilities for vehicles/equipment needed after a hazard event, and emergency operation centers.
- Hospitals, nursing homes, and housing which are likely to contain occupants who may not be sufficiently mobile to avoid injury or death as a result of a hazardous event.
- Public and private utility facilities, which are vital to maintaining or restoring normal services to damaged areas after a hazardous event.
- Structures or facilities that produce, store, or use highly flammable, explosive, volatile, toxic and/or water reactive materials.

Debris Flow – involves the relatively rapid, viscous flow of surface material that is predominantly coarse

grained.

Debris Slide – involves predominantly coarse-grained material moving mainly along a planar surface.

Drought (Agricultural) – lack of water for crop production in a given area.

Drought (Hydrologic) – lack of water in the entire water supply for a given area.

Drought (Meteorological) – lack of precipitation compared to an area's normal.

Drought (Socioeconomic) – lack of water sufficient to support an area's population.

Earth Flow – Involves fine-grained material that slumps away from the top or upper part of a slope, leaving a scarp, and flows down to form a bulging toe.

Earthquake – a sudden motion or trembling in the earth as fracture and movement of rocks along a fault release stored elastic energy.

Earthquake Fault Zone – earthquake fault zones are regulatory zones around active faults. The zones are used to prohibit the location of critical facilities and structures designed for human occupancy from being built astride an active fault. Earthquake Fault Zones are plotted on topographic maps at a scale of 1-inch equals 2,000 feet. The zones vary in width, but average about one-quarter mile wide.

Earthquake-induced Seiche – Earthquake-generated water waves causing inundation around shores or lakes and reservoirs.

Epicenter – the point on the earth's surface directly above the focus of an earthquake.

Epoch – geologic time unit lasting more than an age but shorter than a period (Epoch 2008).

Erosion – the removal of earth or rock material by many types of processes, for example, water, wind, or ice action.

Expansive Soil and Rock – soil and rock which contain clay minerals that expand and contract with changes in moisture content.

Fault – a break in the earth along which movement occurs.

Fault Segment – section of a fault that behaves independently from adjacent sections.

Fault Zone – an area containing numerous faults.

Federal Emergency Management Agency (FEMA) – authorized under Section 404 of the Stanford Act. Provides funding for hazard mitigation projects that are cost-effective and comply with existing post-disaster mitigation programs and activities. These projects cannot be funded through other programs to be eligible.

Fill – material used to raise the surface of the land generally in a low area.

Fire-resistant Vegetation – plants that do not readily ignite and burn when subjected to fire because of inherent physiological characteristics of the species such as moisture content, fuel loading, and fuel arrangement.

Floodplain – an area adjoining a body of water or natural stream that has been or may be covered by floodwater.

Floodplain (100-year/500-year) – Floodplains that have the potential to flood once every 100 or 500 years or that has a 1% (100-year) or 0.2% (500-year) chance of flooding equal to or in excess of that in any

given year.

Floodway – An area of land immediately adjacent to a stream or river channel that, in times of flooding, becomes an enlarged stream or river channel and carries the floodwater with the highest velocity.

Fluvial – concerning or pertaining to rivers or streams.

Focus – the point of origin of an earthquake within the earth, and the origin of the earthquake's seismic waves.

Formation (geologic) – a mappable rock unit consisting of distinctive features/rock types separate from units above and below.

Frequency (seismic waves) – the number of complete cycles of a seismic wave passing a point during one second.

Fuel (fire) – vegetation, building material, debris, and other substances that will support combustion.

Fuel Break – a change in fuel continuity, type of fuel, or degree of flammability of fuel in a strategically-located strip of land to reduce or hinder the rate of fire spread.

Fuel Type – a category of vegetation used to indicate the predominant cover of an area.

Glacial Moraine – debris (sand to boulders) transported and deposited by glacial ice along a glacier's sides or terminus.

Graben – a block of earth dropped between two faults.

Gradient (slope) – a measure of the slope of the land surface.

Ground Failure – a general term referring to any type of ground cracking or subsidence, including landslides and liquefaction-induced cracks.

Ground Shaking – the shaking or vibration of the ground during an earthquake.

Ground Water – that portion of subsurface water that is in the zone of saturation.

Gypsiferous Deposits – soil or rock containing gypsum, which can be subject to dissolution.

Gypsum – a mineral composed of hydrated calcium sulfate. A common mineral of evaporites.

Hazard Mitigation Plan – the Plan resulting from a systematic evaluation of the nature and extent of vulnerabilities posed by a hazard present in society that includes the strategies needed to minimize future vulnerability to hazards.

Hazard Mitigation – any action taken to reduce or permanently eliminate the long-term risk to human life and property and the environment posed by a hazard.

HAZUS-MH – Hazards United States – Multihazards; Earthquake loss estimation software using GIS databases developed by FEMA.

Head (landslide) – the upper parts of the slide material along the contact between the disturbed material and the main scarp.

Holocene – geologic epoch covering the last 10,000 years (after the last Ice Age).

Igneous Rocks – rocks formed by the cooling and hardening of hot liquid material (magma), including rocks cooled within the earth (for example, granite) and those that cooled at the ground surface as lavas (such as basalt).

Impermeable – materials having a texture that does not permit water to move through.

Interfluve – land between two streams in the same drainage basin (Interfluve 2004).

Intermountain Seismic Belt (ISB) – zone of pronounced seismicity, up to 120 miles wide and 800 miles long, extending from Arizona through central Utah to northwestern Montana.

Lacustrine – concerning or pertaining to lakes.

Landslide – a general term for a mass of earth or rock, which moves down slope by flowing, spreading, sliding, toppling, or falling (see slope failure).

Lateral Spread – lateral down slope displacement of soil layers, generally several feet or more, above a liquefied layer.

Levee (flood) – a berm or dike used to contain or direct water, usually without an outlet or spillway.

Liquefaction – sudden large decrease in shear strength of a cohesionless soil (generally sand or silt) caused by collapse of soil structure and temporary increase in pore-water pressure during earthquake ground shaking.

Magnitude (earthquake) – a quantity characteristic of the amplitude of the ground motion of an earthquake. The most commonly used measurement is the Richter magnitude scale; a logarithmic scale based on the motion that would be measured by a standard type of seismograph 60 miles from the earthquake's epicenter.

Metamorphic Rocks – rocks formed by high temperatures and/or pressures (for example, quartzite formed from sandstone).

Mitigation – the act of reducing or preventing hazards which affect society or those things deemed important to society

Modified Mercalli Intensity (MMI) – the most commonly used intensity scale in the U.S.; it is a measure of the severity of earthquake shaking at a particular site as determined from its effect on the earth's surface, man, and man's structures.

Montmorillonite – a clay mineral characterized by expansion upon wetting and shrinking upon drying.

Natural Vegetation – native plant life existing on a piece of land before any form of development.

Normal Fault (block faulting) – fault caused by crustal extension in which relative movement on opposite sides is primarily vertical.

Oolite – spherical grains of carbonate sand with a brine shrimp fecal pellet nucleus.

Outlet (dam) - a conduit through which controlled releases can be made from the reservoir.

Palmer Drought Severity Index (PDSI) – developed by Wayne Palmer in 1965; measures drought severity using temperature, precipitation and soil moisture (Utah Division of Water Resources 2007).

Peat – unconsolidated surficial deposit of partially decomposed plant remains.

Period (geologic) – a standard (world-wide) geologic time unit.

Permeability – the capacity of a porous rock or soil for transmitting a fluid.

Physiographic Province – a region whose pattern of relief features or landforms differs significantly from that of adjacent regions.

Piping (problem soil and rock) – a weak incoherent layer in unconsolidated deposits that acts as a channel directing the movement of water. As the layer becomes saturated it conducts water to a free face (cliff or stream bank for example) that intersects the layer, and material exits out a "pipe" formed in the free face. Piping can occur in a dam as the result of progressive development of internal erosion by seepage.

Pore Space – the open spaces in a rock or soil between solid grains. The spaces may be filled with gas (usually air) or liquid (usually water).

Porosity – the ratio of the volume of pore space in rock or soil to the volume of its mass, expressed as percentage.

Probable Maximum Flood (PMF) – a flood that would result from the most severe combination of critical meteorological and hydrologic conditions possible in a region.

Probable Maximum Precipitation (PMP) – the maximum amount and duration of precipitation that can be expected to occur on a drainage basin.

Problem Soil and Rock – geologic materials that are susceptible to volumetric changes, collapse, subsidence, or other engineering geologic problems.

Project Impact – An initiative of the Federal Emergency Management Agency intended to modify the way in which the United States handles natural disasters. The Goal of Project Impact from a Federal Government perspective is to reduce the personal and economic costs of hazard events by bringing together the private and public sector to better enable the citizens of a community to protect themselves from natural hazards.

Quaternary – a geologic time period covering the last 1.6 million years.

Recurrence Interval – the length of time between occurrences of a particular event (an earthquake, for example).

Rock Fall – abrupt free fall or down slope movement, such as rolling or sliding, of loosened blocks or boulders from an area of bedrock. The rock-fall runout zone is the area below a rock-fall source which is at risk from falling rocks.

Rock Topple – forward rotation movement of a rock unit(s) about some pivot point.

Runout Zone (avalanche) – where a snow avalanche slows down and comes to rest (deposition zone). For large avalanches, the runout zone can include a powder- or wind-blast zone that extends far beyond the area of snow deposition.

Sand Blow (earthquake) – deposit of sandy sediment ejected as water and sand to the surface, formed when ground shaking has caused liquefaction at depth.

Scarp – a relatively steeper slope separating two more gentle slopes. Scarps can form as a result of earthquake faulting.

Sediment – material that is in suspension, is being transported, or has been moved from its site of origin by water, ice, or wind, and has come to rest on the earth's surface either above or below the sea level.

Sedimentary Rocks – rocks formed from loose sediment such as sand, mud, or gravel deposited by water, ice, or wind, and then hardened into rock (for example, sandstone); or formed by dissolved minerals precipitating out of solution to form rock (for example, tufa).

Seiche – a standing wave generated in a closed body of water such as a lake or reservoir. Ground shaking, tectonic tilting, sub aqueous fault rupture, or landsliding into water can all generate a seiche.

Seismic Waves – vibrations in the earth produced during earthquakes.

Seismicity – seismic or earthquake activity.

Sensitive Clay – clay soil that experiences a particularly large loss of strength when disturbed. Deposits of sensitive clay are subject to failure during earthquake ground shaking.

Shear Strength – the internal resistance that tends to prevent adjacent parts of a solid from "shearing" or sliding past one another parallel to the plane of contact. It is measured by the maximum shear stress that can be sustained without failure.

Shear Stress - a stress causing adjacent parts of a solid to slide past one another parallel to the plane of contact.

Slope Failure – a general term referring to any type of natural ground movement on a sloping surface (see landslide).

Slump – a slope failure that slides along a concave rupture surface. Generally slumps do not move very far from the source area.

Snow Avalanche – a rapid downslope movement of a mass of snow, ice, and debris.

Spectral Acceleration – measurement for approximate horizontal force experienced in a model earthquake. Measurements are specific to the frequency of shaking found to affect buildings during and earthquake. A 0.2- second period affects primarily one- and two-story buildings while 1.0- second period of spectral acceleration affects buildings approximately 10 stories in height.

Stafford Act – Robert T. Stafford Disaster Relief and emergency Assistance Act, PL 100-707, signed into law November 23 1988: amended the Disaster Relief Act of 1974, PL 93-288.

Starting Zone (avalanche) – where the unstable snow or ice breaks loose and starts to slide.

Subsidence – a settling or sinking of the earth's crust.

Sunny-Day Failure – the failure of a dam with the water level at the normal pool elevation and no rainfall.

Surface fault rupture (surface faulting) – propagation of an earthquake-generated fault rupture to the ground surface, displacing the surface and forming a scarp.

Tectonic Subsidence – subsidence (down dropping) and tilting of a basin on the down dropped side of a fault during an earthquake.

Toe (landslide) – the margin of disturbed material most distant from the main scarp.

Track (avalanche) – the slope or channel down which a snow avalanche moves at a fairly uniform speed.

Unconsolidated Basin Fill – un-cemented and non-indurated sediment, chiefly clay, silt, sand, and gravel, deposited in basins.

Urban Area – a geographical area, usually of incorporated land, covered predominately by engineered structures including homes, schools, commercial buildings, service facilities, and recreational facilities.

Velocity (ground motion) – the rate of displacement of an earth particle caused by passage of a seismic wave.

Wasatch Fault – a normal fault that extends over 200 miles from Malad City, Idaho to Fayette, Utah, and trends along the western front of the Wasatch Range.

Watershed – the area of land above a reference point on a stream or river, which contributes runoff to that stream.

Weathering – a group of processes (such as the chemical action of air, rain water, plants, and bacteria and the mechanical action of temperature changes) whereby rocks on exposure to the weather change in character, decay, and finally crumble into soil.

Wildfire – uncontrolled fire burning in vegetation.

Wildland Area – a geographical area of unincorporated land covered predominately by natural vegetation.

Wildland Urban Interface (WUI) – Wildland vegetation and forested areas adjacent to or intermingled with residential developments.

Zone of Deformation (earthquake) – the width of the area of surface faulting over which earth materials have been disturbed by fault rupture, tilting, or subsidence.

A.2 List Of Acronyms And Recognized Abbreviations

AARC - Average Annual Rate of Change

AGRC - Automated Geographic Reference Center

APHIS - Animal and Plant Health Inspection Service

BCEGS - Building Code Effectiveness Grading System

BOR - Bureau of Reclamation

CDBG - Community Development Block Grant

CERCLA - Comprehensive Environmental Response Compensation and Liability Act

CERT - Community Emergency Response Team

CFR - Code of Federal Regulations

CFS - Cubic Feet per Second

CRS - Community Rating System

DB - Detention Basin

DFIRM - Digital Flood Insurance Rate Map

DEM - Division of Emergency Management

DMA 2000 - Disaster Mitigation Act of 2000

EAP - Emergency Action Plan

EM - Emergency Management

EOC - Emergency Operations Center

EOP - Emergency Operations Plan

FEMA - Federal Emergency Management Agency

FIRM - Flood Insurance Rate Map

FIS - Flood Insurance Study

FMA - Flood Mitigation Assistance

G - Gravity

GIS - Geographic Information Systems

GOMB - Governor's Office of Management and Budget

GPS - Geographic Positioning System

GSL - Great Salt Lake

HAM - Handheld Amateur Radio

HAZMAT - Hazardous Materials

HAZUS-MH Hazards United States – Multi-Hazards

HMGP - Hazard Mitigation Grant Program

LEPC - Local Emergency Planning Committee

LUST - Leaking Underground Storage Tank

M - Magnitude

MSL - Mean Sea Level

MOU - Memorandum of Understanding

NCDC - National Climatic Data Center

NFIP - National Flood Insurance Program

NIMS - National Incident Management System

NWS - National Weather Service

PDM - Pre-Disaster Mitigation

PDSI - Palmer Drought Severity Index

piC/L - picoCuries per Liter

PL - Public Law

PSC - Public Safety Communications

RCRA - Resource Conservation and Recovery Act

SA - Spectral Acceleration

SBA - Small Business Administration

SHELDUS - Spatial Hazard Events and Losses Database for the United States

SLC - Salt Lake City

SPI - Standardized Precipitation Index

SR - State Route

STAPLEE - Social, Technical, Administrative, Political, Legal, Economic, Environmental

SWSI - Surface Water Supply Index

TAZ - Transportation Analysis Zone

TRI - Toxic Release Inventory

UCAN - Utah Communication Agency Networks

UDAF - Utah Department of Agriculture and Food

UDOT - Utah Department of Transportation

UEDV - Utah Economic Data Viewer

UFFSL - Utah Division of Forestry, Fire, and State Lands

UGS - Utah Geological Survey

USGS - United States Geological Survey

USACE - United States Army Corps of Engineers

USC - United States Code

USDA - United States Department of Agriculture

USFS - United States Forestry Service

USU - Utah State University

UUSS - University of Utah Seismic Stations

WFZ - Wasatch Fault Zone

WUI - Wildland-Urban Interface

B.0 APPENDIX (B) - 2018 Emery County Mitigation Plan

Please visit https://hazards.utah.gov/emery-County/ for more information

C.0 APPENDIX (C) - References and Works Cited

Background information and data for this plan was obtained from the sources listed below. From these sources, the Planning Consultant extracted relevant information and data. That information and data was subsequently submitted to the County Work Groups for their consideration and approval for inclusion into the Plan.

See also Appendix H for GIS sources.

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D.0 APPENDIX (D) - Meeting Agendas, Attendance Lists, and Letters of Support

D.1 Invited Jurisdictions & Local Operators

At the beginning of this initiative, the county made significant efforts to invite stakeholders to participate in the process.

Figure D.1.1 Invitation Letter for Potential Stakeholders

Needs to be placed on County letterhead

__ City Council
c/o ___, email

January 11, 2023

RE: EMERY COUNTY PRE-DISASTER MITIGATION PLAN UPDATE

A Pre-Disaster Mitigation Plan (PDM) is intended to promote sound public policy and protect or reduce the vulnerability of the citizens, critical facilities, infrastructure, private property, and the natural environment within the County. A PDM is required by the Federal Emergency Management Agency (FEMA), and the updated Pre-Disaster Mitigation Plan MUST comply with FEMA rules.

Emery County developed a PDM that FEMA approved in 2018. The County has a strategic imperative to have its existing plan updated and approved before it expires. We have received a grant in support of its initiative in part because local staff time that can be dedicated toward this work is limited.

The process to develop a PDM involves a significant amount of data analysis and coordination between numerous state agencies, municipalities in and adjacent to Emery County, many special service districts, and other community organizations. For the plan to gain this support, the project will need to be managed carefully, information will need to be communicated clearly, and time will need to be reserved for revisions and for the various local adoption processes.

In order for this initiative to proceed, Emery County needs a formal statement of support and agreement to participate from the primary stakeholder agencies (municipalities). We have attached content that we would suggest for your jurisdiction's resolution of support.

Emery County has retained a consultant to help with this initiative (Mike Hansen, Rural Community Consultants). Their team will likely be contacting your office throughout this planning process. Due to the pandemic, they will be focusing most of our interaction through online resources that will be associated with the EmeryHazardPlan.org website.

__
Emergency Manager, Emery County

Figure D.1.2 Table of Stakeholder Participants

Jurisdiction / Entity	Contact Name and Information	2023 Participation (Y/N)
Castle Dale City	Danny VanWagoner, Mayor dancvcc57@hotmail.com	Yes
Clawson Town	Gary Price, Mayor pfamfarm@gmail.com	Yes
Cleveland Town	Preston Wilson, Mayor prestonwilson3075@gmail.com	Yes
Elmo Town	James Winn, Mayor jwinn39@yahoo.com	Yes
Emery Town	Jack Funk, Mayor emerymayor@etv.net	Yes
Ferron City	Adele Justice, Mayor adelej@ferroncity.org	Yes
Green River City	Ren Hatt, Mayor rhatt@greenriverutah.com	Yes
Huntington City	Leonard Norton, Mayor mayor@huntingtonut.com	Yes
Orangeville City	David Robertson, Mayor unclebarn@yahoo.com	Yes
Emery County	Jeremy Lake, Emergency Manager jeremy.lake@ecso.utah.gov	Yes
Carbon County (EM)	Justin Needles, Emergency Manager justin.needles@carbon.utah.gov	No (but invited)
Grand County (EM)	Cora Phillips, Emergency Manager cphillips@grandCountysheriff.org	No (but invited)
Sanpete County (EM)	Jason Albee, Emergency Manager jalbee@sanpeteCountyutah.gov	No (but invited)
Sevier County (EM)	Bill Taufer, Emergency Manager wtaufer@sevier.utah.gov	No (but invited)
San Juan County (EM)	Tammy Gallegos, Emergency Manager tgallegos@sanjuanCounty.org	No (but invited)
Uintah County (EM)	Heidi Lundberg, Emergency Manager hlundberg@uintah.utah.gov	No (but invited)
Wayne County (EM)	Jimmy Harris, Emergency Manager jimmy@wayne.utah.gov	No (but invited)
Wayne County (Assistant EM)	Kassi Brown, Assistant Emergency Manager kassidee@wayne.utah.gov	No (but invited)

Southeastern Regional Development Agency (SERDA)	Todd Thorne, Planner todd.thorne@carbon.utah.gov	Yes
Castle Valley	Jazmine Duncan, Mayor jazmined@castlevalleyutah.com Jocelyn Buck, Town Clerk townclerk@castlevalleyutah.com	No (but invited)
Hill Air Force Base	Barbara Fisher, PIO barbara.fisher.1@us.af.mil	No (but invited)
Ute Indian Tribe of the Uintah and Ouray Reservation	Greg Buxton, PE gbuxton@utetribe.com	Provided draft for review during FEMA review period

D.2 Invited Specialized Local Districts

Jurisdiction / Entity	Contact Name and Information	2023 Participation (Y/N)
Castle Valley SSD	Jacob Sharp, Director jsharp@etv.net	Yes
Emery Emergency Medical Services	Leonard Norton, Chairman jano@emery.utah.gov	Yes
Emery SSD #1 (Roads)	Bevan Wilson, Chairman ecssd1@emery.utah.gov	Yes
Emery County Fire Protection SSD	Ignacio (Nosh) Arrien, Chairman natalieo@emery.utah.gov	Yes
Emery County School District	Jackie Allred, Planner JackieA@emeryschools.org	Yes
Emery County Recreation SSD	Shawnee Snow, Director recreation@emery.utah.gov	Yes
Huntington Airport	Dal Guymon, Manager (435) 381-3589	No (but invited)
North Emery Water Users SSD	Carl Fillmore, Chairman jano@emery.utah.gov	Yes
San Rafael SSD	Lynn Sitterud, Chairman maeganc@emery.utah.gov	Yes

D.3 Invited Non-Governmental Organizations

Specialized Local District	Contact Name and Information	2023 Participation (Y/N)

American Red Cross - Utah	Kristy Denlein, Local Representative kristy.denlein@redcross.org	No (but invited)
Emery Chamber of Commerce	info@emeryCountychamber.com	No (but invited)
Castleview Hospital - Price	435-637-4800	No (but invited)
Emery Medical Center	435-381-2305	No (but invited)
Gagon Family Medicine	435-613-2200	No (but invited)
Green River Medical Center	435-564-3434	No (but invited)
Dominion Energy	Corporate.communications@dominionenergy.com	No (but invited)
Rocky Mountain Power	CCCom2@pacificorp.com	No (but invited)
Huntington Power Plant	Laren Huntsman, Plant Manager laren.huntsman@pacificorp.com 435-687-4000	No (but invited)
Hunter Power Plant	Laren Huntsman, Plant Manager laren.huntsman@pacificorp.com 435-748-5114	No (but invited)

D.4 State & Federal Government Stakeholders (Non-Participatory)

Stakeholder Entity	Contact Name and Information
Federal Emergency Management Agency Region 8 Office Community Assistance Program – State Support Services Element	fema-capssse@fema.dhs.gov
Military	Carl Wiggins, Hill Air Force Base Emergency Manager carl.wiggins.1@us.af.mil Barbara Fisher, PIO barbara.fisher.1@us.af.mil
National Weather Service	Kevin Barjenbruch, PIO
State Dam Safety	Joel Williams, Deputy Director joelwilliams@utah.gov
State Department of Transportation	Rob Wight, Region 1 Director contactudot@utah.gov, rwight@utah.gov
State Fire and Forestry Agency	Gerry Gray, Forestry Program Administrator/Utah Division of Forestry, Fire, and State Lands, ggray@utah.gov
State Fire and Forestry Agency State Geological Survey	Bill Keach, UGS Director/State Geologist billkeach@utah.gov
State National Flood Insurance Program	Jamie Peterson (Utah DEM), Planner
State Planning Office	Laura Hanson, State Planning Coordinator gopb@utah.gov
State Water Resources Agency	Kyle Stevens, Chair of Water Resources Board krstephens08@gmail.com
US Army Corps of Engineers	Sacramento Civil Works Region spk-pao@usace.army.mil

US Department of Housing and Urban	Kelly Jorgensen, Field Office Director UT_Webmanager@hud.gov
US Department of Transportation	Utah Field Office-FMCSA
US Environmental Protection Agency	Region 8 Field Office r8eisc@epa.gov
US Geological Survey	Region 7 usgsstore@usgs.gov
USFS	Tawny Myers, LE Supervisor tawnylynn.myers@usda.gov
Utah Department of Emergency Management	Jamie Peterson, State DEM Region 1 Liaison

D.5 Core Planning Team Meetings

While individual stakeholder meetings were emphasized, the core planning team met throughout the project to coordinate on the project and address specific issues. The core team met both virtually and in-person.

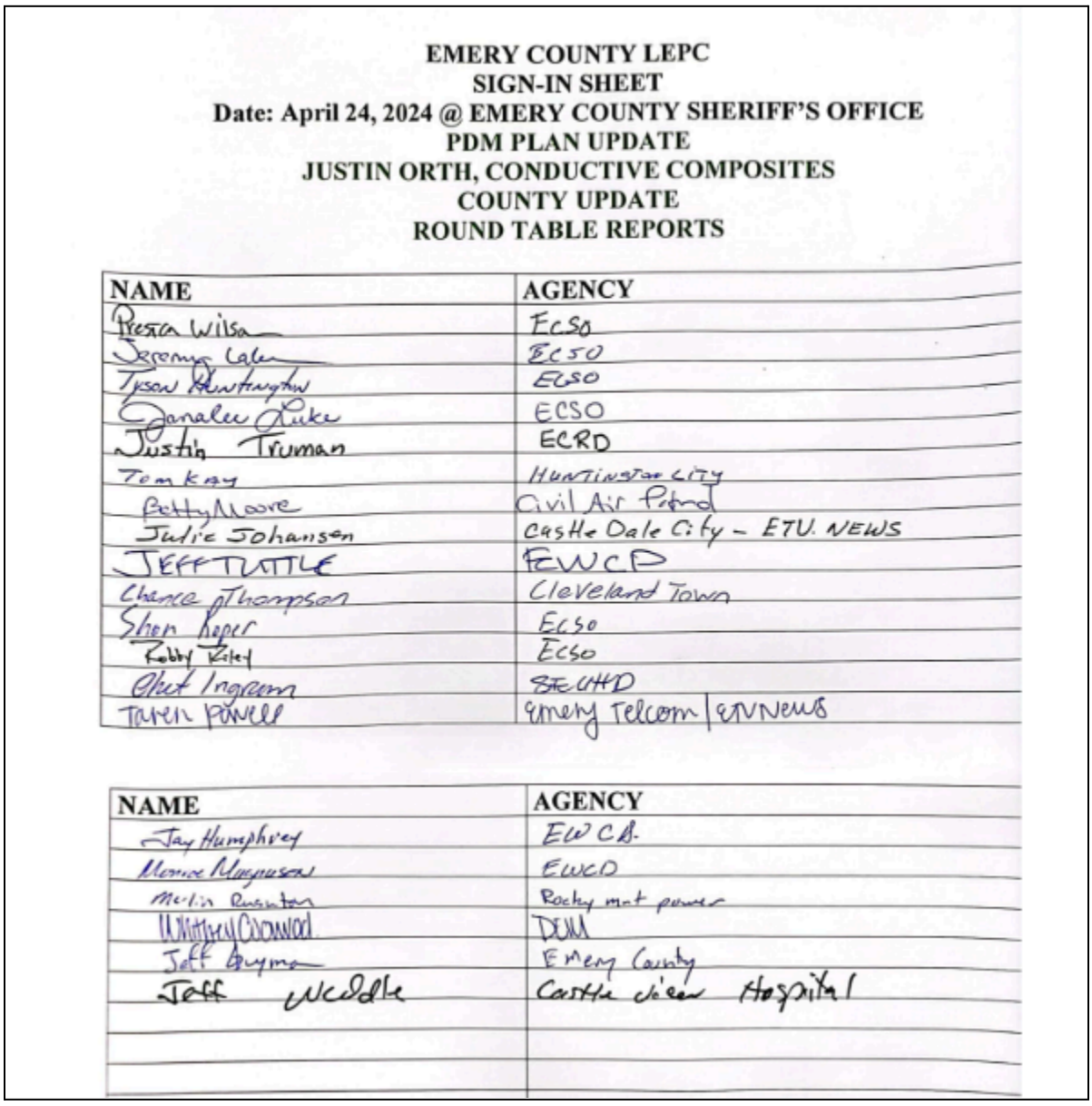
A list of scheduled meetings and unique agenda items follows. Note that this list does not include the numerous exchanges via email and phone.

Figure D.5.1 Dates and Agenda of Core Planning Team Meetings

Date	Unique Agenda Item(s)
8/31/2022	Kickoff Meeting with Emery County Emergency Manager and Rural Community Consultants, General Team Introduction, Project Management Plan + Timeline Overview
8/31/2022	Stakeholder kickoff meeting (LEPC meeting)
1/23/2023	Include state GIS modeling / mapping staff
1/27/2023	include hazard modeling staff from University of Utah
2/15/2023	Stakeholder meeting readthrough draft
6/6/2023	focus on capital improvement lists (Southeast AOG)
2/2/2024	project update discussion
2/9/2024	project update discussion (follow-up), new partnership with BRAG AOG
2/15/2024	draft readthrough
2/16/2024	(new team) coordination meeting
2/23/2024	coordination meeting
3/1/2024	coordination meeting
3/8/2024	coordination meeting
3/11/2024	update meeting for county (in-person)
3/15/2024	coordination meeting
3/22/2024	coordination meeting
3/29/2024	Stakeholder meeting (LEPC meeting)

4/5/2024	coordination meeting
4/10/2024	coordination meeting (project detailed check-in)
4/24/2024	Stakeholder meeting (LEPC meeting)
4/26/2024	coordination meeting
5/3/2024	coordination meeting
5/17/2024	coordination meeting
5/31/2024	coordination meeting
6/21/2024	coordination meeting
7/12/2024	coordination meeting
8/11/2024	review all public comments
8/14/2024	Meeting with Utah DEM
9/20/2024	Final team coordination meeting before first client submittal

Figure D.5.2 Example Sign-in Sheet from LEPC Meetings



EMERY COUNTY LEPC
SIGN-IN SHEET
Date: April 24, 2024 @ EMERY COUNTY SHERIFF'S OFFICE
PDM PLAN UPDATE
JUSTIN ORTH, CONDUCTIVE COMPOSITES
COUNTY UPDATE
ROUND TABLE REPORTS

NAME	AGENCY
Presca Wilson	ECSO
Jeremy Lake	ECSO
Tyson Huntington	ECSO
Janalee Luke	ECSO
Justin Truman	ECRD
Tom Kay	Huntington City
Betty Moore	Civil Air Patrol
Julie Johansen	Castle Dale City – ETV. NEWS
JEFF TUTTLE	FEWCD
Chance Thompson	Cleveland Town
Shon Roper	ECSO
Robby Riley	ECSO
Chet Ingram	SEUHD
Taven Powell	Emery Telcom / ETVNews

NAME	AGENCY
Jay Humphrey	EWCA.
Monica Magnuson	EWCD
Merlin Rasmussen	Rocky mt power
Whitney Crawford	DEM
Jeff Bryner	Emery County
Jeff Weddle	Castle View Hospital

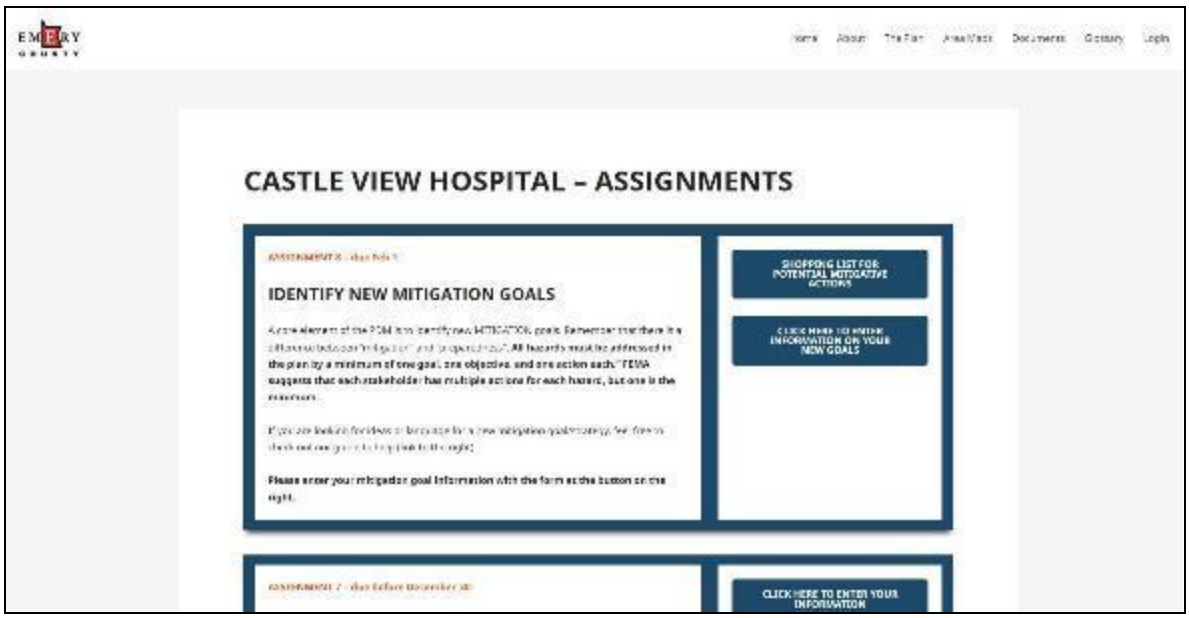
D.6 Attendance List for One-on-One Stakeholder Meetings

Stakeholder and Participants	Date	Format	Purpose and Participation
Southeast Utah AOG *(Tamara Dockstader, Planner)*	2023.06.08	online	Content review (capital projects).
Emery School District *(Jackie Allred, Director)*	2023.08.07	online	Gather missing information on new goals and content review.
Castle Dale City *(Danny VanWagoner, Mayor)*	2024.02.15	in-person	Request new information on status of previous and new goals.

Clawson Town *(Shaun Gregersen, Town Clerk)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Cleveland Town *(Nancy Livingston, Town Clerk)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Elmo Town *(Gabbe Brotherson, Town Clerk)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Emery Town *(Susan Cole, Town Clerk)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Ferron City *(Barbara Bowles, Town Clerk)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Huntington City *(Jenene Hansen, Town Recorder)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Orangeville City *(David Robertson, Mayor)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Emery SSD 1 *(Bevan Wilson, Chairman)*	2024.02.15	in-person	Request new information on status of previous and new goals.
Southeast Utah AOG *(Todd Thorne, Planning Administrator)*	2024.02.16	online	Discuss stakeholder capacity and support.
Southeast Utah AOG *(Todd Thorne, Regional Planner)*	2024.03.20	online	Verification of capital projects on SEUALG list.
North Emery SSD and San Rafael SSD *(Jay Humphrey, Director)*	2024.06.12	online	Gather missing information on new goals.
Emery County EMS SSD *(Stoney Huems, Manager)*	2024.06.13	online	Gather missing information on new goals and content review.
Emery School District (Jared Hansen, Project Manager)	2024.07.24	online	Gather missing information on new goals and content review.

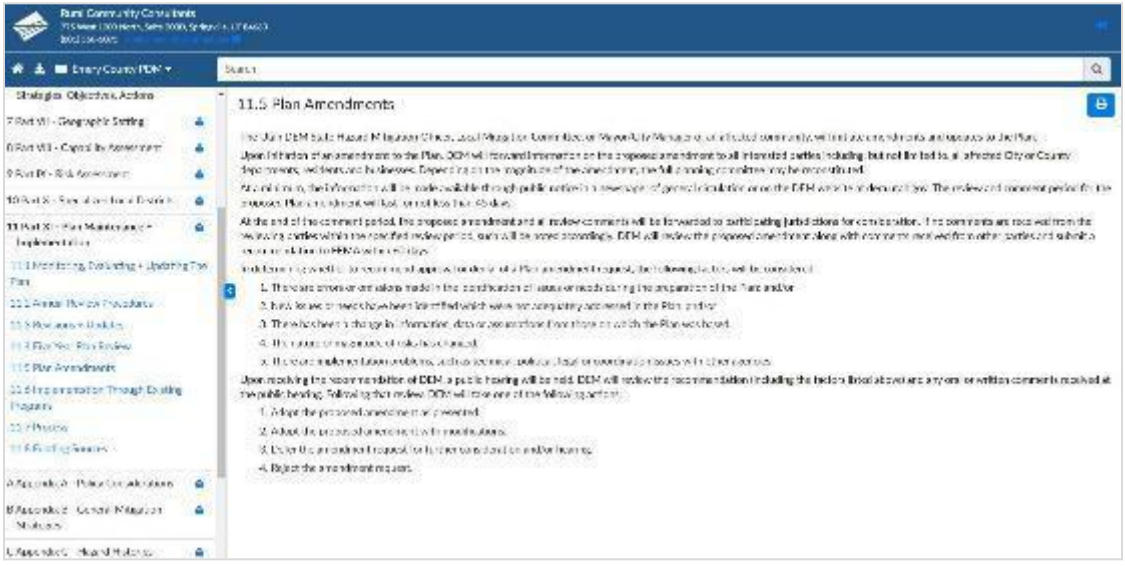
D.7 Stakeholder Interaction Portal

In order to facilitate communication between stakeholders and plan writers, a web portal was incorporated into the initiative website.



Screen Capture of the "assignment pages" on the secured section of the initiative website. Stakeholders were provided specific instructions and individual folders to upload their response materials.

Communication was also facilitated with the use of civiclinQ.com (see example below). Each part of the plan was digitized into this format, and links were shared with stakeholders who were able to make tracked comments and suggestions within the text. These comments were reviewed and incorporated by the core planning team throughout the initiative. The public was also given access to do the same during the public comment period.



Screenshot of typical edits provided by stakeholders and captured by the document (before committee acceptance).

D.8 Letters of Support from Participating Communities

Municipality	2023 Participation	Supporting Resolution Date	Support Resolution Link
Castle Dale City	Yes	11/21/2020	BRIC PDM SUPPORT LETTERS - Castle Dale.pdf
Clawson Town	Yes	11/24/2020	BRIC PDM SUPPORT LETTERS - Clawson.pdf
Cleveland Town	Yes	12/2/2020	BRIC PDM SUPPORT LETTERS - Cleveland.pdf
Elmo Town	Yes	11/23/2020	BRIC PDM SUPPORT LETTERS - Elmo.pdf
Emery Town	Yes	11/24/2020	BRIC PDM SUPPORT LETTERS - Emery Town.pdf
Ferron City	Yes	11/24/2020	BRIC PDM SUPPORT LETTERS - Ferron.pdf
Green River City	Yes	11/30/2020	BRIC PDM SUPPORT LETTERS - Green River.pdf
Huntington City	Yes	11/23/2020	BRIC PDM SUPPORT LETTERS - Huntington.pdf
Orangeville City	Yes	11/23/2020	BRIC PDM SUPPORT LETTERS - Orangeville.pdf

D.9 Sample Resolution

RESOLUTION NO.

A RESOLUTION ADOPTING THE EMERY COUNTY 2023 NATURAL HAZARD PRE-DISASTER MITIGATION PLAN UPDATE, AS REQUIRED BY THE FEDERAL DISASTER MITIGATION AND COST REDUCTION ACT OF 2000.

(Name of Jurisdiction)

(Governing Body)

(Address)

WHEREAS, President William J. Clinton signed H.R. 707, the Disaster Mitigation and Cost Reduction Act of 2000, into law on October 30, 2000; and,

WHEREAS, the Disaster Mitigation Act of 2000 requires all jurisdictions to be covered by a Pre-Disaster Hazard Mitigation Plan to be eligible for Federal Emergency Management Agency post-disaster funds; and,

WHEREAS, the *Natural Hazard Pre-Disaster Mitigation Plan* has been prepared in accordance with FEMA requirements at 44 C.F.R. 201.6; and,

WHEREAS, the [MUNICIPALITY] is within Emery County and participated in the update of the multi-jurisdictional Plan, the *Natural Hazard Pre-Disaster Mitigation Plan*; and,

WHEREAS, the [MUNICIPALITY TYPE]/[MUNICIPALITY] is a local unit of government that has afforded its citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and,

WHEREAS, the [County] is concerned about mitigating potential losses and has determined that it would be in the best interest of the community to adopt the *Natural Hazard Pre-Disaster Mitigation Plan*;

NOW THEREFORE, BE IT RESOLVED by the City Council that the [MUNICIPALITY] adopts the *2023 Emery County Natural Hazard Pre-Disaster Mitigation Plan Update* as this jurisdiction's Multi-Hazard Mitigation Plan.

ADOPTED this XX day of XX, 2021 at the meeting of the [MUNICIPALITY] Council. Signed: (Chief Elected Official)

(City Council)

D.10 Public Announcement(s)

Please refer to section 3.4 - Public Involvement.

E.0 Appendix (E) - Authority

E.1.1 Federal

Public Law 93-288 as amended, established the basis for federal hazard mitigation activity in 1974. A section of this Act requires—as prerequisite for state receipt of future disaster assistance outlays—the identification, evaluation, and mitigation of hazards. Since 1974, many additional programs, regulations, and laws have expanded on the original legislation to establish hazard mitigation as a priority at all levels of government.

Several additional provisions were also included when PL 93-288 was amended by the Stafford Act that provide for the availability of significant mitigation measures in the aftermath of a Presidentially declared disaster. Civil Preparedness Guide 1-3, Chapter 6- Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed toward hazards with a high impact and threat potential.

The Disaster Mitigation Act of 2000 (DMA 2000) was signed into Law on October 30, 2000 by President Bill Clinton. Section 322, defines mitigation planning requirements for state, local, and tribal governments. Under Section 322, if states submit a mitigation plan (a summary of local/regional mitigation plans) identifying natural hazards, risks, vulnerabilities, and proposed actions to reduce those risks and vulnerabilities, the state is eligible for an increase in the Federal share of hazard mitigation.

E.1.2 State

The Governor's Emergency Operation Directive, The Robert T. Stafford Disaster Relief and Emergency Assistance Act, amendments to Public Law 93-288, as amended, Title 44, CFR, Federal Emergency Management Agency Regulations, as amended, State Emergency Management Act of 1981, Utah Code 53-2, 63-5, Disaster Response Recovery Act, 63-5A, Executive Order of the Governor, Executive Order 11, Emergency Interim Succession Act, 63-5B.

E.1.3 Local

Local governments play an essential role in implementing effective mitigation. For the purposes of this Plan, local governments include not only cities and counties, but also special service districts with elected boards. Each local government will review all present or potential damages, losses and related impacts associated with natural hazards to determine the need or requirement for mitigation action and planning. In Emery County, the local executives responsible for carrying out plans and policies are the County commissioners and Cities or Towns mayors and administrators. The Southeast Association of Local Governments is a regional planning and coordination agency that serves as a platform for local governments to collaborate on a range of issues including pre-disaster mitigation.

Local governments must be prepared to participate in the post-disaster hazard mitigation team process and pre-disaster mitigation planning as outlined in this document in order to effectively protect their citizens. All jurisdictions in Emery County participated in the development of this plan.

F.0 APPENDIX (F) - Critical Facilities

FEMA's definition of a Critical Facility is as follows: *For some activities and facilities, even a slight chance of flooding is too great a threat. Typical critical facilities include hospitals, fire stations, police stations, storage of critical records, and similar facilities. These facilities should be given special consideration when formulating regulatory alternatives and floodplain management plans (https://www.fema.gov/glossary/critical-facility).*

F.1 Natural Hazard Impact Legend

Emery County's summary for the risk assessment for all the critical facilities by hazard (DF = Dam Failure, DR = Drought, EQ = Earthquake, FL = Flood, IN= Infestation, LS= Landslide, SW= Severe Weather, PS= Problem Soils, WF= Wildfire).

Each hazard has its own criteria for risk:

- **Wildfire** categories of Very Low (VVL), Very Low (VL), Low (L), Low-Moderate (L-M), Moderate (M), Moderate-High (M-H, High (H), Very High (VH), Extreme (E), and Urban, Agriculture, Water, or Barren (W). (DNR for the Utah Wildfire Risk Assessment Portal has identified)
- **Dam Failure** has High (H) = facility is in inundation area, Moderate (M) = facility is within 0.10 mile of inundation area, and Low (L) = facility is >0.10 mile of inundation area.
- **Earthquake** Peak Ground Acceleration has High (H), Moderate (M) and Low (L) based on data from USGS.
- **Landslide** has High (H), Moderate (M), Low (L) and Very Low (VL) based on USGS.
- **Drought** has Exceptional Drought (D4), Extreme Drought (D3), Severe Drought (D2), Moderate Drought (D1), Abnormally Drought (D0), None: No Drought. National Integrated Drought Information System
- **Flood** has High (H), Moderate (M), Low (L) and Very Low (VL).
- **Infestation** has High (H), Moderate (M), Low (L) and Very Low (VL).
- **Severe Weather** has High (H), Moderate (M), Low (L) and Very Low (VL) NOAA.
- **Problem Soils** High has (H), Moderate (M), Low (L) and Very Low (VL).

F.2 Emery County Critical Facilities

As the County continues to see substantial growth, they have focused much attention on the improvements of critical infrastructure. The County maintains the utmost standards of public safety along with current construction methods and seismically sound structures. And the goals of the County moving forward demonstrate their commitment to maintaining essential infrastructure and the safety of its residents well into the future.

At the time of construction, all County buildings were designed under current building, fire, and seismic codes.

Emery County Critical Facilities 2023

Facility Name	DF	DR	EQ	FL	IN	LS	SW	PS	WF
Castle Valley Special Service District 90 S 100 E - Castle Dale, UT, (435)381-5333	ML	D2	M	M	L	L	H	L	VL
Huntington Water Treatment Plant, Hwy 31	VH	D2	M	H	L	M	H	L	VL
Castle Dale Water Plant 1155 N Center - Castle Dale, (435)381-2799	VL	D2	M	VL	VL	VL	H	L	VL
Ferron Water Plant 1555 W Mill Road - Ferron (435)384-2412	VVH	D2	M	H	L	L	H	L	VL
Strait Canyon Water Treatment Plant 4320 W SR 29 - Orangeville (435)748-5736	VVH	D2	H	VH	L	L	H	L	VL
Green River Water Treatment Facility 520 S 650 E - Green River, (435)564-3321	H	D2	H	M	L	H	H	L	VL
Emery Water Treatment Plant 300 W 700 N - Emery *If no phone, contact CVSSD	L	D2	M	M	L	M	H	L	VL
Little Bear Spring Huntington Canyon *If no phone, contact CVSSD	M	D2	H	M	L	L	H	L	M
Big Bear Spring Huntington Canyon *If no phone, contact CVSSD	M	D2	H	M	L	L	H	L	M
Ty Fork Springs - Upper and Lower Huntington Canyon, *If no phone, contact CVSSD	L	D2	H	H	L	L	H	L	M
Castle Dale 65 E 100 N - Castle Dale (435)381-2115	M	D2	M	M	L	L	H	L	VL

Cleveland 130 W Main - Cleveland (435)653-2310	L	D2	M	L	L	L	H	L	VL
Elmo 75 S 100 E - Elmo (435)653-2125	L	D2	M	H	L	L	H	L	VL
Emery Town 65 N Center - Emery (435)286-2417	L	D2	H	M	L	L	H	L	VL
Ferron 75 E 100 S (Molen Rd) - Ferron (435)385-2350	VH	D2	M	H	L	L	H	L	VL
Green River 130 W Green River Avenue (435)564-3448 Green River	H	D2	M	H	L	L	H	L	VL
Huntington 360 N Main - Huntington (435) 687-2436	M	D2	M	M	L	L	H	L	VL
Orangeville 430 S Main - Orangeville (435)748-2651	VH	D2	M	H	L	L	H	L	VL
Clawson 200 S Main (435) 384-2724	L	D2	M	L	L	L	H	L	VL
Book Cliff Elementary 205 S Solomon (435) 564-8102 Green River	VH	D2	M	H	L	L	H	L	VL
Green River High School 745 W Pirate Ave (435) 564-3461 Green River	VH	D2	M	VH	L	L	H	L	VL
Ferron Elementary 125 W Mill Rd (435) 384-2383 Ferron	VH	D2	M	H	L	L	H	L	VL
San Rafael Middle School 390 W 500 S (435)384-2335 Ferron	VH	D2	M	VH	L	L	H	L	VL
Cottonwood Elementary 55 E 200 S (435)748-2481 Orangeville	VH	D2	M	H	L	L	H	L	VL

Castle Dale Elementary 195 E 600 N (435)381-5221 Castle Dale	L	D2	M	L	L	L	H	L	VL
Emery High School 955 N Center (435)381-2689 Castle Dale	L	D2	M	M	L	L	H	L	VL
Huntington Elementary 70 E 100 N (435)687-9954 Huntington	L	D2	M	M	L	L	H	L	VL
Canyon View Middle School 550 N 400 W (435)687-2265 Huntington	L	D2	M	L	L	L	H	L	VL
Cleveland Elementary 30 S 100 W (435)653-2235 Cleveland	L	D2	M	L	L	M	H	L	VL
School District Bus Garage 955 N Center (435)381-2611 Castle Dale	L	D2	M	M	L	L	H	L	VL
School District Office 120 N Main (435)687-9846 Huntington	L	D2	M	L	L	L	H	L	VL
Emery County Sheriff's Office 1850 N 550 W (435) 381-2404 Castle Dale	L	D2	M	L	L	L	H	L	VL
Emery County Sheriff's Office 80 Farrer Street (435) 564-3432 Green River	L	D2	M	M	L	L	H	L	VL
PacifiCorp Huntington Plant Hwy 31 Huntington (435)687-4000	H	D2	H	H	L	H	H	L	H
PacifiCorp Hunter Plant Sr 10 Castle Dale (435)748-5114	M	D2	M	H	L	L	H	L	VL
Emery Medical Center 300 N 100 W (435) 381-2305 Castle Dale	H	D2	M	M	L	L	H	L	VL

Green River Medical Center 585W Main (435) 564-3434 Green River	M	D2	M	M	L	L	H	L	VL
Castleview Hospital 300 Hospital Drive – (435)637-4800 Price	VL	D2	M	M	L	L	H	L	VL
XTO Energy 1095 N Coal Haul Rd - (435)748-5395 Orangeville	H	D2	M	VH	L	H	H	L	VL
Green River Refining 4210 E Old 6/50 Hwy Green River	L	D2	M	M	L	L	H	L	VL
Cell Phone Tower Green River	L	N/A	M	L	L	M	H	L	VL
Cell Phone Tower Emery	L	N/A	M	L	L	M	H	L	VL
G Hill Green River	L	N/A	M	L	L	M	H	L	VL
Cell Phone Tower Orangeville	L	N/A	M	L	L	M	H	L	VL
Emery Telcom 445 E SR 29 (435) 748-2223 Orangeville	H	D2	M	H	L	L	H	L	VL
Cedar Mountain Woodside	L	D2	M	L	L	M	H	L	M
Horn Mountain Orangeville	L	D2	M	L	L	M	H	L	M
Maverik 285 E Main - (435)381-5365 Castle Dale	M	D2	M	M	L	L	H	L	VL
JRS STOP & GO 10 E Main - (435)381-2828 Castle Dale	M	D2	M	M	L	L	H	L	VL
Emery County Road Department 120 W Hwy 29 (435) 381-5450 Castle Dale	L	D2	M	L	L	L	H	L	VL

Randy's Service 5 E Main - (435)286-2333 Emery	L	D2	M	L	L	L	H	L	VL
Gilly's 15 N State - (435)384-3333 Ferron	VH	D2	M	H	L	L	H	L	VL
Gas N Go 1810 W Main (435) 564-8262 Green River	L	D2	M	M	L	L	H	L	VL
West Chevron 1775 W Main (435) 564-3302 Green River	L	D2	M	M	L	L	H	L	VL
Silver Eagle - Shady Acres 780 E Main - (435)564-8295 Green River	VH	D2	M	VH	L	L	H	L	VL
West Winds 1095 E Main (435) 564-8600 Green River	VH	D2	M	VH	L	L	H	L	VL
Short Stop 1224 E Main (435) 564-8600 Green River	L	D2	M	L	L	L	H	L	VL
AmeriGas 1080 E Main (435) 564-3262 Green River	L	D2	M	L	L	L	H	L	VL
Harts 140 S Main - (435)687-9336 Huntington	L	D2	M	L	L	L	H	L	VL
Maverick 185 N Main 435-687-9467 Huntington	L	D2	M	L	L	L	H	L	VL
BK's 480 N Main 435-687-9467 Huntington	L	D2	M	L	L	L	H	L	VL
Nelson Construction 825 N Loop RD. 435-687-2494 Huntington	H	D2	M	L	L	L	H	L	M

Food Ranch 335 E SR 29 435-748-2725 Orangeville	VH	D2	M	H	L	L	H	L	VL
Substations Listed Below:									
Huntington City	L	N/A	M	L	L	L	H	L	VL
Huntington Canyon	VH	N/A	M	VH	L	M	H	L	M
Wilberg	L	N/A	M	M	L	M	H	L	M
Trail Mountain	L	N/A	M	M	L	M	H	L	M
Orangeville	H	N/A	M	H	L	L	H	L	VL
Emery Hunter Plant	H	N/A	M	H	L	L	H	L	VL
Rock Canyon	M	N/A	M	M	L	L	H	L	M
Ferron	VH	N/A	M	VH	L	L	H	L	VL
Moore	L	N/A	M	L	L	L	H	L	L
Emery City	L	N/A	M	L	L	L	H	L	VL
CONSOL Coal	L	N/A	M	M	L	L	H	L	VL
Green River	L	N/A	M	M	L	L	H	L	VL
Sphinx Green River SR 6	L	N/A	M	L	L	L	H	L	VL
McFadden	L	N/A	M	L	L	L	H	L	VL
Huntington City	L	N/A	M	L	L	L	H	L	VL
Huntington Airport 1930 N SR 10 – (435)749-1912 Huntington	L	D2	M	L	L	L	H	L	VL
Green River Aviation 1651 South Airport Road, Green River	L	D2	M	L	L	L	H	L	VL
Joe's Valley Reservoir Dam, West of Orangeville on SR29	H	D2	H	H	L	L	H	L	H
Millsite Reservoir Dam West of Ferron	H	D2	H	H	L	L	H	L	L

Ferron Reservoir Dam West of Ferron on the Mtn.	H	D2	M	M	L	L	H	L	H
Electric Lake Dam West of Huntington on SR31	H	D2	H	H	L	H	H	L	H
Huntington North State Park Dam, North of Huntington on SR10	H	D2	M	M	L	L	H	L	VL
Cleveland Reservoir Dam, West of Huntington on SR31	H	D2	M	H	L	L	H	L	H
Miller's Flat Reservoir Dam West of Huntington on MTN	H	D2	M	H	L	L	H	L	H
Mammoth Reservoir Dam, Sanpete County	H	D2	M	H	L	L	H	L	H

F 2.1 County, Amateur Radio Resources, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.2 County, Electric Generation Facility Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.3 County, Emergency Operations Centers Vulnerability, 2023

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.4 Carbon County, Oil Refining Facility Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.5 County, Fire Station Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.6 County, Hospital Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.7 County, Law Enforcement Facility Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.8 County, School Facility Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

F 2.9 County, Water + Wastewater Facility Vulnerability, 2021

Note: Data is forthcoming. We will update this section when data is available from stakeholders.

G.0 APPENDIX (G) - Detailed Risk Assessment Methodology

G.1 GIS Methodology

Geographic Information System (GIS) software was used as the basic analysis tool to complete the hazard analysis for the County Natural Hazards Pre-Disaster Mitigation Plan. For most hazards a comparison was made between digital hazard data and Transportation Analysis Zone (TAZ) demographic information.

Statewide digital data was obtained from Utah Geospatial Reference Center (UGRC) for problem soils only. The vulnerability assessment for the County estimates the number of homes, business, infrastructure and population vulnerable to each hazard and assigns a replacement dollar value to residential structures and infrastructure in each hazard area. All the analysis takes place within the spatial context of a GIS. With the information available in spatial form, it is a simple task to overlay the natural hazards with census data to extract the desired information.

In addition to the above methodology, future risk assessments will be profiled using HAZUS-MH, which is shorthand for Hazards United States - Multihazards. The County is anticipating that the Utah Division of Emergency Management will be able to help refine these findings, and will update this plan when they are available.

In addition to the linear features, point data for critical facilities, dams, care facilities, schools, power generation facilities and substations were analyzed to determine if the feature was within a hazard area.

Limited availability of digital data presented a problem in completing the vulnerability assessment. Potential loss numbers were only determined for earthquakes, flood, landslides, dam failure, problem soils and wildfires in this Plan. Additional limitations to the above described analysis method include:

- Assuming random distribution
- Limited data sets for water, gas, electrical, resulting in incomplete numbers for these features
- Lack of digital parcels data for some areas of the County
- Relied on state wide data not intended for manipulation at the scale it was used
- Data was not field checked, resulting in an analysis wholly dependent on accuracy of data
- Metadata was lacking on some of the used data sets

In this document, simple maps were created to provide a graphical illustration of location. These maps are done at a scale, which allows them to fit on a standard letter sized page. Data manipulation and maps were created as a planning tool, to be used by interested persons within Emery County. This information should not take the place of accurate field verified mapping from which ordinances need to be based.

Effort to analyze hazards related to potential future development areas was also addressed where applicable. This proved to be a very difficult exercise and at best can only identify areas which need additional research before development should be allowed. No viable source of data exists for this study area to facilitate analysis of future development. Limited zoning data was available, but this data does not necessarily indicate which areas will be developed and which will not.

G.2 Vulnerable Populations Methodology

In order to identify the different vulnerable populations in Emery County, a number of data points were gathered from the most recent census. These include:

1. Median Age
2. Median Household Income
3. Population by Poverty Status
4. Population by Educational Attainment
5. Population by Marital Status
6. Disabled Persons
7. Home Ownership Rate
8. Housing Units

Populations at risk are more likely to experience adverse social, health, and economic outcomes due to their race, age, gender, poverty status, and other socioeconomic measures. Headwaters Economics (headwaters.org) used US Census data (ACS 2021-2023) and found that within Emery County's nine municipalities the highest percentage of vulnerable populations are typically:

- populations over 65
- population that 'Did Not Work'
- Rentals where Gros Rent Exceeds 30% of Household Income
- Populations with Disabilities
- people over 65-years-old and living alone
- people living in mobile homes
- Hispanic populations

To analyze which populations are particularly vulnerable to each hazard and suggest specific mitigation actions we've considered the intersections between the hazards and the populations. Vulnerable populations are inherently more vulnerable to potential disaster hazards. The interactions between vulnerable populations and the natural hazards posing the most potential risk to Emery County are:

1. Earthquake:
    - Populations Vulnerable: People over 65 years old, people with disabilities, and people living alone, especially in older or unreinforced buildings, are particularly vulnerable during earthquakes due to mobility issues and potential difficulties in evacuating.
    - Mitigation Actions:
        - Retrofitting older buildings and infrastructure to withstand seismic activity, especially in areas with high concentrations of vulnerable populations.
        - Establishing community-based earthquake preparedness programs that include targeted outreach and education for at-risk populations.
        - Providing financial assistance and incentives for homeowners and landlords to retrofit properties to meet seismic safety standards, prioritizing vulnerable households.
2. Flood:
    - Populations Vulnerable: People living in flood-prone areas, including those with lower incomes paying more than 30% of their household income for rent expenses, people living

in mobile homes, and Hispanic populations may face challenges in evacuating and recovering from flood events.

- Mitigation Actions:
  - Implementing floodplain management measures and zoning regulations to reduce exposure to flood risk, particularly in vulnerable communities.
  - Offering financial assistance and resources for flood mitigation measures such as elevating homes, constructing flood barriers, and improving drainage systems in at-risk areas.
  - Conducting culturally sensitive outreach and education campaigns on flood preparedness and response tailored to the needs of Hispanic populations and other underserved communities.

3. Landslide:
   - Populations Vulnerable: People living in areas with steep slopes or unstable terrain, including those with lower incomes and people living in mobile homes, are at higher risk of landslides.
   - Mitigation Actions:
     - Conducting geotechnical assessments and land-use planning to identify and mitigate landslide hazards in vulnerable areas.
     - Providing financial assistance and technical support for homeowners and communities to implement slope stabilization measures and erosion control strategies.
     - Offering relocation assistance and affordable housing options for residents in high-risk landslide areas, particularly those in mobile homes or with limited resources.
4. Problem Soils:
   - Populations Vulnerable: People living in areas with problematic soils, including those with lower incomes and people living in mobile homes, may experience structural damage and property loss during soil-related hazards.
   - Mitigation Actions:
     - Implementing soil stabilization measures such as drainage systems, soil reinforcement, and vegetation planting to mitigate the effects of problem soils on infrastructure and property.
     - Providing financial assistance and technical support for homeowners to conduct soil assessments and implement appropriate mitigation measures, prioritizing underserved communities.
     - Developing building codes and regulations that address soil-related hazards and ensure the resilience of structures, particularly for mobile homes and vulnerable households.
5. Wildfire:

- Populations Vulnerable: People living in wildfire-prone areas, including those with lower incomes and people living in mobile homes, may face challenges evacuating quickly and accessing emergency services.
- Mitigation Actions:
  - Implementing vegetation management and fire-resistant landscaping strategies to reduce wildfire risk around homes and communities.
  - Developing evacuation plans and communication systems tailored to the needs of vulnerable populations, including those with limited mobility and language barriers.
  - Providing resources and support for homeowners to create defensible space and retrofit properties with fire-resistant materials, prioritizing underserved communities and mobile home parks.

6. Dam Failure:
   - Populations Vulnerable: People living downstream of dams, including those with lower incomes and people living in mobile homes, are at risk of flooding and displacement in the event of a dam failure.
   - Mitigation Actions:
     - Implementing dam safety inspections and maintenance programs to identify and address potential failure risks, including emergency preparedness and evacuation plans for downstream communities.
     - Developing floodplain management measures and infrastructure improvements to enhance dam safety and reduce flood risk in vulnerable areas.
     - Providing financial assistance and support for residents to improve flood resilience and relocate to safer areas if necessary, prioritizing underserved communities and mobile home residents.
7. Severe Weather:
   - Populations Vulnerable: People with disabilities, older adults, people living in mobile homes, and Hispanic populations may face challenges during severe weather events due to mobility issues, limited access to transportation, and language barriers.
   - Mitigation Actions:
     - Establishing accessible emergency shelters and transportation options for individuals with disabilities, older adults, and mobile home residents during severe weather events.
     - Developing communication systems and emergency alerts that are accessible and culturally sensitive, including multilingual messaging and outreach to Hispanic populations.
     - Conducting outreach and education campaigns to raise awareness about severe weather preparedness and evacuation procedures among vulnerable populations, prioritizing underserved communities and mobile home parks.

For historically underserved populations, mitigation actions should prioritize equitable access to resources, services, and decision-making processes. This may include:

- Ensuring that mitigation measures are inclusive and address the specific needs and vulnerabilities of historically underserved communities.
- Engaging with community leaders, advocacy groups, and stakeholders from historically underserved populations to incorporate their perspectives and priorities into mitigation planning efforts.
- Allocating resources and funding to support initiatives that reduce disparities and enhance resilience among historically underserved populations, such as affordable housing programs, economic development initiatives, and cultural competency training for emergency responders.
- Monitoring and evaluating the effectiveness of mitigation actions to ensure equitable outcomes and address any gaps or disparities in implementation and impact.

By considering the intersectionality of hazards and vulnerable populations, and implementing targeted mitigation actions, cities can reduce risk and build resilience for all residents, including historically underserved communities.

H.0 APPENDIX (H) - GIS Data Sources

Emery County PDM (2009-052) GIS Data Source Citation

Exhibit 1 – Location Overview and all other exhibits:

All reference layers (municipalities, roads, hydrology, and boundaries) were sourced from Utah Geospatial Resource Center (UGRC) – Utah SGID:

https://gis.utah.gov/data/sgid-index/

Exhibit 2 – Dam Failure:

Dams (points): UGRC – Utah SGID – Utah Dam Inventory - https://opendata.gis.utah.gov/datasets/utahDNR::utah-dam-inventory/explore?location=39.742084%2C-110.585755%2C-1.00

Inundation Areas (polygon): UGRC – Utah SGID – Utah Dam Inundation - https://opendata.gis.utah.gov/datasets/utahDNR::utah-dam-inundation-/explore?location=39.726053%2C-110.583446%2C-1.00

Exhibit 3 – Drainage Basins:

Drainage Basin Boundaries (polygon): UGRC – Utah SGID – Utah Watersheds Area - https://opendata.gis.utah.gov/datasets/utah-watersheds-area/explore?location=39.396451%2C-110.804390%2C-1.00

Exhibit 4 – Floodplains:

500-Year Flood Extents (polygon): Federal Emergency Management Agency (FEMA), National Flood Hazard Layer (NFHL), Product ID: NFHL_49007C, effective date: 20190815 - FEMA Flood Map Service Center | Search All Products

100-Year Flood Extents (polygon): Federal Emergency Management Agency (FEMA), National Flood Hazard Layer (NFHL), Product ID: NFHL_49007C, effective date: 20190815 - FEMA Flood Map Service Center | Search All Products

Exhibit 5 – Fire Risk:

Past Fire Perimeters and Distance from Past Fire Perimeter (polygons): National Interagency Fire Center (NIFC) – Wildland Fire Open Data – Interagency Fire Perimeter History All Years - https://data-nifc.opendata.arcgis.com/datasets/e02b85c0ea784ce7bd8add7ae3d293d0_0/explore?location=39.645456%2C-110.788466%2C10.88

Existing Structure Density (heatmap constructed from building footprint polygons): UGRC – Utah SGID – Utah Buildings -

https://opendata.gis.utah.gov/datasets/utah-buildings/explore?location=39.518391%2C-110.808622%2C-1.00

Land Ownership: UGRC – Utah SGID – Land Ownership - State of Utah Trust Lands Administration: https://opendata.gis.utah.gov/datasets/SITLA::land-ownership/explore?location=39.568972%2C-110.757864%2C-1.00

Exhibit 6 – Earthquake Epicenter:

Magnitude of Earthquake and Year of Earthquake: UGRC – Utah SGID - Utah Earthquake Epicenters 1850 to 2016: https://opendata.gis.utah.gov/datasets/utah-earthquake-epicenters-1850-to-2016/explore?location=39.517311%2C-111.500000%2C-1.00

Quaternary Fault Types: UGRC – Utah SGID – Utah Quaternary Faults: https://opendata.gis.utah.gov/datasets/utahDNR::utah-quaternary-faults/explore?location=39.531402%2C-111.568529%2C-1.00

Existing Structure Density (heatmap constructed from building footprint polygons):

UGRC – Utah SGID – Utah Buildings - https://opendata.gis.utah.gov/datasets/utah-buildings/explore?location=39.518391%2C-110.808622%2C-1.00

Exhibit 7 – Landslide Susceptibility:

Landslide Depositions: UGRC – Utah SGID – Utah Landslide Compilation Polygons: https://opendata.gis.utah.gov/datasets/utah-landslide-compilation-polygons/explore?location=39.710550%2C-110.531672%2C-1.00

NFIP Coverage

"NFIP Multiple Loss Properties - V1." *FEMA.gov*, 29 Feb. 2024,

www.fema.gov/openfema-data-page/nfip-multiple-loss-properties-v1.

I.0 APPENDIX (I) - Community Technical Capabilities

I.1 Capability Assessments

This assessment analyzes current capacity to mitigate the effects of natural hazards and emphasizes the positive capabilities that should be continued. Emery County has elected to conduct a hazard and capabilities analysis.

The following areas were assessed to determine mitigation capabilities:

1. Staff and Organization
2. Technical
3. Fiscal
4. Policies and Programs
5. Land Use Management
6. Legal Authority
7. Political Willpower

I.2 Staff & Organization

City and County Elected Officials

The Emery County Commission consists of three members. Each of the ten cities has a mayor and a city council, most consisting of five members, which governs the municipality. The elected officials have the responsibility of adopting mitigation policies. Cities and counties receive their legal authority to govern from the State of Utah.

Emery County General Capabilities

Listed below is a general organizational list of County/City governmental administrative areas involved in pre- disaster mitigation:

- Elected officials
- City Managers
- County and City Attorneys
- County Assessors
- County Clerks
- Human Services/Personnel Directors
- County and City Treasurers/ Finance
- Public Works Departments
- County and City Planning/GIS Departments

- County Health Department
- Police and Fire Departments
- County Emergency Management
- Special Improvement Districts

Emergency Management

Emery County has an emergency management director, organized under the sheriff's office. The emergency management director is responsible for natural and man-made hazard mitigation, preparedness, response, and recovery operations.

Fire/Emergency Medical Services

Most of the cities in Emery County have fire departments. Following a national trend, there are two multi-jurisdiction fire districts in Emery County that were formed with the goal to better provide fire and emergency medical services.

Public Works

Divisions within public works often include streets, engineering, water, power, wastewater and sanitation. The Emery County public works department has undertaken a number of mitigation projects in the County. Several municipal public works departments have also participated in hazard mitigation, primarily in the form of stormwater and watershed management projects.

Health Care

Emery County's hospitals and the County health department provide medical emergency preparedness and response. Emery County Health organizes, coordinates and directs emergency medical and health services. The health department assesses health hazards caused by damage to sewer, water, food supplies or other environmental systems. It also provides safety information, assesses disaster related mental health needs and services, and provides crisis counseling for emergency workers. Short of a pandemic disease outbreak, the health department will likely continue to adequately staff, train and fund its mission.

School District

The Emery School District has more than 2,248 students in 10 schools. District administrators work closely with local public safety officials including law enforcement, fire emergency medical services, and public health to help ensure that schools are well prepared for any kind of emergency.

Special Service Districts

For the purposes of this Plan, Special Service Districts (SSD) are defined as quasi-governmental agencies having taxing authority, providing a specific public service that may include; public transportation, fire, water, wastewater and sewer. These SSD's work closely with local public safety officials to ensure that these Districts are well prepared for any kind of emergency. In many cases, the districts participate in the County or City emergency preparedness committee for emergency coordination, planning and response.

I.3 Technical Capability

Throughout the plan update process, Emery County staff consulted with and utilized the technical expertise from a wide variety of resources listed below:

Jurisdiction Technical Expertise

Emery County and all of the cities either employ or contract with planners, emergency managers, building inspectors, housing specialists and engineers on staff.

Geographic Information Systems (GIS)

Emery County has experienced GIS staff capable of providing important data to this planning process. GIS is a geo-referenced set of hardware and software tools that are used to collect, manage and analyze spatial data (GIS capabilities are often found in other departments such as public works or information technology). GIS is most beneficial when data from all departments and planning jurisdictions is inputted for analysis.

Public Safety Communications (PSC)

Public safety communications networks assure emergency communications through radio, microwave, telephone, satellite, internet, e-mail, fax and amateur radio. One of the most beneficial capabilities of PSC is providing cross communication between equipment and frequencies. PSC coordinates dissemination of emergency information to the media, the public and emergency personnel; activates internal information systems; acts as a liaison to elected officials; assists in the provision of emergency information and documents the impact. Note that the Emery County Emergency Operations Plan's ESF #15 (Public Information) provides updated details about emergency- and hazard-related communications.

Public Works

Public works departments generally provide engineering, transportation, GIS, water, wastewater, sanitation (in some cases electric power) expertise and capability. As a team, public works personnel identify critical infrastructure and plan and prepare for emergency mitigation.

Utah Division of Emergency Management (Utah DEM)

Utah DEM assists Emery County in providing information on preparing for, responding to, and recovering from emergencies. DEM serves as the liaison between local, state and federal emergency assistance. DEM also educates the public about earthquakes, hazardous materials, floods, communications, leadership, information technology, funding, coordination and supplies.

Utah State University(USU) Cooperative Extension

The USU Extension Service assisted with family and community data in putting research-based knowledge to work. Many of the programs and informational courses improve pre-disaster mitigation.

University of Utah

The University of Utah was utilized as a technical resource for academic mitigation research and demographic data (particularly through the Kem C. Gardner Institute).

I.4 Jurisdiction Technical Capability Assessment

The following table presents a summary of Emery County jurisdictions' current technical capabilities for hazard mitigation, planned improvements, and resources needed to enhance these capabilities.

Jurisdiction	Current Capability Gaps	Planned Improvements	Resources Needed + Timeline

Emery County	• Limited GIS capacity for hazard-specific analysis • Emergency management staffing constraints • Outdated emergency response protocols	• Enhanced GIS analysis tools • Advanced staff training • Update emergency response procedures	• GIS software licenses • Training budget • Consultant support • Timeline: 2025-2026
Castle Dale	• Limited planning staff • Outdated floodplain management tools	• Staff certification in floodplain management • Updated planning procedures	• Training funds • Technical assistance • Timeline: 2025-2026
Clawson	• No dedicated emergency manager • Limited technical capacity	• Share services with County • Develop interlocal agreements	• Interlocal agreement • Staff training • Timeline: 2025-2027
Cleveland	• Limited planning staff • Outdated hazard assessment tools	• Contract planning services • Implement new assessment tools	• Operating budget increase • Technical support • Timeline: 2026-2027
Elmo	• Limited staffing and technical capacity • Outdated emergency response plans	• Share services with County • Update response protocols	• Interlocal agreement • Plan development • Timeline: 2025-2026
Emery Town	• No dedicated emergency manager • Limited flood management capacity	• Staff training • Develop flood response procedures	• Training budget • Technical assistance • Timeline: 2025-2026
Ferron	• Outdated emergency response protocols • Limited planning capacity	• Update EOP • Enhance staff training	• Staff time • Consultant support • Timeline: 2026
Green River	• Limited floodplain management capacity • Outdated community notification systems	• Staff certification • Update notification protocols	• Training funds • System upgrade costs • Timeline: 2025-2026
Huntington	• Limited emergency coordination capacity • Outdated hazard assessment tools	• Enhanced staff training • Update assessment procedures	• Training budget • Software upgrades • Timeline: 2025-2026

Orangeville	• Limited planning staff • Outdated emergency procedures	• Share services with County • Update emergency protocols	• Interlocal agreement • Plan development • Timeline: 2026-2027
Emery School District	• Facility assessment tools • Emergency response coordination	• New facility management system • Enhanced staff training	• Software • Training budget • Timeline: 2025-2026
Castle Valley Special Service District	• Emergency response protocols • Infrastructure vulnerability assessment	• Update emergency procedures • Enhanced vulnerability mapping	• Staff time • Technical assistance • Timeline: 2025-2026
PacifiCorp Hunter Plant	• Hazard-specific response plans • Emergency coordination with local agencies	• Update emergency protocols • Joint training exercises	• Staff time • Training resources • Timeline: 2025-2026
PacifiCorp Huntington Plant	• Wildfire vulnerability assessment • Emergency response coordination	• Updated wildfire mitigation plan • Enhanced coordination procedures	• Assessment tools • Interagency agreements • Timeline: 2025-2026
Emery Medical Center	• Emergency power backup systems • Patient evacuation plans	• Upgrade backup systems • Enhanced evacuation protocols	• Equipment funding • Training resources • Timeline: 2025-2026
Green River Medical Center	• Limited emergency response capacity • Outdated communications systems	• Staff training • Communications upgrades	• Training budget • Equipment funding • Timeline: 2025-2027
Emery Telcom	• Emergency communications resilience • Backup systems coverage	• Infrastructure hardening • Expanded backup systems	• Capital investment • Technical expertise • Timeline: 2025-2027

J.0 APPENDIX (J) - Historical Hazard Events Database

Due to size constraints, please view the Historical Hazard Events at: https://hazards.geology.utah.gov/.

Table J.1 - Major Disaster Statistics by Type 1962-2005 (2005 dollars, HVRI) County

	Injuries	Pct of Total Injuries	Fatalities	Pct of Total Fatalities	Property Damage	Pct Total Property Damage	Crop Damage	Pct Total Crop Damage
Avalanche	1.63	2.30%	1.25	22.80%	$0	0.00%	$0	0.00%
Extreme Cold	0.17	0.20%	0.03	0.50%	$537,791	2.00%	$1,457,399	20.80%
Flooding	0.24	0.30%	0.68	12.40%	$4,901,262	17.90%	$4,901,262	69.90%
Fog	13.8	19.20%	0.4	7.30%	$159,947	0.60%	$0	0.00%
Hail	6.07	8.40%	0.02	0.40%	$444,374	1.60%	$189,368	2.70%
Heavy Snow	38.69	53.80%	2.32	42.30%	$5,169,331	18.90%	$64,299	0.90%
Ice	5	7.00%	0	0.00%	$101,575	0.40%	$0	0.00%
Landslide	0	0.00%	0.17	3.00%	$82,029	0.30%	$0	0.00%
Lightning	0.24	0.30%	0.02	0.40%	$446,492	1.60%	$690	0.00%
Tornado	0	0.00%	0	0.00%	$199,629	0.70%	$2,994	0.00%
Wind	6.04	8.40%	0.6	2.50%	$15,269,889	55.90%	$398,328	5.70%
TOTAL	**71.87**	100.00%	**5.49**	91.50%	**$27,312,318**	100.00%	**$7,014,340**	100.00%

Table J.2 - Major Disaster Statistics by Decade 1960-2010 (2007 dollars, HVRI) County

	Injuries	Pct of Total Injuries	Fatalities	Pct of Total Fatalities	Property Damage	Pct Total Property Damage	Crop Damage	Pct Total Crop Damage
1960s	1.9	3.00%	0.07	1.00%	$2,111,058	7.00%	$114,743	2.00%
1970s	15.7	21.00%	1.12	20.00%	$3,415,339	12.00%	$1,920,583	27.00%
1980s	0	0.00%	0.57	10.00%	$8,080,463	29.00%	$4,668,534	67.00%
1990s	38.2	51.00%	3.09	56.00%	$13,170,387	47.00%	$224,746	3.00%
2000s	19	25.00%	0.64	12.00%	$1,497,915	5.00%	$85,734	1.00%
2010s								
TOTAL	**74.8**	100.00%	**5.49**	99.00%	**$28,275,162**	100.00%	**$7,014,340**	100.00%

K.0 APPENDIX (K) - Utah Repetitive Loss Properties

Emery County, Castle Dale City, Clawson Town, Cleveland Town, Elmo Town, Emery Town, Ferron City, Green River City, Huntington City, and Orangeville City have no repetitive loss properties and no severe repetitive loss properties.

This information was confirmed by the Utah State Floodplain Program Manager in December 2025. See Section 6.7.3 for further discussion of NFIP participation.

https://www.fema.gov/openfema-data-page/nfip-multiple-loss-properties-v1

L.0 APPENDIX (L) - HAZUS Modeling Results

The planning team attempted to use the HAZUS-MH 5.1 model to gain inputs on both earthquake and flooding risks. However, due to a lack of sufficient input data, the team felt like the results could not be verified.

Emery County intends to partner with the Utah Division of Emergency Management in conducting future analysis. Once those results are generated, they will be amended into this plan.

M.0 APPENDIX (M) - Comprehensive Range of Mitigation Actions

This appendix presents a comprehensive range of potential mitigation actions that were considered by participating jurisdictions during the planning process. These actions represent different mitigation approaches spanning four categories as defined by FEMA:

1. **Local Plans and Regulations**: Government authorities, policies, or codes that influence the way land and buildings are developed and built.
    - Comprehensive plans.
    - Land use ordinances.
    - Subdivision regulations.
    - Building codes and enforcement.
    - NFIP Community Rating System.
    - Capital improvement programs.
    - Open space preservation.
2. **Structure and Infrastructure Projects**: Modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area.
    - Acquisitions and elevations of structures in flood prone areas.
    - Utility undergrounding.
    - Structural retrofits.
    - Floodwalls and retaining walls.
    - Detention and retention structures.
    - Culverts.
3. **Natural Systems Protection**: Actions that minimize damage and losses and preserve or restore the functions of natural systems.
    - Sediment and erosion control.
    - Stream corridor restoration.
    - Forest management.
    - Conservation easements.
    - Wetland restoration and preservation.
    - Green infrastructure.
4. **Education and Awareness Programs:** Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.
    - Radio or television spots.
    - Websites with maps and information.
    - Real estate disclosure.
    - Presentations to schools or neighborhood organizations.
    - Mailings to residents in hazard-prone areas.
    - StormReady program.
    - Firewise Communities.

The table below provides specific examples of mitigation actions that were considered for each identified hazard:

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Dam Failure	• Develop enhanced dam safety regulations addressing Joe's Valley, Millsite, and other high-hazard dams in the county • Update emergency action plans for all regulated dams, focusing on coordination between Castle Valley Special Service District and municipalities • Create detailed inundation mapping for communities like Castle Dale, Orangeville, and Ferron that face direct risks • Incorporate dam failure scenarios into countywide evacuation planning, particularly for canyon communities • Implement development restrictions in mapped inundation zones below major reservoirs	• Strengthen and retrofit aging dam infrastructure, prioritizing Millsite Dam and smaller irrigation structures • Install early warning systems with redundant communication methods tailored to rural areas • Improve monitoring equipment at dams that supply critical agricultural water • Enhance spillway capacity at irrigation reservoirs with inadequate discharge capabilities • Develop secondary water diversion systems to reduce pressure on high-risk dams during heavy precipitation events	• Create and maintain natural buffer zones in dam inundation areas, particularly along Cottonwood Creek and Huntington Creek • Preserve open space in downstream flood corridors for water detention during emergency releases • Restore wetland areas below dams that can provide natural flood attenuation • Implement sediment management practices in reservoirs to maintain capacity and reduce dam stress • Enhance vegetation management in watersheds above reservoirs to reduce debris flow into reservoirs	• Educate residents in Orangeville, Castle Dale, Ferron and other communities in inundation zones about evacuation routes • Develop reliable notification systems appropriate for rural areas, including alternative methods where cellular coverage is limited • Conduct regular evacuation drills coordinated between the County and municipalities • Create dam safety awareness materials specific to Emery County water infrastructure • Train emergency responders in dam failure response scenarios tailored to local conditions and infrastructure

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Drought	• Develop drought contingency plans for Emery County's agricultural water users • Update water conservation ordinances that address the unique needs of communities like Green River, Ferron, and Castle Dale • Implement tiered water use restrictions tailored to the county's water sources • Create secondary water recycling programs for irrigation • Develop management plans for groundwater sources in canyon areas	• Modify plumbing systems for water efficiency in county facilities • Develop redundant water connections between municipal systems • Install rainwater collection systems at key public facilities • Improve canal infrastructure to reduce water loss in irrigation systems • Implement improved water metering technology	• Protect and restore water-retaining ecosystems in the Wasatch Plateau watersheds • Implement xeriscaping at county facilities and promote in communities • Protect and restore riparian areas along the Green River and tributaries • Support agricultural soil moisture management appropriate for Emery County's soil types • Maintain healthy forest cover in upper watersheds	• Promote water conservation practices specific to high desert conditions • Educate farmers on drought-resistant crops suitable for Emery County soils and climate • Create drought awareness campaigns addressing the county's specific vulnerabilities • Develop educational materials on water conservation for schools and community events • Provide information on low-water landscaping appropriate for the local climate
Earthquake	• Adopt and enforce updated building codes reflecting Emery County's seismic risk profile • Incorporate seismic risk assessments into land use planning, especially for	• Retrofit or replace unreinforced masonry buildings, prioritizing the remaining URM school buildings and public facilities • Secure utility infrastructure at the Hunter and Huntington power plants to ensure	• Implement land use planning to reduce development in high-risk areas along the Wasatch fault zone • Conduct slope stabilization projects in landslide-prone areas, particularly	• Educate homeowners on securing items within structures, with special focus on rural communities with limited emergency services access • Promote earthquake

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
	canyon mouth development areas in Huntington, Ferron, and Castle Dale • Require seismic evaluations and potential retrofitting for critical public facilities, particularly older URM structures in the county • Develop comprehensive inventories of at-risk structures, prioritizing unreinforced masonry buildings in older town centers • Review infrastructure resilience of water delivery systems crossing fault zones, especially those serving isolated communities	continuity of operations • Install flexible pipe fittings at critical junctions in municipal water systems and irrigation infrastructure • Brace generators and critical equipment at emergency operations centers, medical facilities, and communications infrastructure • Strengthen bridges and culverts along key evacuation routes, particularly in canyon areas and rural roads	in canyon areas west of Huntington and Orangeville • Apply soil stabilization techniques at critical infrastructure sites to reduce liquefaction potential • Preserve open space in high-risk seismic areas to limit exposure of built environment • Maintain healthy vegetation on slopes to reduce secondary landslide risks following seismic events	insurance appropriate for Emery County construction types and risk levels • Develop family and business emergency plans addressing the specific challenges of rural communities • Create and practice "Drop, Cover, and Hold" drills in all schools, government buildings, and businesses • Train local contractors on cost-effective seismic retrofitting techniques appropriate for the county's building stock
Flooding	• Adopt stricter floodplain regulations for development near Cottonwood Creek, Huntington Creek, and other	• Install and maintain improved stormwater systems in flood-prone communities, particularly in	• Preserve floodplains as open space, particularly along the Green River corridor • Restore and maintain wetland areas to enhance	• Educate property owners about flood mitigation techniques appropriate for Emery County's flash flood risks

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
	flood-prone waterways • Incorporate flood mitigation requirements into subdivision standards, particularly for areas near canyon mouths • Improve stormwater management regulations to address flash flooding issues in communities like Ferron and Green River • Adopt freeboard requirements appropriate for the County's flash flood potential • Create stream buffer ordinances to protect riparian areas along the Green River and its tributaries • Develop special flood area regulations for alluvial fan zones at canyon mouths	Castle Dale and Orangeville • Elevate or relocate critical facilities in identified flood hazard areas • Construct appropriately sized flood control structures at key drainage points like Cardinal Wash • Install backup generators at critical facilities that may be affected by flooding • Retrofit public buildings in flood zones to better withstand inundation • Improve culvert capacity along key transportation routes • Construct detention basins in strategic locations above developed areas	natural flood storage capacity • Implement green infrastructure techniques to enhance natural absorption • Improve river channel maintenance while preserving natural functions • Stabilize stream banks in areas experiencing erosion, especially in populated areas • Maintain healthy vegetative cover in upper watersheds to reduce runoff rates • Implement erosion control measures on slopes prone to debris flows	• Develop warning systems specifically designed for canyon and wash flooding scenarios • Provide NFIP information to residents in communities like Orangeville, Castle Dale, and Green River • Install high-water mark signage at locations with historical flooding • Develop evacuation plans specific to each community's flood vulnerabilities • Create educational materials about the relationship between drought, wildfires, and subsequent flooding • Conduct regular community workshops on flash flood safety
Infestation	• Develop comprehensive invasive species management plans addressing tamarisk along the Green River	• Install physical barriers against pests at key agricultural storage facilities	• Implement biological control methods appropriate for Emery County ecosystems, such	• Educate the public about invasive species identification and impacts specific to Emery

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
	and its tributaries • Create rapid response protocols for emerging invasive species threats such as spotted knapweed and cheatgrass • Implement coordinated monitoring programs across jurisdictional boundaries • Establish quarantine regulations for high-risk entry points and recreational areas • Develop collaborative agreements with state and federal agencies to address cross-boundary infestation issues • Create vegetation management requirements for new developments	• Create monitoring and detection systems at recreation access points to prevent spread • Construct washing stations at trailheads and boat launches to prevent aquatic invasive spread • Develop treatment facilities for equipment and vehicles used in high-risk areas • Install screening systems at irrigation intakes to prevent spread of aquatic invasives • Implement physical control measures along transportation corridors	as tamarisk beetle release programs • Conduct regular monitoring and early detection in high-value natural areas • Preserve natural predators that help control pest populations • Maintain healthy ecosystem balance in rangeland and forest areas • Restore native vegetation in areas affected by cheatgrass and other invasive plants • Implement targeted grazing programs to control noxious weeds • Support pollinator habitat to strengthen ecosystem resilience	County ecosystems • Develop reporting systems accessible to rural residents and recreational users • Create identification guides for common invasive plants and insects in the region • Promote prevention practices among agricultural producers, including equipment cleaning • Educate tourists and visitors using the Green River and recreation areas about preventing spread • Provide training for landowners on early detection and management techniques • Develop school programs to increase awareness of ecosystem impacts

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Landslide	• Adopt steep slope ordinances for development in foothill areas west of Huntington, Castle Dale, and Ferron • Implement slide-prone area development restrictions, especially in canyon areas with historical landslide activity • Require geotechnical review for construction in high-risk areas, particularly near the Wasatch Plateau • Map and assess vulnerability to landslides throughout the county, with special focus on post-wildfire burn areas • Develop hillside development regulations that account for Emery County's soil and geological conditions • Create landslide hazard overlay zones in land use planning documents	• Construct retaining walls and soil stabilization infrastructure at critical transportation corridors • Reinforce roads and bridges in slide-prone areas, particularly along canyon highways • Install warning systems at locations with high landslide potential • Improve drainage systems along steep hillsides and road cuts • Implement protective barriers for critical infrastructure in path of potential debris flows • Design infrastructure with landslide loads in mind, especially for post-wildfire conditions • Stabilize existing landslide-prone areas using appropriate engineering techniques	• Maintain and restore vegetative cover in landslide-prone areas, especially following wildfires • Install erosion control measures on bare slopes in post-fire zones like those in Huntington Canyon • Use properly engineered containment basins to capture debris flows • Manage surface drainage to reduce infiltration in susceptible areas • Practice revegetation of disturbed slopes using native, deep-rooted species • Implement selective forest management to maintain slope stability • Create buffer zones between development and steep, unstable terrain	• Educate residents about landslide warning signs specific to Emery County's geology • Create real-time monitoring websites for areas with known landslide potential • Develop emergency evacuation plans for communities near landslide-prone areas • Educate developers about best practices for building in or near vulnerable areas • Provide information on insurance options for landslide damage • Develop public awareness campaigns about the connection between wildfire and subsequent landslides • Train emergency responders on landslide response procedures

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Problem Soils	• Require soil studies before development in areas with known expansive clay, Mancos shale, or other problem soils • Adopt building codes specific to soil hazards prevalent in Emery County • Develop special foundation requirements for construction on gypsum-rich or alkali soils • Create setbacks from problem soil areas, particularly in developing areas outside established towns • Require geological assessments for larger developments, especially on benches and foothill areas • Implement soil management requirements for agricultural lands affected by alkali soil conditions • Develop soils maps to guide development	• Implement specialized foundations in problem soil areas throughout the county • Stabilize collapsible soils in locations with essential infrastructure • Use engineered fills in construction projects on unstable soil types • Install drainage systems designed for problem soil conditions • Retrofit existing structures affected by soil expansion and contraction • Increase width of slope adjacent to roadways to create buffer zones • Implement road engineering techniques specific to Emery County's soil conditions	• Maintain vegetation cover on sensitive soils to prevent erosion • Implement erosion control measures in areas with unstable soil conditions • Manage surface water drainage to minimize impacts on problem soils • Create buffer zones around areas with highly erosive or unstable soils • Restore native vegetation in disturbed areas with problem soils • Manage riparian vegetation to stabilize riverbanks in areas with erosive soils • Develop agricultural best practices for maintaining soil health in problem soil areas	• Educate property owners about risk signs associated with Emery County's problem soils • Inform developers about construction techniques appropriate for local soil conditions • Create homeowner maintenance guidance for structures built on problem soils • Develop real estate disclosure requirements for problem soil areas • Provide information to contractors about appropriate construction methods • Create fact sheets describing problem soil risks for distribution to new homeowners • Develop educational materials about managing alkali soils for agricultural producers

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
	decisions in county planning			
Severe Weather (including Lightning, Heat Wave, Cold Wave, Avalanche, Ice Storm, Tornado, Hail, and Strong Wind)	• Adopt and enforce updated building codes to address high wind events common in canyon areas • Update emergency response plans for extreme weather events, including winter storms that can isolate rural communities • Develop heat / cold wave event plans • Implement snow and ice removal strategies for communities like Huntington and Orangeville • Develop community sheltering plans for severe weather emergencies • Create special ordinances for structures in high-wind zones near canyons • Implement storm drainage requirements appropriate for intense rainfall events	• Install/maintain enhanced stormwater systems designed for flash flooding from heavy rainfall • Develop cooling centers and warming shelters in communities throughout the county • Install backup power sources for critical facilities to maintain operations during outages • Retrofit public buildings to better withstand severe weather impacts • Implement wind retrofits for vulnerable structures in high-wind corridors • Install lightning protection systems at key public facilities • Construct safe rooms in vulnerable public buildings • Install Doppler radar on Horn Mountain to improve severe weather prediction	• Maintain urban tree canopy for heat reduction while considering wind resistance • Create wind breaks through strategic planting and natural feature preservation • Manage snow-shedding areas to reduce avalanche risk in recreational areas • Develop green infrastructure to mitigate impacts of heavy precipitation • Implement natural drainage improvements to handle intense rainfall events • Preserve natural water retention areas to reduce flash flooding during storms • Manage forest health to reduce risk of falling trees during high wind events	• Promote the StormReady program participation throughout the county • Encourage avalanche preparedness for county backcountry users • Create emergency preparedness campaigns for extreme weather conditions • Develop educational materials about lightning safety for outdoor recreation • Provide information on winterizing homes and vehicles • Establish check-in systems for vulnerable populations during extreme weather events • Create weather safety campaigns tailored to both residents and tourists • Develop emergency notification

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
				systems appropriate for rural areas with limited connectivity
Wildfire	• Adopt and enforce wildland-urban interface (WUI) codes • Develop comprehensive wildfire protection plans • Create defensible space requirements for properties in WUI areas • Update building codes to incorporate fire-resistant materials • Establish land use regulations to limit development in high-risk fire zones • Implement fuel management policies in forested areas • Develop zoning restrictions for vegetation management in wildfire-prone regions	• Remove dead and diseased trees in Wildland Urban Interface areas • Create fire breaks between wildfire zones and residential areas • Install fire-resistant roofing and building materials • Develop secondary water sources for firefighting • Construct roads between fire interface zones and residential areas • Install fire detection and early warning systems • Retrofit existing structures with fire-resistant features • Upgrade water infrastructure to support firefighting efforts	• Implement forest management techniques like thinning and prescribed burns • Restore fire-adapted ecosystems • Manage grazing practices to reduce fuel loads • Preserve and restore native vegetation that provides natural fire resistance • Create fuel breaks using strategic vegetation management • Maintain healthy watershed areas to reduce fire spread potential • Implement erosion control measures in post-fire landscapes • Protect and restore riparian areas as natural fire barriers	• Promote Firewise Communities/USA recognition program • Conduct public education campaigns about wildfire risks • Develop community wildfire preparedness training and create educational materials about defensible space • Conduct hazardous fuel reduction awareness campaigns • Train residents on emergency evacuation procedures • Develop wildfire safety education for schools and community groups

Based on this comprehensive range of potential actions, each jurisdiction selected actions that were most appropriate based on their specific vulnerabilities, capabilities, and priorities. The selected actions appear in the "Present and Future Mitigation Strategies" sections of each jurisdiction's profile in Part 7 of this plan.