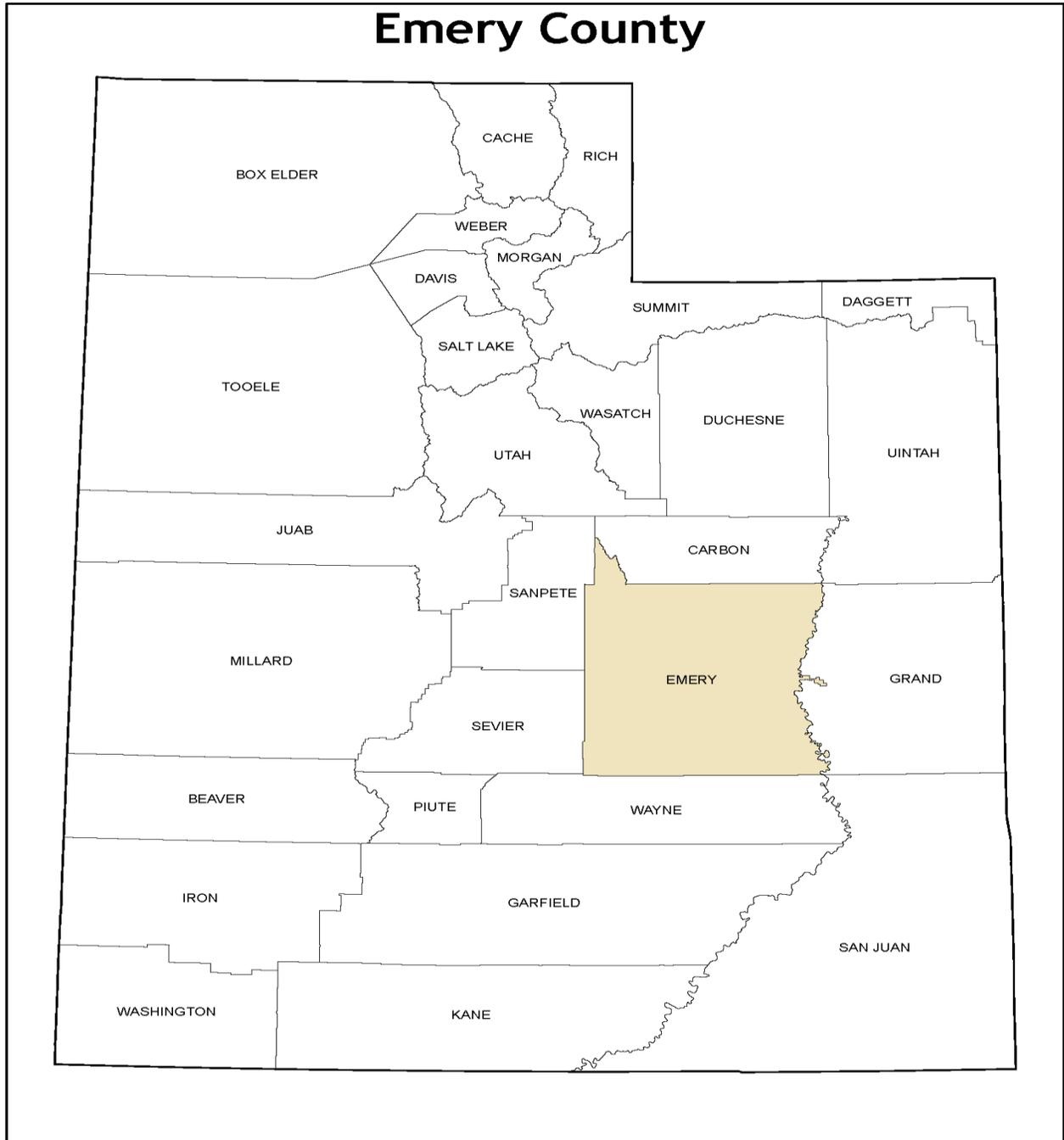


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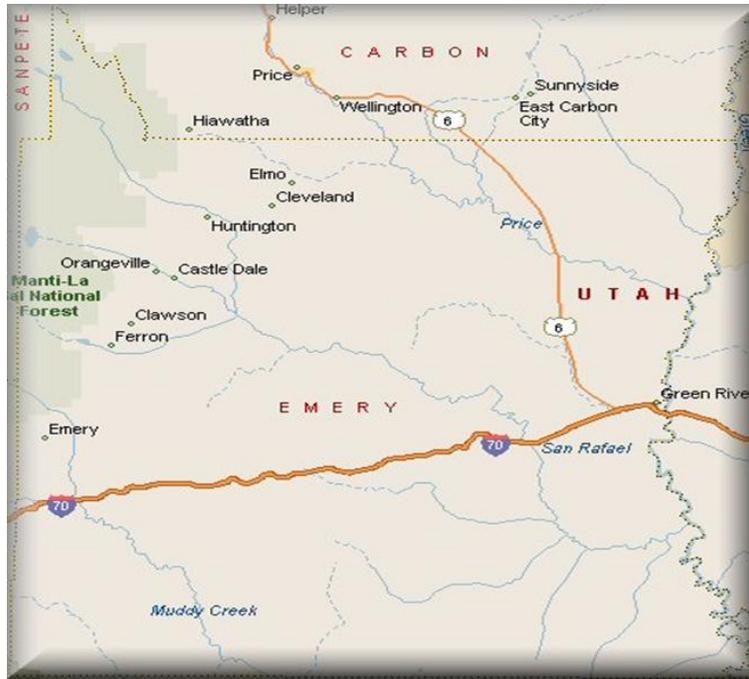
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Emery County

Emery County is located where the desert meets the mountains in Southeastern Utah. It encompasses 4,452 square miles making it Utah's seventh largest county. On the western side of the County is the Wasatch Plateau, which is the major water supply for the County. The San Rafael Swell dominates the County's center with its rugged reefs, "castles", and gorges. East of the San Rafael Swell is the Green River Desert, an arid district which has been historically important to ranching operations located in the lower San Rafael Valley. The eastern border of the County is formed by the Green River. Emery County includes nine municipalities: Castle Dale City, Clawson Town, Cleveland Town, Elmo Town, Emery Town, Ferron City, Green River City, Huntington City, and Orangeville City. Emery County has a population of approximately 10,216 residents distributed between the nine incorporated municipalities and its unincorporated areas, with Castle Dale City being the County Seat. Green River City is the only community in the eastern part of the county at the junction of Interstate 70 and US 6.

Emery County's economy was built and remains founded today on agriculture, livestock production, coal mining, and coal-fired electric power generation. There are two coal-fired electric power plants. Huntington power plant located at the mouth of Huntington Canyon and the Hunter Plant located south of Castle Dale off Highway 10. Emery County's future belongs to those individuals that desire a rural, natural setting in which to live and raise a family, but who are also resourceful and innovative enough to produce goods and services for the worldwide marketplace.

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Below is a quick reference of Emery County's past, present and future Mitigation projects

Date Started	Project Name and Brief Description	Project Status
2011	Building of Adobe Pond near Orangeville, UT	Completed 2013
2013	Resize 48" culvert under Long Street, Green River, UT	Completed 2016
2013	Resize 88" culvert under Long Street, Green River, UT	Completed 2016
2013	Woodside Cutoff; place riprap and replace wing walls on box culvert	Completed 2015
2013	Resize 96" culvert under Long Street, Green River, UT	Completed 2016
2013	Resize 72" culvert under Long Street, Green River, UT	Completed 2016
2013	Upper Washboard Wash Replace half culvert drain with geotextile fabric and rip rap	Completed 2015
2013	Entrance to Millsite State Park, resized culvert at Section L	Completed 2015
2013	Regain functioning of the HCIC sediment management systems impacted by the post Seeley Fire flash floods	Completed 2017
2013	Upgrade the existing HCIC facilities to manage the increased debris and	Completed 2017

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	sediment flows from the Seeley Fire	
2013	Huntington Creek; Reconstruct a washed out diversion structure	Completed 2017
2013	Construct a Debris Catch Basin on Huntington Creek	Completed 2015
2013	Crandall Canyon Bridge; Replace washed out rip rap around the base of the bridge	Completed 2014
2013	Remove debris and overgrowth from Huntington Creek	Completed 2014
2013	Remove a large log jam from Huntington Creek	Completed 2014
2013	State RT. 31, Mile Post 23.5 to Mile Post 33 Remove Debris to improve drainage	Completed 2014
2013	Huntington Creek, 4 miles west of Huntington, rebuild a diversion structure	Completed 2014
2013	Green River, UT Remove vegetation along canals and ditches to reduce fire risk	Completed 2014
2013	Seeley Fire Burn Scar; Prevent livestock from entering the burn scar area for 3 years	Completed 2016
2013	Huntington City Hall; install a propane back-up generator	Completed 2015

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2013	Huntington City; Complete due diligence concerning the availability and costs of a citywide warning system	Completed 2014
2013	Tusher Dam; Increase the height and strengthen the structure	2016
2013	Dislodge large rocks along the Highways prior to rockfalls caused by freeze/thaw cycle cause injuries or property damage	On Going

Emery County 2018 Pre-Disaster Natural Hazard Mitigation Plan Introduction

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.

Plan Review and Update 2018

After an extensive review to incorporate the most current demographic data, maps, vulnerability assessments, and mitigation projects, this 2018 Emery County Pre-Disaster Natural Hazards Mitigation Plan (PDM) has been created to update the original PDM plan created in 2003, updated in 2013, 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

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the mitigation goals, objectives, and actions for ease in reading and for more clearly identifying projects. There have been some minor changes to appendices and general maintenance parts, however there were no changes to background history and data which continues to accurately reflect the region.

Organization

As with the original Pre-Disaster Mitigation Plan (PDM), this updated version was developed and organized within the rules and regulations established under CFR Title 44, Part 201.6. Contained within the plan is a consideration of the purpose and methodology used in developing the plan, as well as a profile of communities within the county, and a vulnerability analysis of nine potential natural hazards. Several appendices are included to provide further detail on specific elements of the above content. This plan is intended to create a foundation that will enable Emery County and the communities within Emery County to develop projects that provide for both the safety of their populations and the protection of the environment.

Plan Financing

The Emery County Pre-Disaster Natural Hazard Mitigation Plan was financed and developed under the Pre-Disaster Natural Hazard Mitigation Program guidelines established by the FEMA and the Utah Department of Public Safety Division of Emergency Management.

Plan Participation

The 2018 Emery County Pre-Disaster Natural Hazards Mitigation Plan was completed through the collaborative efforts of the Utah Department of Public Safety Division of Emergency Management, Emery County Emergency Manager, Fire Departments, Emery County Sheriff's Office, Public Works Department, Planning Commission, Assessor's Offices, 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. Feedback was solicited through the Emery County Pre-Disaster Natural Hazard Mitigation Plan Working Group during the plan development. Public participation was also encouraged through a public hearing and review of the 2018 PDM Plan on the Emery County website. All comments, questions, and discussions resulting from these activities were given thoughtful consideration as the plan was developed.

Purpose

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This plan exists to identify natural hazard threats to the community, prepare mitigation management strategies to address those threats, develop short-term and long-term goals and objectives for mitigation planning, and to fulfill federal, state, and local hazard mitigation planning obligations. The intention of this plan is to enhance awareness of, and provide mitigation strategies for, elected officials, agencies, and the public, develop actions which will minimize negative outcomes to Emery County's citizens, the economy, and the environment due to potential natural hazard threats. 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.

Community Capabilities

Emery County and the municipalities of Green River City, Castle Dale City, Clawson Town, Cleveland Town, Elmo Town, Emery Town, Ferron City, Huntington City and Orangeville City face many challenges to improve the natural hazard mitigation efforts and sustain the Emery County Pre-Disaster Natural Hazards Mitigation 2018 Plan. The following capabilities have been identified for consideration for discussion and strengthening to implement and sustain the plan.

Financial:

Emery County nor the municipalities of Green River City, Castle Dale City, Clawson Town, Cleveland Town, Elmo Town, Emery Town, Ferron City, Huntington City and Orangeville City maintain a natural hazard mitigation specific fund or funding mechanism. The county does participate in the Utah Wildland Suppression Fund and has developed the Community Wildfire Preparedness Plan (Appendix 7). The CWPP does provide for some mitigation funding for Urban Wildland Interface fuels reduction programs. The challenge as acknowledged in the Emery County General Plan is 95% of the county is owned by other Federal, State government agencies and only 5% of the county is providing the tax base for county and municipal services.

Planning and Technical Services:

The planning and technical capabilities of Emery County and the municipalities are impacted by the limited tax base as the hiring of professional staff is often unattainable. The elected officials and appointed staff perform many of the tasks normally completed by professional staff members. An example of a technical shortfall is that within Emery County there are only three GIS trained staff members with multiple duties. The county and municipalities will contract out for specific planning documents such as Master Plans, General Plans, and Zoning Ordinances. The Southeast AOG is an organization the county can reach out to for assistance with planning and technical services.

Administration:

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Emery County has an elected County Commission consisting of three commissioners. The emergency manager is a Sheriff's Captain assigned multiple duties that include training, firearms training, supervise the Search & Rescue organization, develop and conduct multifunctional exercises, day to day administrative duties and other duties as assigned. The county has Building and Zoning Department with a contracted part time building inspector. The elected Sheriff provides law enforcement services throughout the county, the incorporated and unincorporated cities and towns with a limited staff. The fire and EMS first responders are volunteers along with the Search & Rescue organization within the county. The county does maintain a Road Department.

The municipalities have an elected mayor and city council with their own planning and zoning departments. They defer to the county for providing law enforcement services.

The ability of Emery County and the municipalities to expand the funding opportunities, roles and responsibilities beyond the current capability of implementing and sustaining the Pre-Disaster Natural Hazards 2018 Plan is constrained by the limited tax base.

Scope

The plan provides comprehensive natural hazard identification, risk assessment, vulnerability analysis, mitigation actions, and an implementation schedule.

Emery County Plan Goals and 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 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.

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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 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. The criterion becomes especially important when two or more projects are competing for limited resources.

1. Identification of persons, agency or organization responsible for implementation.
2. Project a time frame for implementation.
3. Explanation of how the project will be financed including the conditions for financing and implementing (as information is available).
4. Identifying 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.

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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.
12. 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.

Authorities

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.

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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.

Local:

Effective natural hazard mitigation is dependent upon local governments assuming a vital role. As such, each local government will review all present or potential damages, losses, and related impacts associated with natural hazards to determine what is required for mitigation action and planning. For Emery County and the Cities and Towns of Emery County, the local executives responsible for implementing plans and policies are the Emery County Commission and City or Town Mayors. It is critical that local governments be prepared to participate in the post-disaster Hazard Mitigation Team process, as well as the pre-mitigation planning outlined in the Pre-Disaster Natural Hazard Mitigation Plan.

Demographics and Population Growth

Table 1 shows a comparison between the State of Utah and Emery County. Details of the population, percent growth/change over 5 years and the percentage of ages located within Emery County. Knowledge of the population is important to understand the impacts that a natural hazard would have on a local community. Table 1A depicts the Ethnic breakdown of Emery County. Table 2 shows the population for Emery County each community within Emery County.

Table 1 The State of Utah and Emery County Population Change Comparison

Population Change	Emery County	Utah
Population percent change, 2010 to 2016	-6.9%	+10.4%
Persons under 5 years old; percent, July 2016	6.9%	8.3%
Persons Under 18 years old, percent, July 2016	29.8%	30.3%
Persons 65 and older, percent July 2016	16.2%	10.5%

(United States Census 2016 Quick Facts)

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Table 1A Emery County Ethnic Breakdown

Race	Number	Percent	National Avg
One Race	10,703	99.8%	96.9
White	10,613	99.9%	73.1
African American	18	0.2%	12.7
American Indian	16	0.1%	0.8
Asian	6	0.1%	5.4
Asian Indian	4	1.2%	1.2
Chinese	2	0.0%	1.3
Filipino	0	0.0%	0.9
Japanese	0	0.0%	0.2
Korean	0	0.0%	0.5
Vietnamese	0	0.0%	0.5
Other Asian	0	0.0%	0.8
Pacific Islander	3	0.0%	0.2
Native Hawaiian	0	0.0%	0.1
Guamanian	0	0.0%	0.0
Samoan	3	0.0%	0.0
Other Pac Islander	0	0.0%	0.1
Other Races	47	0.4%	4.8
Two or more Races	25	0.2%	3.1
Hispanic	Number	Percent	National Avg
Latino	667	6.2%	17.6
Mexican	587	5.5%	11.1
Puerto Rican	2	0.0%	1.7
Cuban	0	0.0%	0.7
Other Hispanic	78	0.7%	4.1
Non-Hispanic	10,061	93.8%	82.4

<https://www.homefacts.com/demographics/Utah/Emery-County.html> Jan.2018

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Table 2 Emery County Population

Census Year	Emery County: Cities and Towns for Human Population										Utah State
	Emery County	Castle Dale City	Clawson Town	Cleveland Town	Elmo Town	Emery Town	Ferron City	Green River City	Huntington City	Orangeville City	
1980	11,451										
1990	10,332	1,704	151	498	267	300	1,606	881	1,875	1,459	
2000	10,962	1,657	153	508	368	308	1,623	973	2,131	1,398	2,233,204
2010	10,976	1,630	163	464	418	288	1,626	952	2,129	1,470	2,763,885
2016 (EST.)	10,216	1,538	190	442	408	266	1534	943	1975	1378	3,051,217

(United States Census 2016 Quick Facts)

Economy

The mainstays of Emery County's economy are mining, transportation, communications, utilities, and government. These industries' high wages help sustain the county's standard of living. The agriculture, livestock ranching industries remain important as well. An emerging part of Emery County's economy are recreation and tourism. Emery County's economy has struggled throughout the last decade. The coal mining industry lost jobs, as did utilities. Construction positions decreased with the completion of a major project and manufacturing jobs were basically unchanged. Trucking, information, and local government employment, as well as retail and wholesale trade all saw a slight decline, while federal land management jobs increased. As shown in Table 3.

Table3: Emery County's Employment Rates

Employment	Emery County %
Mining	2.1
Construction	-46.8
Manufacturing	106.7
Trade/Transport/Utilities	0.3

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Leisure/Hospitality	-2.2
Information	3.7
Financial Activities	15.8
Prof/Business Services	9.0
Education/Health/Social Services	7.1
Other Services	-22.4
Government	-0.6

Utah Department of Workforce Service, July 2017

Transportation and Commuting Patterns

The principle east-west corridor through Emery County is Interstate 70. US Highways 6 and 191 are the main highways for both north-south traffic between Salt Lake City and southeastern Utah, and east-west traffic between Salt Lake City and Denver, Colorado. State Highway SR 10 is located on the east bench of the Wasatch Range. The Burlington Northern Santa Fe (BNSF) Railroad runs roughly parallel US Highway 6 and 191 from Green River through Price City. Also, Highway SR 31 connects Huntington in Emery County to Fairview in San Pete County.

The main highway used for commuting through Emery County is Highway SR 10. It runs north and south throughout Huntington, Castle Dale, Ferron, and Emery Town while traveling from Highway SR 10 to reach highway SR 155 to Elmo and Cleveland and using either the SR 29 or SR 57 to Orangeville. The Highway US 6/191 connects Carbon County to Emery County with travel to Green River City. Emery County southern end borders Interstate 70, which connects Highway SR 10. The people's means of transportation are listed in Table 4:

Table 4 Emery County Mode of Transportation for Employment:

Mode of Transportation	Drove a car alone	Carpooled	Worked at home	Walked	Public Trans. & Other
Percentage of employed people	79.1%	12%	4.6%	2.3%	2%

City Data July 2017

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Land Ownership and Land Use

Emery County is Utah's seventh largest county in terms of land area. Emery County encompasses 4,452 square miles of land of which 82% is federally owned, 13% is State owned, and 5% is privately owned as displayed in Table 5. Table 6 shows the land use break-out of the county acre total of 2,047,558. This is broken into grain crop, pasture, orchard, shrub, water, wetlands, and developed land use.

Table 5: Emery County Land Ownership Per Acres and by Percentage

Emery County Land Ownership Acreage	
BLM	2,063,076
Forest Service	214,058
State	347,287
National Park	2,092
Public Lands	2,626,513
Private Lands	135,586
Total Emery County Lands	2,762,099
Percentage	
BLM	74.69%
Forest Service	7.75%
State	12.57%
National Park	0.08%
Public	95.09%
Private	4.91%

Emery County GIS 2018

Table 6: Land Usage

Emery County Acreage per Land Type	
Developed	7,823
Grain Crops	1,250
Grass/Pasture/Hay	42,500
Orchards/Vineyards	20
Shrub/Rangelands	1,995,000
Water	435
Wetlands	530

NRCS Report 2018

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The Emery County General Plan (dtd August 2016) is structured towards conserving, protecting, and enhancing scenic, wildlife, recreational opportunities to include motorized, mechanical and primitive types, further benefit and enjoyment for historical, natural heritage, and educational resource of the San Rafael Swell, Western heritage and Historic Mining National Conservation Area.

The Emery County General Plan makes a position statement on the preservation of cultural and historical heritage resources: “Emery County views the preservation and perpetuation of its heritage and culture, coupled with the development of a nationally significant heritage area and its associated heritage and tourism industries, as one of the County's highest priorities for planning and implementation for the next decade. These objectives are the result of years of planning and implementation that preceded and have followed the adoption of the Emery County General Plan and are a direct reflection of the objectives outlined for economic development, tourism development, public lands management and the maintaining of a rural character and lifestyle”.

Over the last seven years, 2011-2017, building permits issued during each year are shown in Table 7 for all municipalities and Emery County.

Table 7: Emery County Building Permits Issued During 2011-2017

Year	2011	2012	2013	2014	2015	2016	2017	Total Permits Issued
Number of Building Permits Issued	156	128	56	52	46	55	41	

(Utah Division of Workforce Services Report 2016) (Emery County Building Inspector 2018)

The development trends for oil and gas operations are slowly continuing. The eastern part of Emery County has three overlapping sedimentary basins with little oil or gas development currently in that area. The northwestern portion of the county near the City of Castle Dale has an elevated level of natural gas development. The Zoning Ordinances for the County have addressed and submitted plans for dealing with releases of hazardous materials relating to the drilling or operation of wells. This information is furnished to the local fire, police, and emergency management authorities. (Intermountain Oil and Gas BMP Project)

The 2016 the estimated median house value in Emery County was \$135,100.00. The average household size is 2.6 people with an estimated median household income reported in 2016 of \$51,276.00.

2016 US Census Quick Facts

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Risk Assessment

The Working Group concurred that the following natural hazards are specific natural hazards in the county. There are nine natural hazards profiles; Wildfire, Flood, Dam Failure, Infestation, Drought, Landslide, Problem Soils, Severe Weather, and Earthquakes. The Working Group also compiled a list of critical facilities in Emery County to be considered during the risk assessment process. The Risk Assessment methodology for developing this updated plan included several steps to gather information from the whole community, prepare the input, analyze and discuss the data to provide information of the potential impacts of the nine natural hazards identified for Emery County. The Emery County Working Group primarily used available GIS maps and FEMA Flood Plain Maps for the identified natural hazards along with historical data, local knowledge, and the potential impact on the critical facilities and infrastructure. The gathered information was shared with the appropriate subject matter experts for their review and input. The final compilation of data was discussed by the Working Group and the Risk Assessment for each of the nine identified natural hazards was reached by consensus of the Working Group.

Table 8: Emery County Identified Natural Hazards

Typed of Natural Hazard	Probability	Severity (Potential Magnitude)	County Ranking
Drought	Extreme-Highly Likely	Catastrophic	1
Flood	Moderate-Likely	Critical	2
Wildland Fire	Extreme-Highly Likely	Catastrophic	3
Severe Weather	Moderate-Likely	Limited	4
Earthquake	Moderate-Likely	Limited	5
Landslide	Moderate-Possible	Critical	6
Dam Failure	Moderate-Possible	Critical	7

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Problem Soils	Moderate-Possible	Limited	8
Infestation	Moderate-Likely	Limited	9

Pre-Disaster Natural Hazard Mitigation Planning Process History

According to the Local Multi-Hazard Mitigation Planning Guidance of July 2008 the plan update is required by 44CFR §201.6(d)(3) to review and revise the initial plan of 2003. During the March 2011 meeting, participants reviewed the Emery County identified natural hazards the Working group agreed upon the previous identified hazards may be problematic and agreed to add Wildland Fire, Problem Soils, and Infestation. The Pre-Disaster Natural Hazard Mitigation Working Group in 2016 reviewed the natural hazards listed in the 2013 Pre-Disaster Hazard Mitigation Plan and removed Hazardous Materials as a natural hazard.

The Emery County 2018 Pre-Disaster Natural Hazards Mitigation Working Group identified the following Critical Facilities to be considered during the Hazard Assessment process for the 2018 Pre-Disaster Natural Hazards Mitigation Plan.

Table 9: Emery County Critical Facilities

The Emery County Critical Facilities List was updated by the Emery County Pre-Disaster Mitigation Working Group and coordinated through the Emery County Emergency Manager.

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.

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Landslide has High (H), Moderate (M), Low (L) and Very Low (VL) based from 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).

If a hazard does not affect any facility (such as infestation) you could just leave it off the table or just explain it. N/A may be utilized.

Table 9: Emery County Critical Facilities

Emery County Critical Facilities									
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 No Phone	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

Emery County Pre-Disaster Hazard Mitigation Plan

2018

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 No phone *If no phone, contact CVSSD	L	D2	M	M	L	M	H	L	VL
Little Bear Spring Huntington Canyon No phone *If no phone, contact CVSSD	M	D2	H	M	L	L	H	L	M
Big Bear Spring Huntington Canyon No phone *If no phone, contact CVSSD	M	D2	H	M	L	L	H	L	M
Ty Fork Springs - Upper and Lower Huntington Canyon No phone *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 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	M	D2	M	M	L	L	H	L	VL

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(435)687-2436									
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

Emery County Pre-Disaster Hazard Mitigation Plan

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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

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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
Nine Mile East Carbon	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

Emery County Pre-Disaster Hazard Mitigation Plan

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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

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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, (435)-564-8383 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

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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

Emery County Natural Hazards Profiles

Dam Failure

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	Possible	
		Unlikely	
Location	Dam locations are mainly in the mid-to-northwestern portion of the county.		
Seasonal Pattern or Conditions	Rainy Day Failure happens mainly during heavy precipitation events, can have some warning time. Sunny Day Failure happens with no warning at all can happen at any time.		
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.		
Analysis Used	Review of Bureau of Reclamation (BOR) inundation maps and plans, Flood Insurance Studies (FIS), and Utah Water Rights information.		

Description of Location and Extent

Hazard ratings are determined by downstream uses, size, height, volume and incremental risk/damage assessments. The hazard ratings are: Low-insignificant property loss; Moderate-significant property loss; High-possible loss of life. It should be noted, dam safety hazard classifications are in the event of dam failure and are based upon the consequences of dam

Emery County Pre-Disaster Hazard Mitigation Plan

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failure, and the classification of a high hazard dam does not mean that the dam has a high probability of failure. Table 10 gives an alphabetized list of dams that may affect Emery County.

Table 10: Dam Risk

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

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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

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. In the above narrative, downstream towns have been identified that could be potentially affected if a dam were to breach.

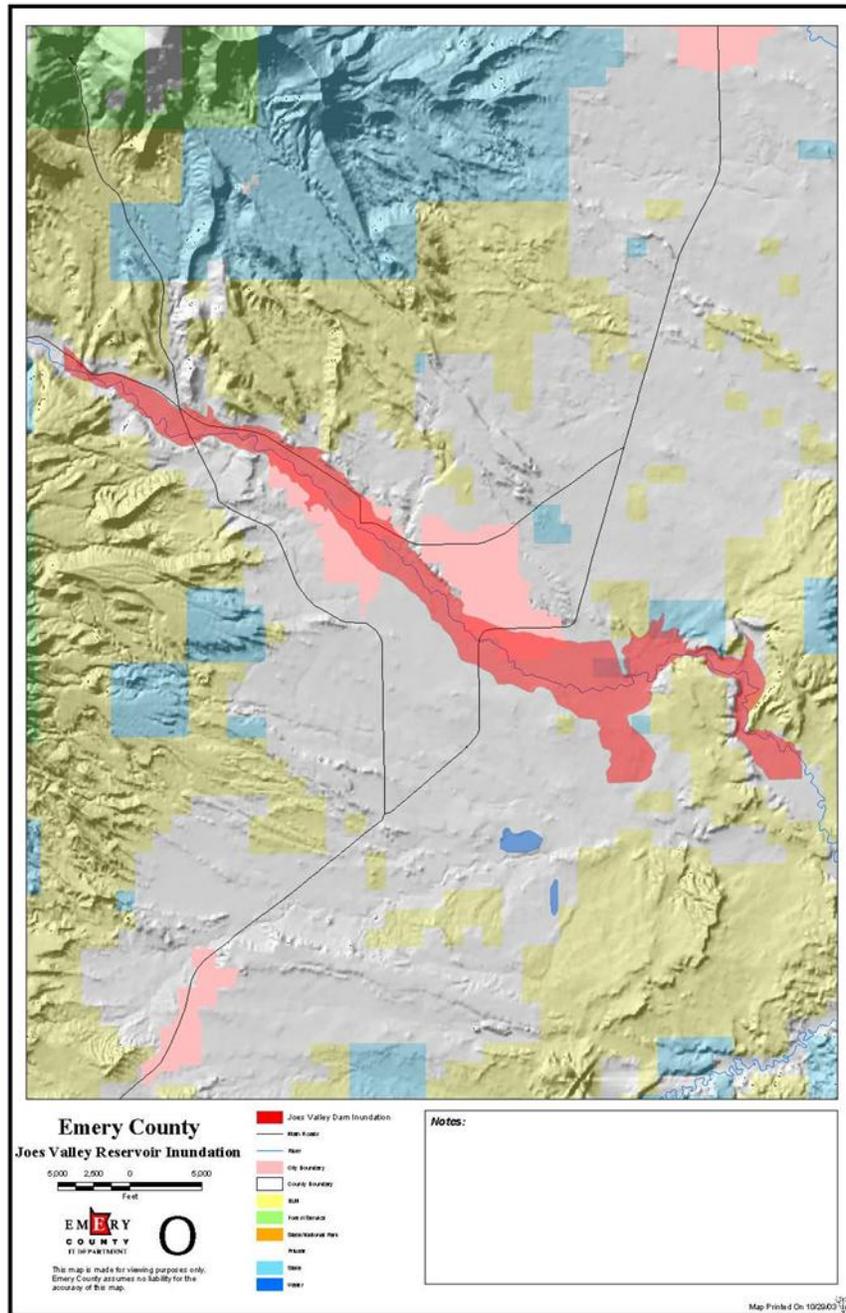
Emery County Pre-Disaster Hazard Mitigation Plan

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Joe's Valley Reservoir Inundation

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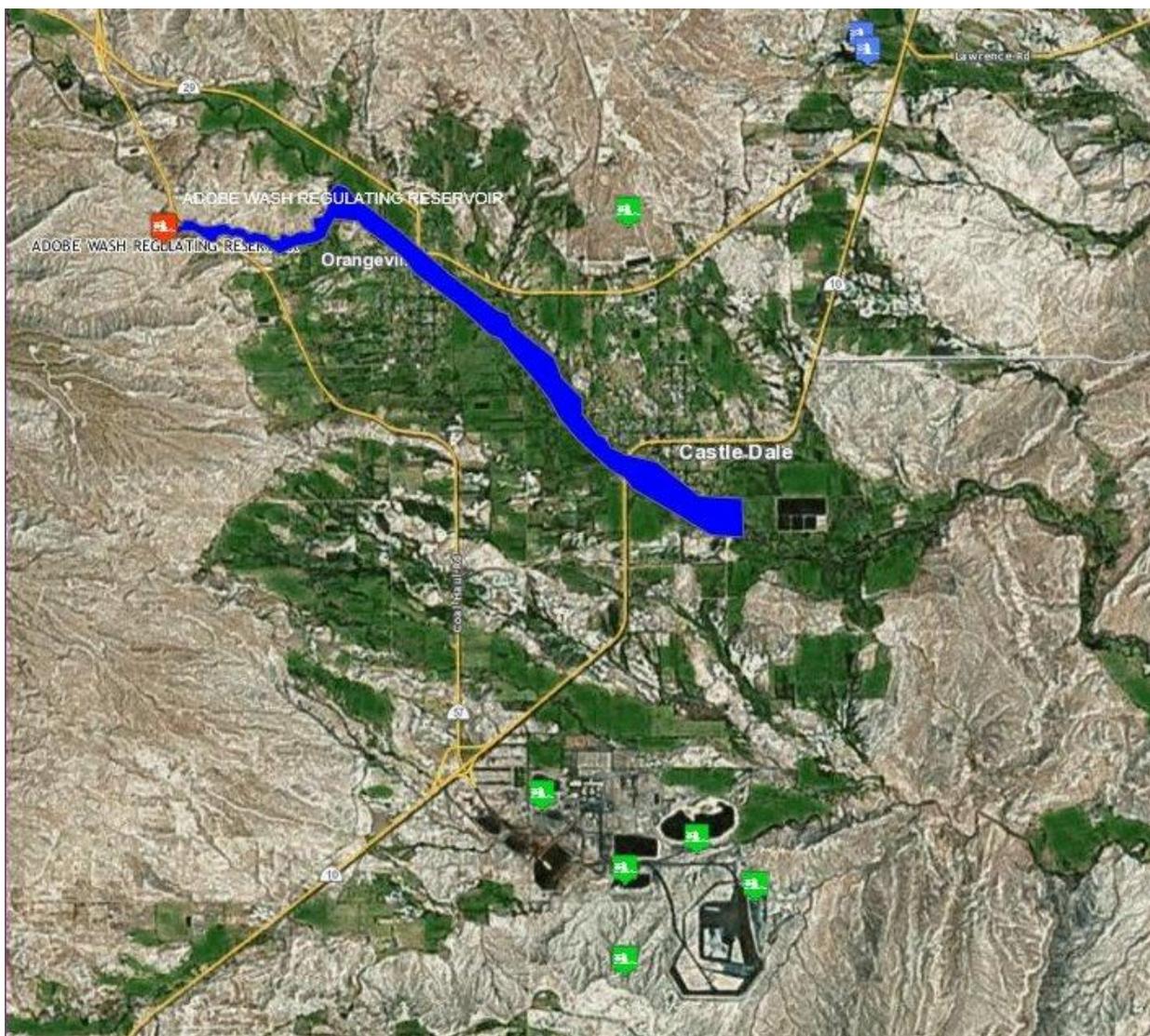
2018



Emery County Pre-Disaster Hazard Mitigation Plan

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Adobe Wash Regulating Reservoir



Utah Water Rights Dam Inventory 2018

Emery County Pre-Disaster Hazard Mitigation Plan

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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.

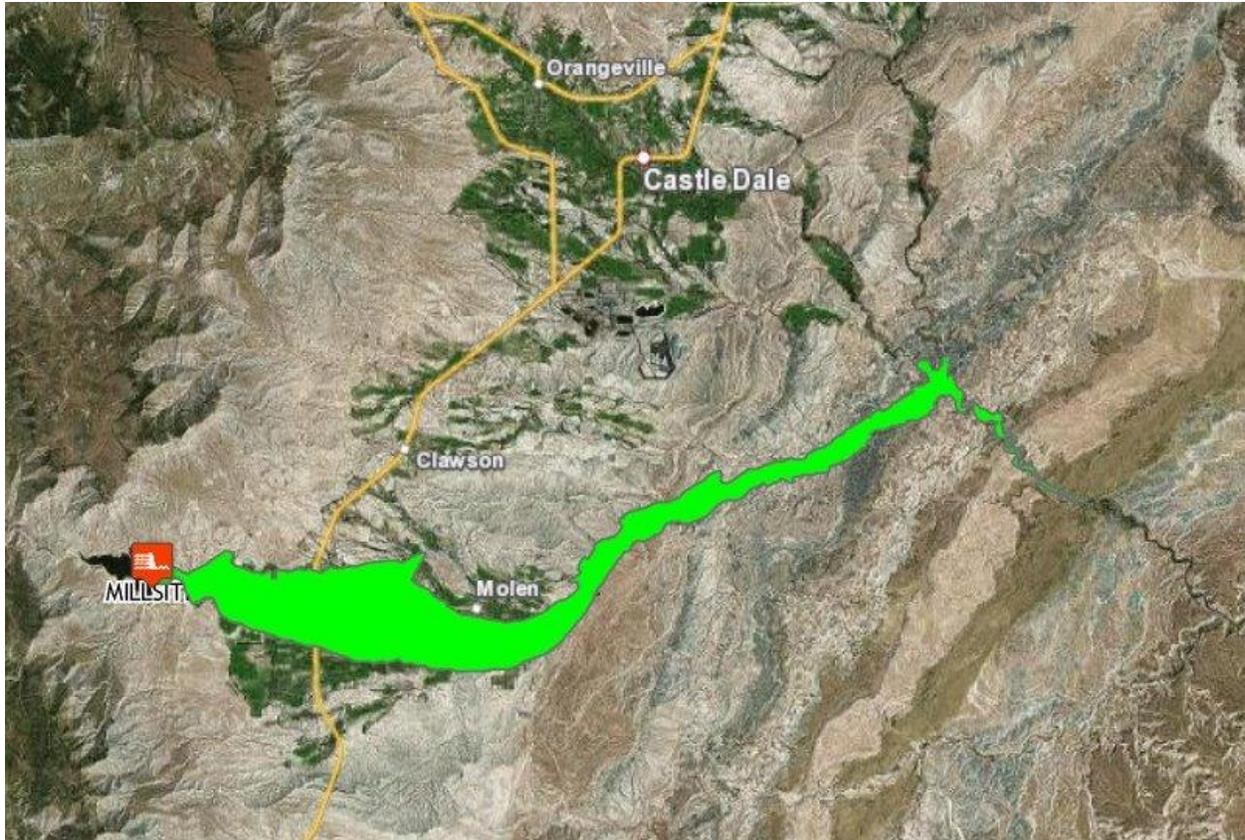
The Ferron Debris Basin No. 4 has moderate hazard rating. This dam was built in 1970 and owned by Ferron Canal and Reservoir & Company. The reservoir storage at spillway crest is 44 acre-feet and the reservoir storage at dam crest is 61 acre-feet. The maximum dam breach flow is 7,000cfs in a one square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

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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.

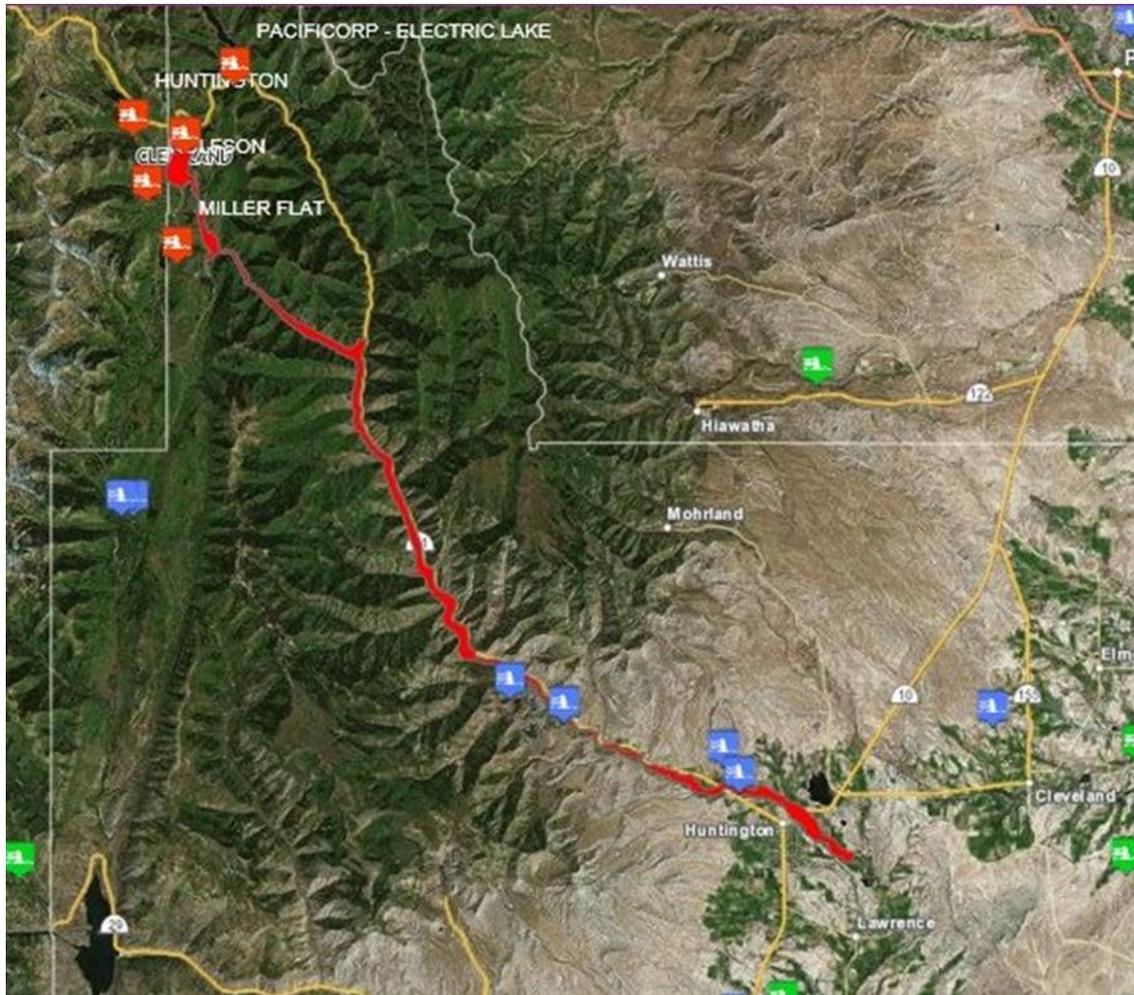
The Miller's Flat Reservoir was built in 1948 and modified in 1985. The dam has a high hazard rating and owner is Huntington-Cleveland Irrigation Company. The reservoir storage at spillway crest is 5560 acre-feet and the storage at dam crest is 6393 acre-feet. The spillway maximum discharge is 2000cfs 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.

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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.

Huntington Inundation Map



Utah Water Rights Dam Inventory 2018

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Flood

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
	X	Likely	
		Possible	
		Unlikely	
Location	The major rivers are Green River, Price River, Muddy Creek, and the San Rafael. Flash flooding occurs throughout the county.		
Seasonal Pattern or Conditions	Spring, Cloudburst Storms and heavy Snowfall Runoff.		
Duration	Flooding can last anywhere from hours to days and even weeks.		
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.		

Description of Location and Extent

Countywide along the rivers and streams within the county. Areas that could be affected if there were heavy snowmelt and/or dam failure include farmland along the east bench of the Wasatch Plateau. The communities of Emery County: Castle Dale, Cleveland, Emery, Ferron, Huntington, Orangeville, and Green River are the most susceptible. Canal systems, such as the earthen Clipper, Western and mammoth canals could threaten Orangeville. The Joes' Valley Canal, also known as the Cottonwood Creek—Huntington Canal (a five-mile membrane and twelve-mile earthen canal) could affect Orangeville, Huntington, and Castle Dale.

Emery County National Flood Insurance Program

Emery County	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

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	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 the NFIP	
	Cleveland Town	0 Policies	6/11/92 Entry into the NFIP	Level A, 7/12/77 Date of Flood Zone Map on file
	Elmo Town		Non-Participant in the NFIP	

SFHA: Special Flood Hazard Area

Utah Division of Emergency Management Flood Plain Manager 2017

There are no repetitive loss properties in Emery County

No repetitive loss properties in Castle Dale City

No repetitive loss properties in Emery Town

No repetitive loss properties in Ferron City

No repetitive loss properties in Green River City

No repetitive loss properties in Huntington City

No repetitive loss properties in Orangeville City

No repetitive loss properties in Cleveland Town

No repetitive loss properties in Clawson Town

No repetitive loss properties in Elmo Town

The Emery County Flood Plain Administration is conducted by the Emergency Manager 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 flood plain 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.

Vulnerability Assessment

The Utah Division of Emergency Management GIS provided a 100-year flood event analysis using the HAZUS-MH Flood Global Risk Report (Appendix 1) The completed report was

Emery County Pre-Disaster Hazard Mitigation Plan

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provided in January 2018. The following paragraphs highlight the potential harm flood waters may do overall to Emery County.

Building

The report estimates that about 11 buildings will be at least moderately damaged. This is over 42% of the total number of buildings in the scenario. There are an estimated 5 buildings that will be completely destroyed.

Shelter

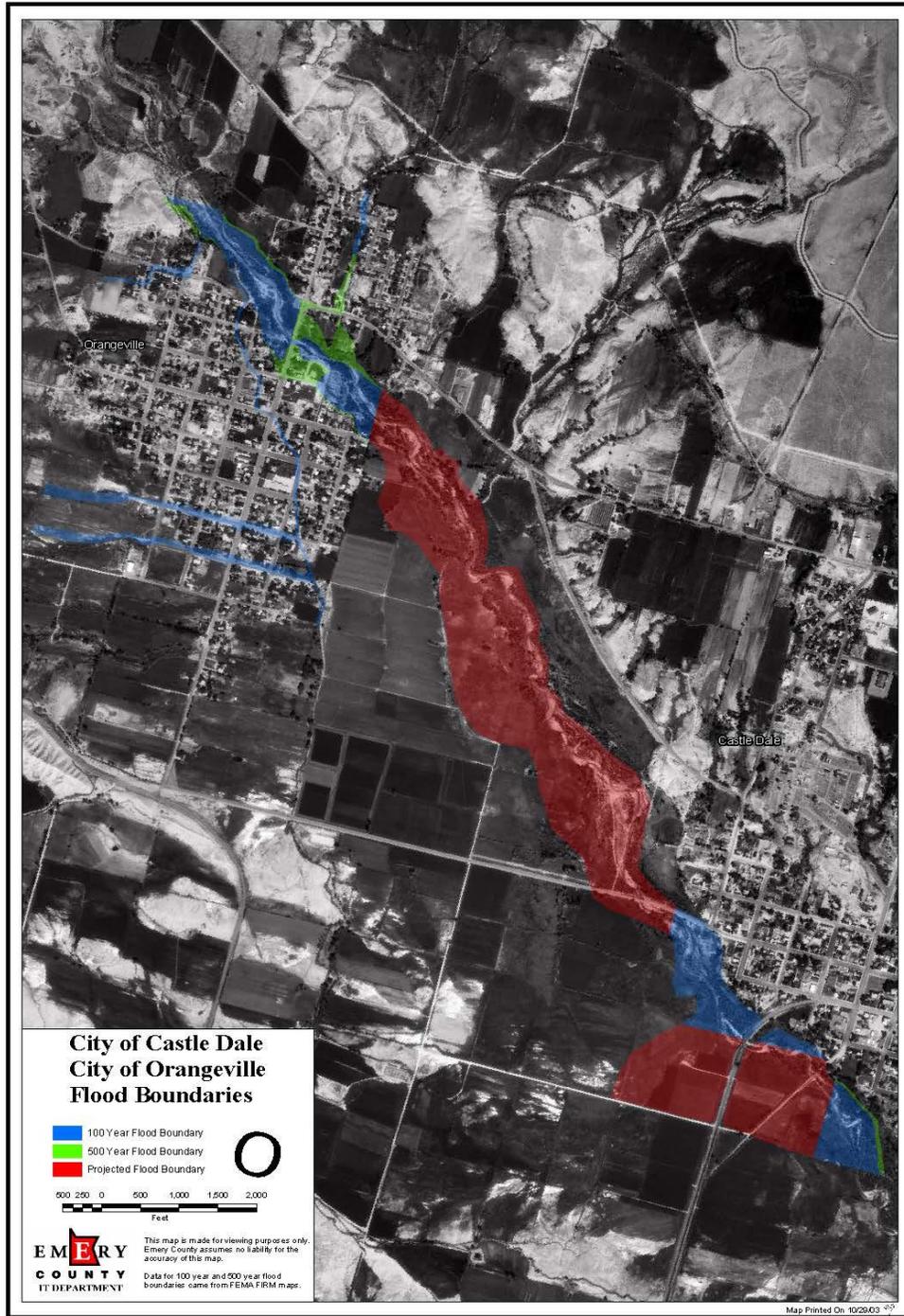
The report estimates 84 households will be displaced due to the flood which includes households evacuated from within or very near to the inundated area. Of these, 55 people will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 12.35 million dollars. The building losses were 12.25 million dollars. One percent of the estimated losses were related to the business interruption while residential occupancies made up 32.92% of the total loss.

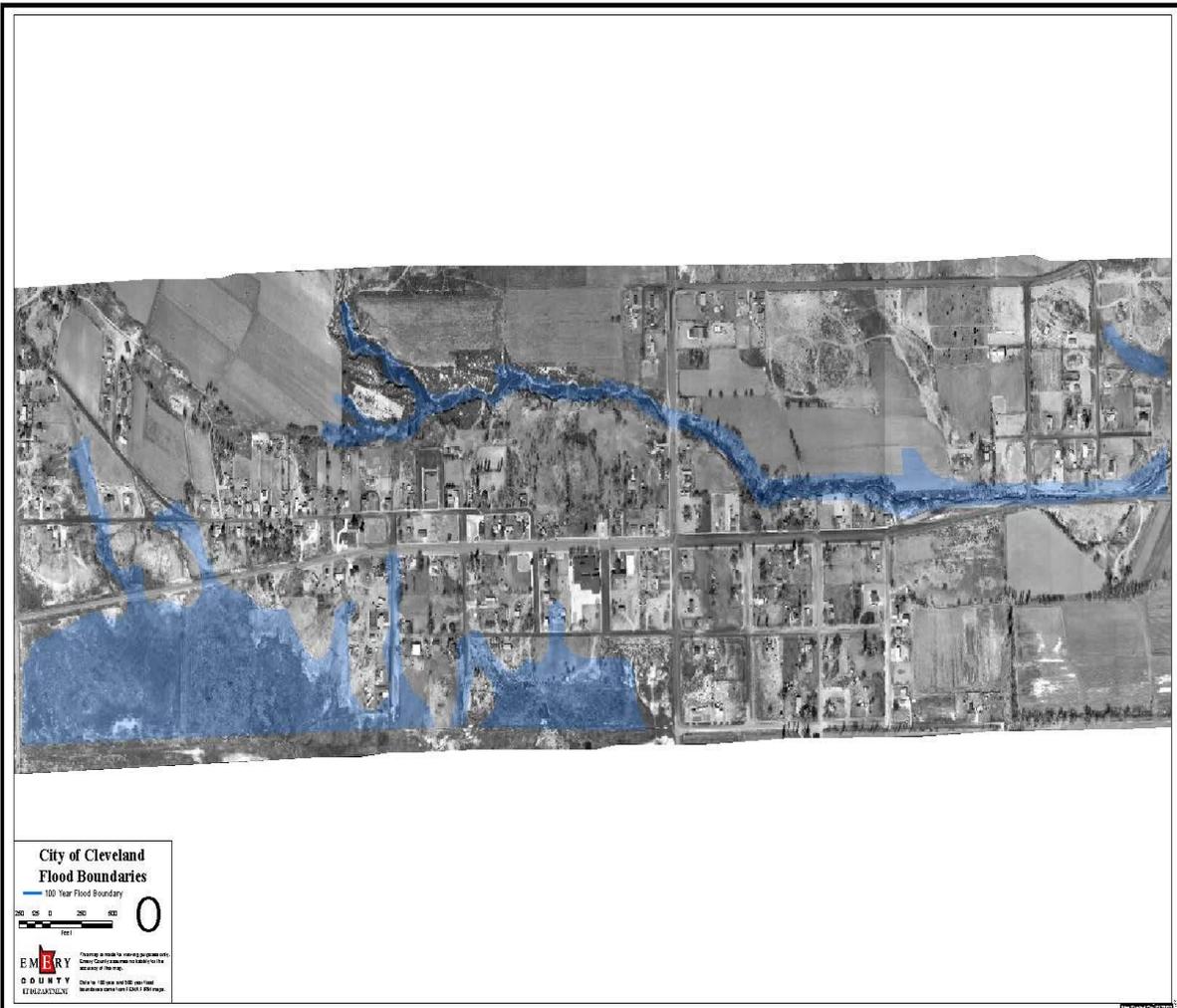
Emery County Pre-Disaster Hazard Mitigation Plan

2018



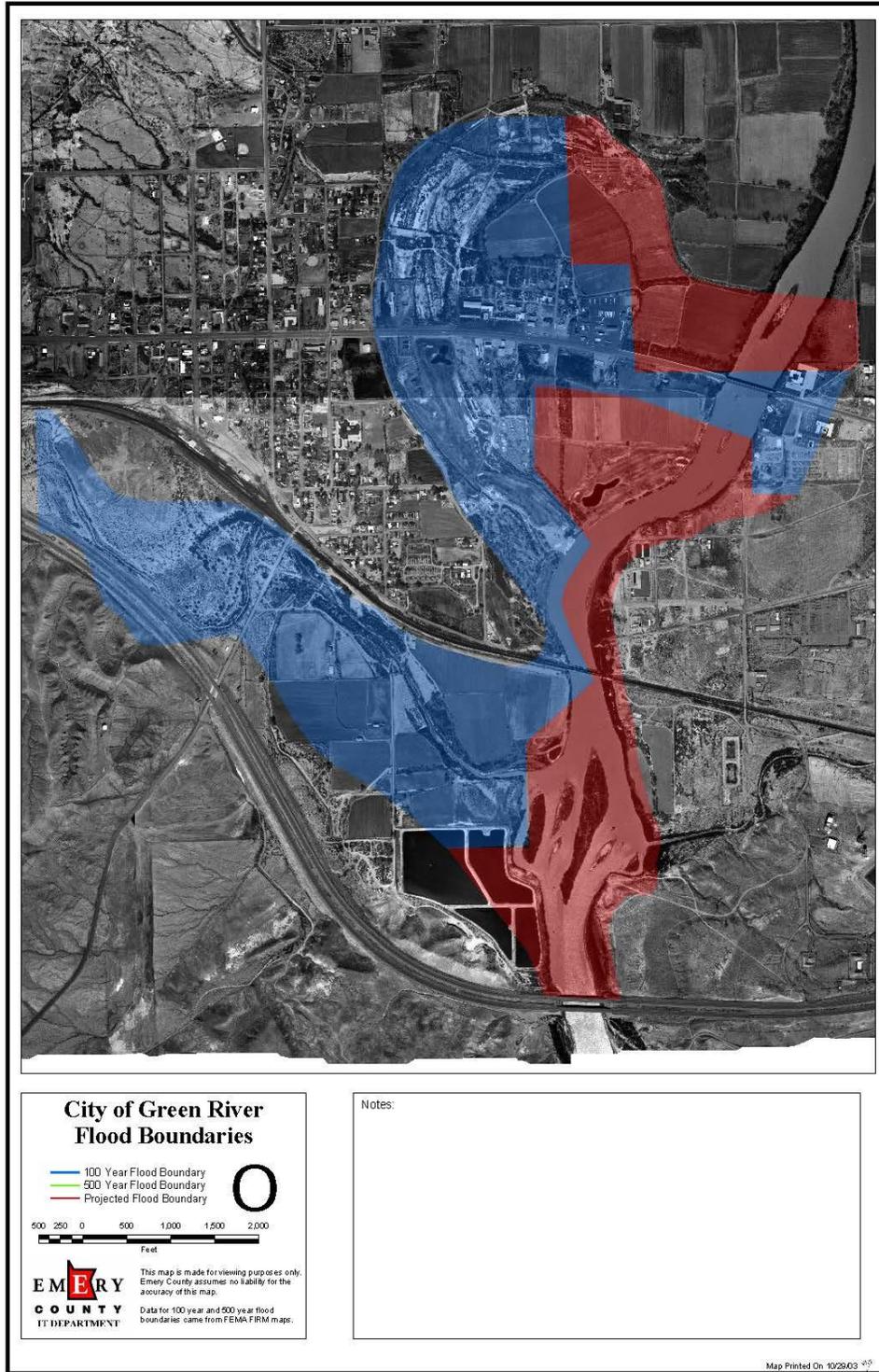
Emery County Pre-Disaster Hazard Mitigation Plan

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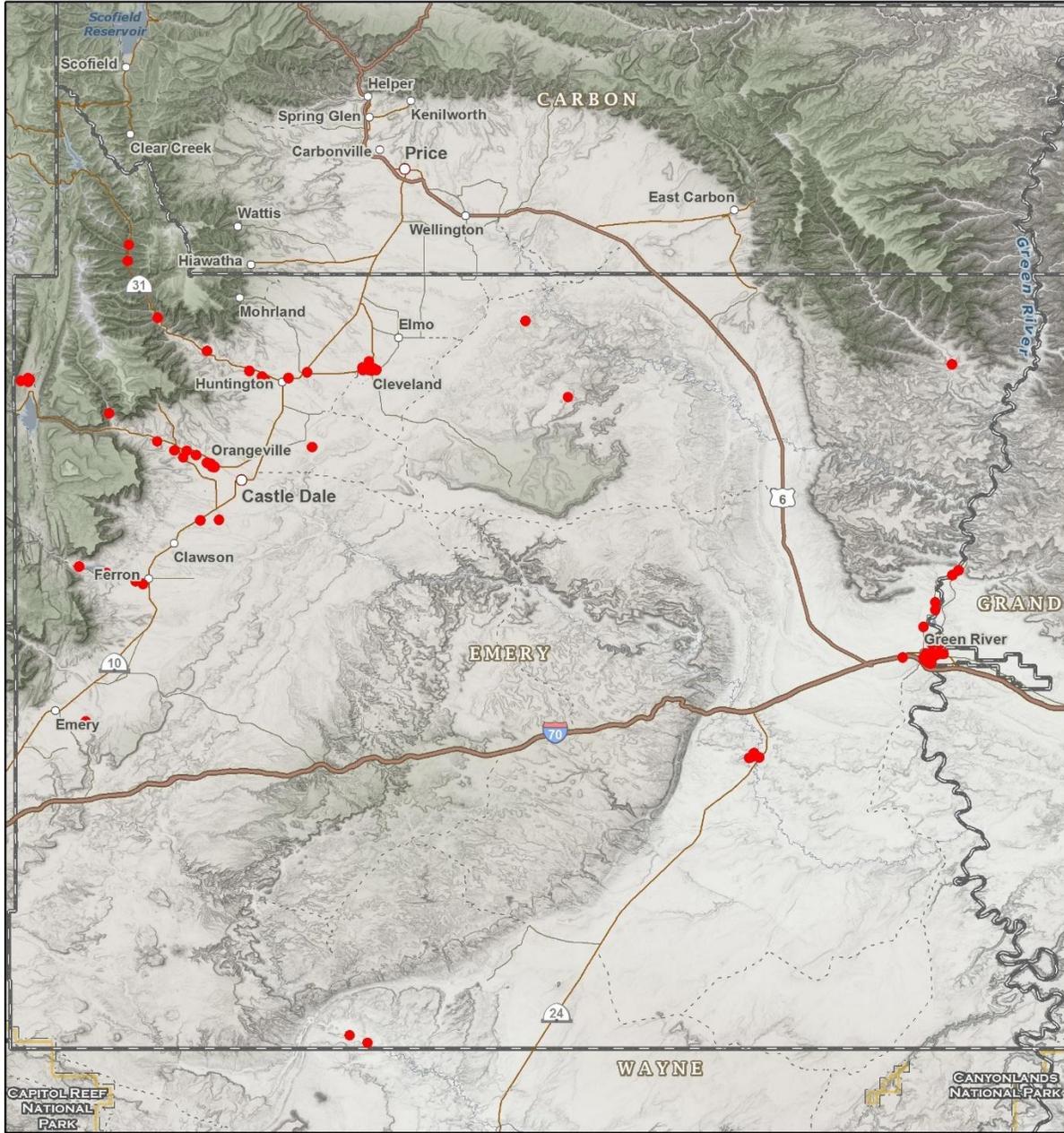
Emery County Pre-Disaster Hazard Mitigation Plan

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Emery County Pre-Disaster Hazard Mitigation Plan

2018



Direct Building Economic Loss

Emery County 100 Year Flood

• 1 Dot = \$100,000
(By Census Block)

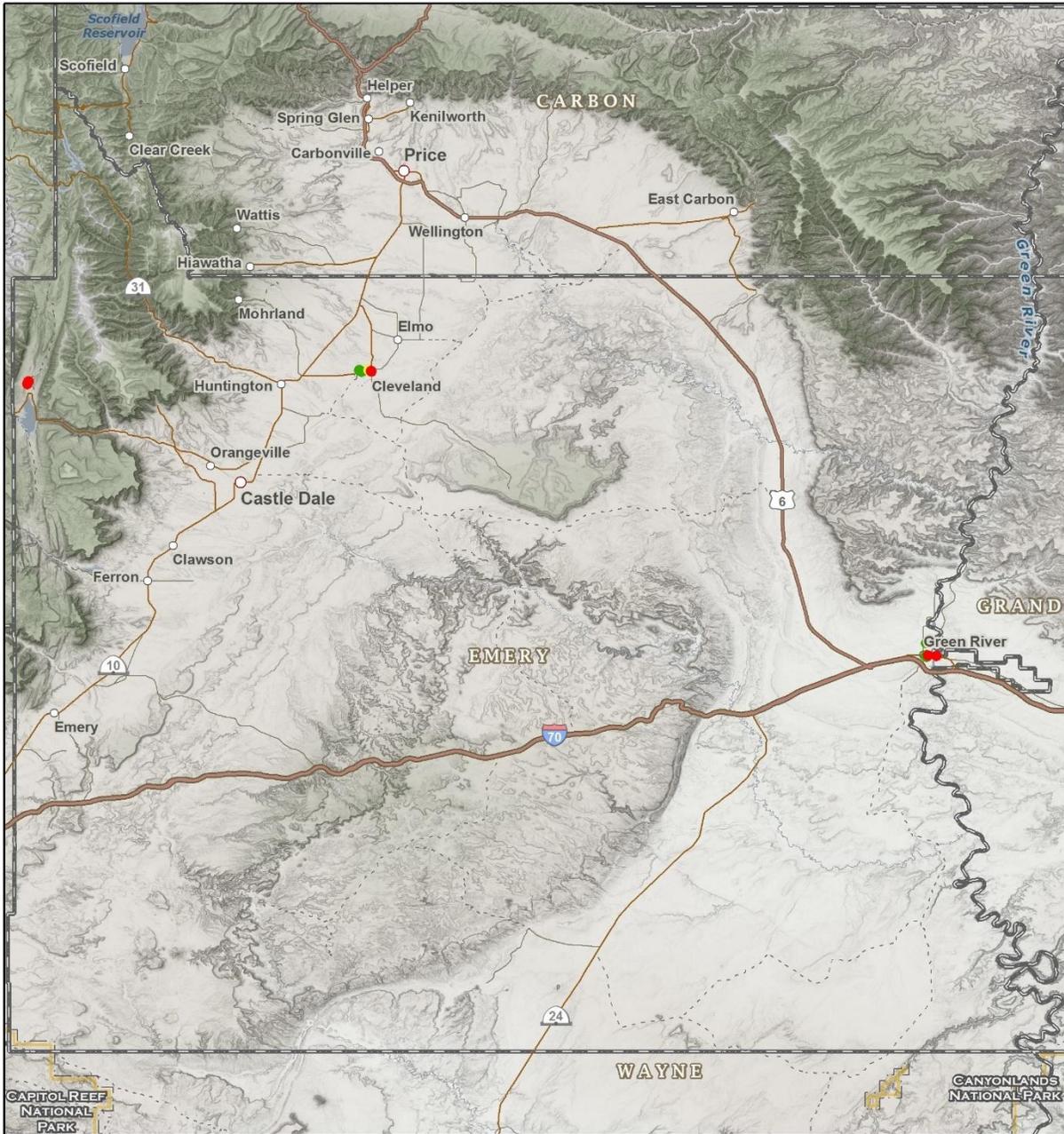
Direct building economic loss includes structural losses, non-structural losses, content and inventory losses, as well as income-related losses such as relocation costs, capital related loss, wages losses and rental income loss.

Loss Estimation Data: HAZUS-MH 3.2
Level 2 Building and Parcel Data Imported into the HAZUS General Building Stock from: Emery County GIS, Infogroup 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	NM

Emery County Pre-Disaster Hazard Mitigation Plan

2018



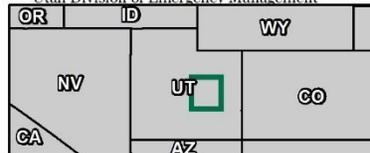
Building Inspection Needs

Emery County 100 Year Flood

1 Dot = 1 Buildings
(by Census Block)

- Red Tag
(Substantial Damage)
- Yellow Tag
(21% - 50% Damage)
- Green Tag
(1% - 20% Damage)

Loss Estimation Data: HAZUS-MII 3.2
 Level 2 Building and Parcel Data Imported into
 the HAZUS General Building Stock from:
 Emery County GIS, Infogroup and the Utah
 Automated Geographic Reference Center
 Reference Data: Utah Automated Geographic
 Reference Center
 Analysis Performed By:
 Utah Division of Emergency Management



Emery County Pre-Disaster Hazard Mitigation Plan

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Landslide

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	Possible	
		Unlikely	
Location	Generally, occur in canyon mouth and foothill areas.		
Seasonal Pattern or Conditions	Spring and Summer usually caused by the stress release of over-weighted soils and or loosening of rock and debris.		
Duration	Landslides generally last hours or days, but some can last weeks.		
Analysis Used	Information and maps provided by Utah Geologic Survey (UGS), Division of Emergency Service and Homeland Security (DESHS), and Automated Geographic Reference Center (AGRC).		

Description of Location and 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 northern most 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 countywide impacts.

Vulnerability Assessment

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. Refer to Table 11 for possible infrastructure damage related to landslides.

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Table 11: Infrastructure in Landslide Area

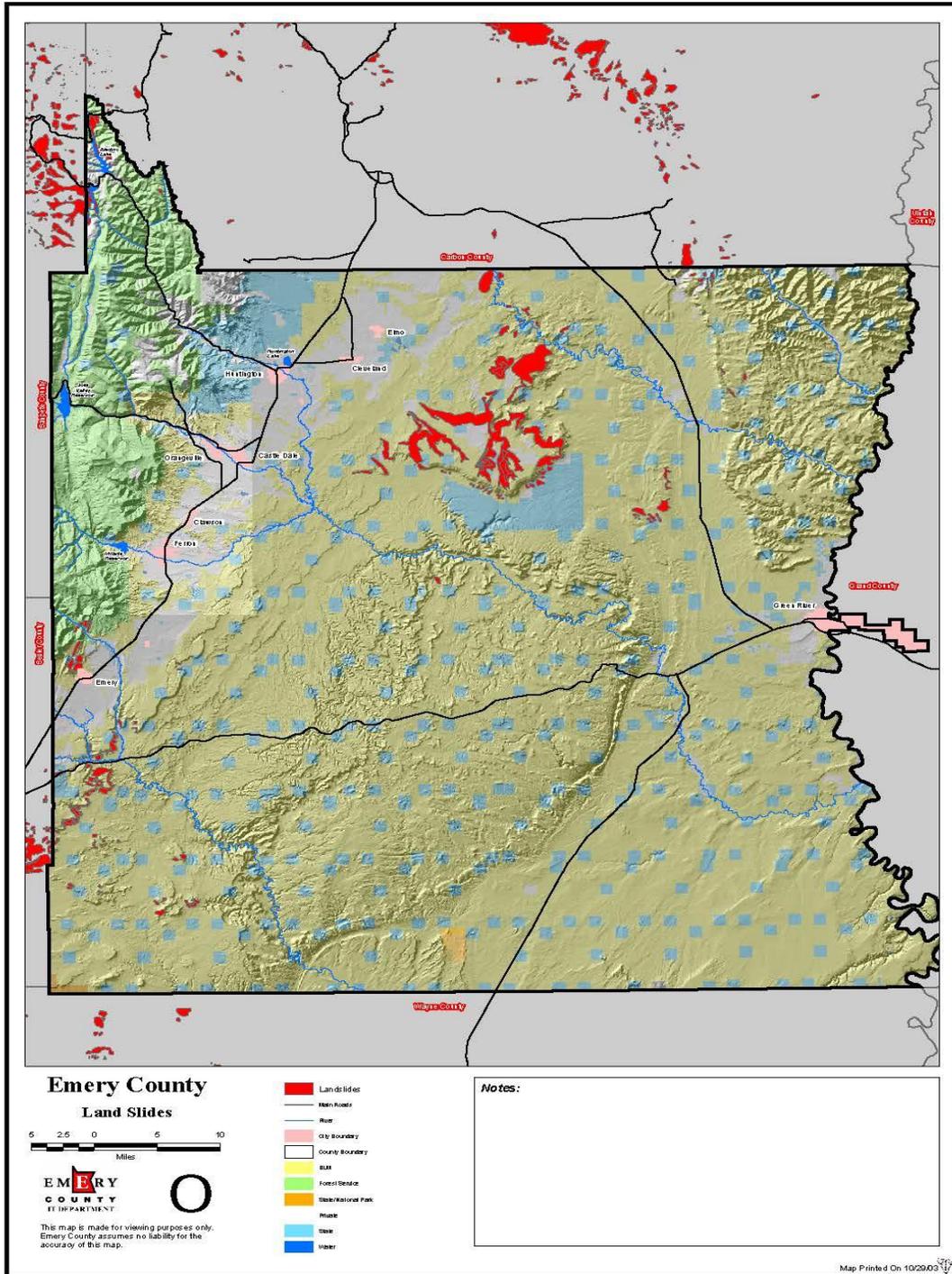
Infrastructure	Length (miles)	Replacement Cost
Local Roads	3.80	\$9,500,000
State Highways	25	\$125,000,000
US Highways	0.00	\$0.00
US Interstates	0.25	\$1,250,000
Power Lines	0.26	\$368,550
Gas Lines	0.00	\$0.00

Note: There are no known residences, businesses, or population located in landslide risk areas for Emery County. (Utah Department of Transportation,)

Emery County Pre-Disaster Hazard Mitigation Plan

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Emery County Landslide Hazards



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Wildland Fire

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
		Critical	25-50%
	X	Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	Generally, occur in zones near and in forested areas.		
Seasonal Pattern or Conditions	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.		
Duration	Wildland Fires typically last days to months. Depends upon climate, fuel load, as well as financial and manpower resources that are available.		
Analysis Used	Review made by USU Extension Office, US Forest Service, National Climate Center, FEMA, AGRCm County Hazard Analysis Plan.		

Description of Location and Extent

The Division of Forestry, Fire and State Lands augmented a statewide wildfire database to represent wildfire vulnerability into five categories: Extreme, High, Medium, Low and Very Low. These ratings cover all of Emery County and are based on the type and density of vegetation in each area. Additional factors influencing wildland fires such as weather conditions, wind speed and direction are not considered in this risk assessment.

Vulnerability Assessment

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. Table 12 Structures and Population in Wildfire Area shows the number of commercial and number of residential structures inside the vulnerable areas.

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Catastrophic Wildfires Cascading Effects

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 water shed 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.

Table 12 Structures and Population in Wildfire Area

Use Type	Extreme Risk	High Risk	Moderate Risk
Commercial Units/Annual Sales	16/\$8.24 million	34/\$12.14 million	6/\$1.26 million
Residential Units/*Est. Replacement Costs	204/\$27,560,400	401/\$54,175,100	25/\$3,377,500
Population	612	1203	75

*Replacement cost does not include contents, which would increase the values list by approximately 50%. Av Residential Cost 2016 Census Quick Facts: \$135,700 Av Household 3.

Wildfire Risk with Municipal Boundaries

Table 13 Wildfire Risk Area contains the number of acres for each wildfire risk area that is within the municipal boundaries of the following cities in Emery County. Table 14 shows the infrastructures that may be affected while Table 15 lists the Wildland Fires hazard history for Emery County.

Table 13 Wildfire Risk Area

City Name	Acres of Extreme	Acres of High	Acres of Moderate
Castle Dale	31	195	0
Clawson	270	226	0
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

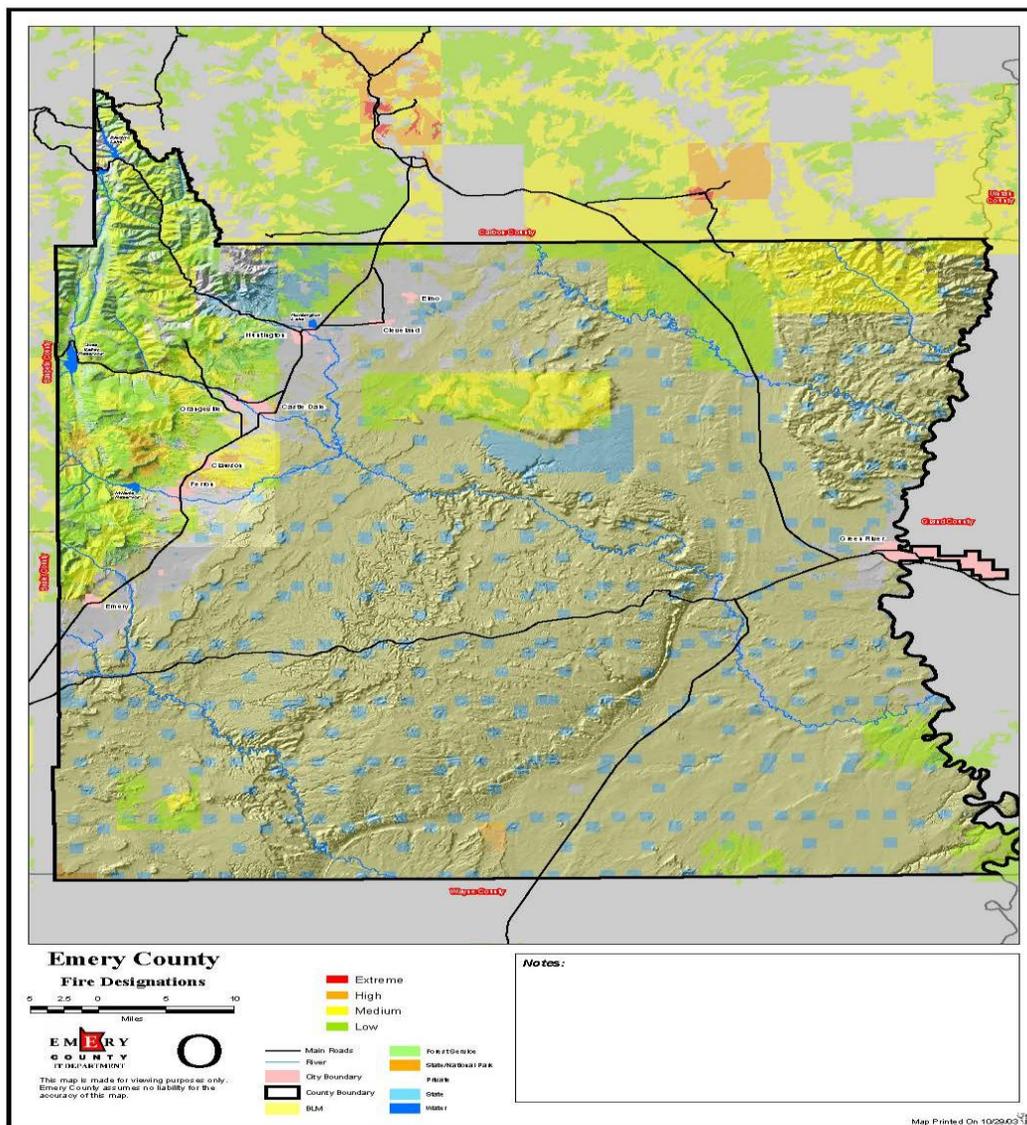
Emery County Pre-Disaster Hazard Mitigation Plan

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Table 14 Infrastructure Affected by Wildfire

Item	Length (Miles)	Cost Replacement (2017)
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	0.0

*The requested information as it is considered confidential and proprietary by PacifiCorp.



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Table 15 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 Dont Know		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

Emery County Pre-Disaster Hazard Mitigation Plan

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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
2018				

Emery County Pre-Disaster Hazard Mitigation Plan

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Problem Soil

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
	X	Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	Possible	
		Unlikely	
Location	Emery County Problem Soil Map		
Seasonal Pattern or Conditions	Dependent on geology of county.		
Duration	Constant engineering problem for new construction.		
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.		

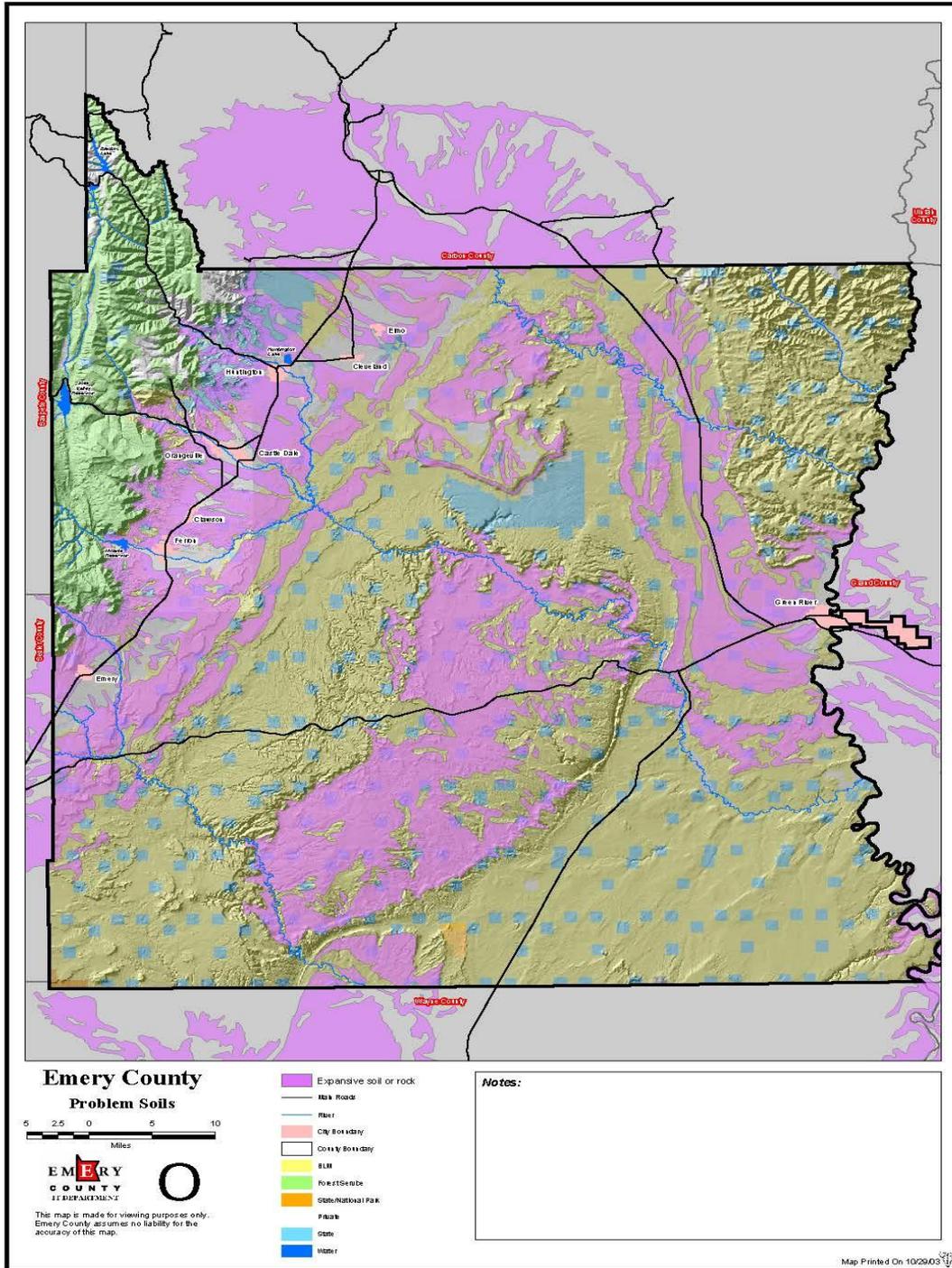
Description of Location and Extent

Problem soils pose challenges to construction, utility trenching, and agriculture. The county contains copious quantities of compacted Mancos shale, as well as soils with high alkali content; however, pH of the soil does not pose a major problem. The type of soils and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soils. Changes in soil volume present a hazard primarily to structures built on top of expansive soils. Of the two major groups of rocks for expansive soils, affects the West-Central States and thus this county. This rock group consists of sedimentary rock containing clay minerals, often referred to as swelling clays. The best solution is the prevention of building upon these types of soils. However, due to the commonality of this type of soil throughout the County, it is almost impossible not to build upon.

Applied engineering practice 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.

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Emery County Pre-Disaster Hazard Mitigation Plan

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Vulnerability Assessment

Emery County 2018 PDM working group had comments on the salinity content is mainly clay, alkali with a high salt content of Gypsum and affects agriculture crops that can be grown in the county. Mancos soil can cause shrinking and swelling clay 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 wild life, and downstream usage of the water. Agriculture soil practices should be followed to encourage environmentally healthy water shed.

Infestation

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
	X	Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
	X	Likely	
		Possible	
		Unlikely	
Location	Agricultural lands, forested areas, areas of extreme drought, countywide.		
Seasonal Pattern or Conditions	Summer months, related to drought		
Duration	Months to years		
Analysis Used	Reviewed information provided by UGS, DEM, and AGRC, Utah Forestry Fire and State Lands, Utah State University Extension Service, and local input.		

Emery County Pre-Disaster Hazard Mitigation Plan

2018

Description of Location and Extent

An organization called Skyline Cooperative Weed Management Area (Skyline SWMA) is a group of landowners and government agencies that meet monthly to identify and prioritize projects in the county. The Carbon and Emery Counties have joined to fight against weeds while projects take place on public and private lands. The Parent to this group is the Utah Weed Control Association (UWCA) with a mission of professionals that implement the best weed management practices available with today's technology. See Appendix 5 for a complete list of Utah weeds. The Department of Agriculture—Forest Service for this area is Region 4, where their mission includes the following:

- Detection and evaluation of disease and insect situations.
- Management guidance through field visits, publications and training.
- Participating in forest planning and forest plan implementation.
- Participating in interdisciplinary teams.
- Technical and financial assistance for insect and disease suppression, prevention and/or restoration projects.
- Developing or applying new technology for management of forest insects and diseases (Region 4), (Utah Weed Control Association).

Vulnerability Assessment

Potential loss estimates are unable to be calculated for such a hazard. There are several sources as the above paragraphs describe to help detect and evaluate insect and foliage diseases; however, only solo reports have been completed during the last ten years. While these reports give specific information about an insect or foliage disease it does not give calculations due to the unpredictability of such occurrences. Future analysis for this may be based on historical events to grasp an understanding of this type of hazard.

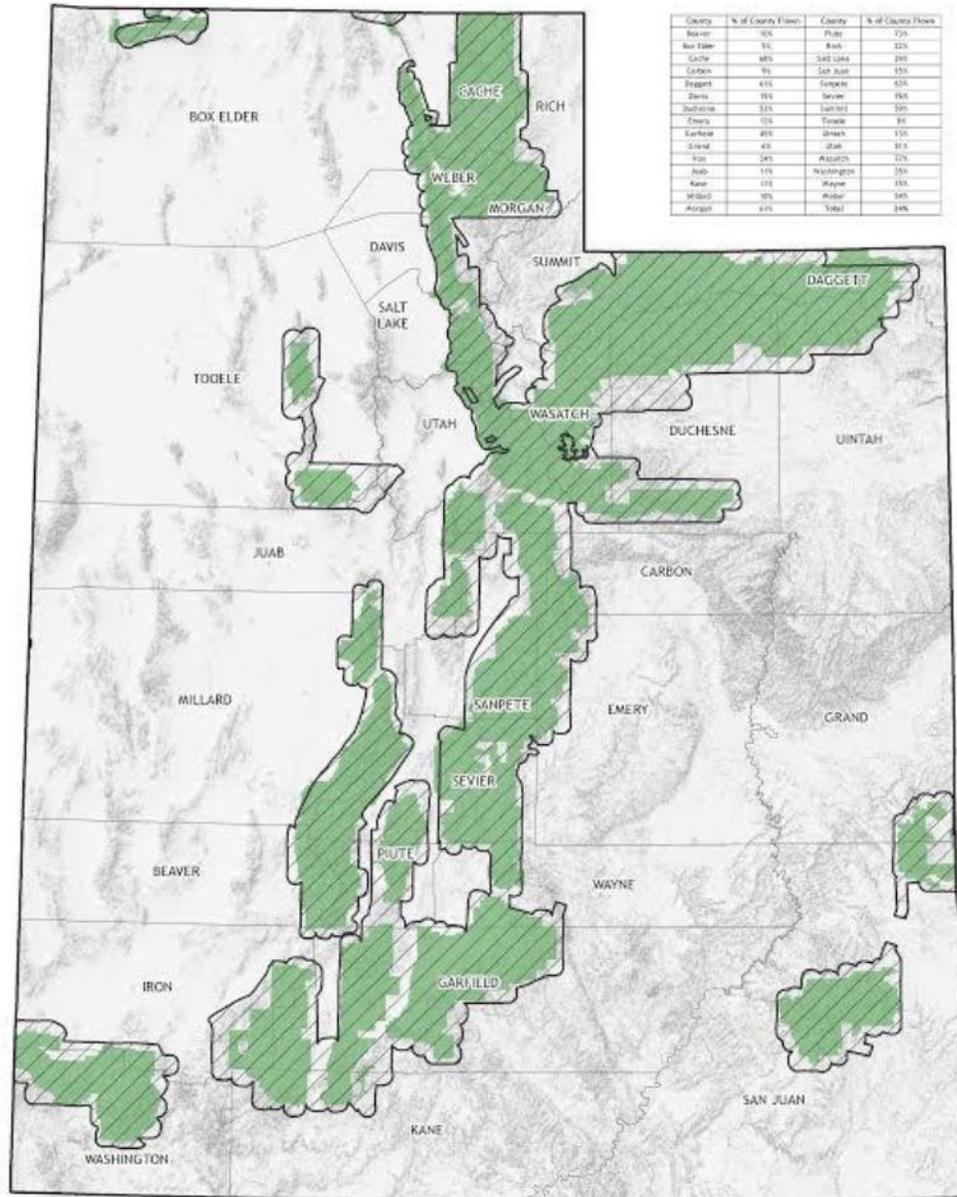
Noting that vulnerability to weeds and insects accounts to the following:

- Cyclical or seasonal patterns are uncontrollable.
- Potential for infestation and economical values are variable.
- Farms deal with hardships based on how they control their crop; noxious weeds present in a crop will eventually stop the sale of that crop.

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Surveyed Areas for the 2015 Aerial Insect and Disease Detection Survey



 2015 Aerial Survey

Total area surveyed: 12,916,519 acres



Emery County Pre-Disaster Hazard Mitigation Plan

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Table 16 Trees Killed and Acres Affected by Bark Beetles Reported in the 2015 Survey in Emery County

Tree Type	Number of Trees	Number of Acres
Mountain Pine Beetle	2001 Trees	908 Acres
Douglas Fir Beetle	103 Trees	51 Acres
Spruce Beetle	7 Trees	3 Acres
Pinon Engraver	0 Trees	0 Acres
Fir Engraver Beetle	0 Trees	0 Acres
Subalpine Fir	1,815 Trees	793 Acres

Table 17 Number of Acres Impacted by Defoliators and other Agents in 2015

Cause	Number of Acres
Western Spruce Budworm	0 Acres
Unknown Aspen Defoliant	0 Acres
Aspen Decline	20 Acres

Utah Forest Insect and Disease Conditions Report 2015, State of Utah Department of Natural Resources, Division of Forestry, Fire, and State Lands.

Severe Weather

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
	X	Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
	X	Likely	
		Possible	
		Unlikely	
Location	Countywide		
Seasonal Pattern or Conditions	The occurrence of severe weather is generally snow, hail, and fog during the winter months, lightning and thunderstorms late spring, summer, and early fall.		
Duration	The storms may be hours or days		
Analysis Used	NOAA Reports		

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Description of Location and Extent

The severe weather is generally a countywide event also affecting The City of Green River, The City of Ferron, The City of Huntington, The City of Orangeville, and the City of Castle Dale along with the Towns of Clawson, Cleveland, Elmo, and Emery within the county.

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

Earthquake

Hazard Profile

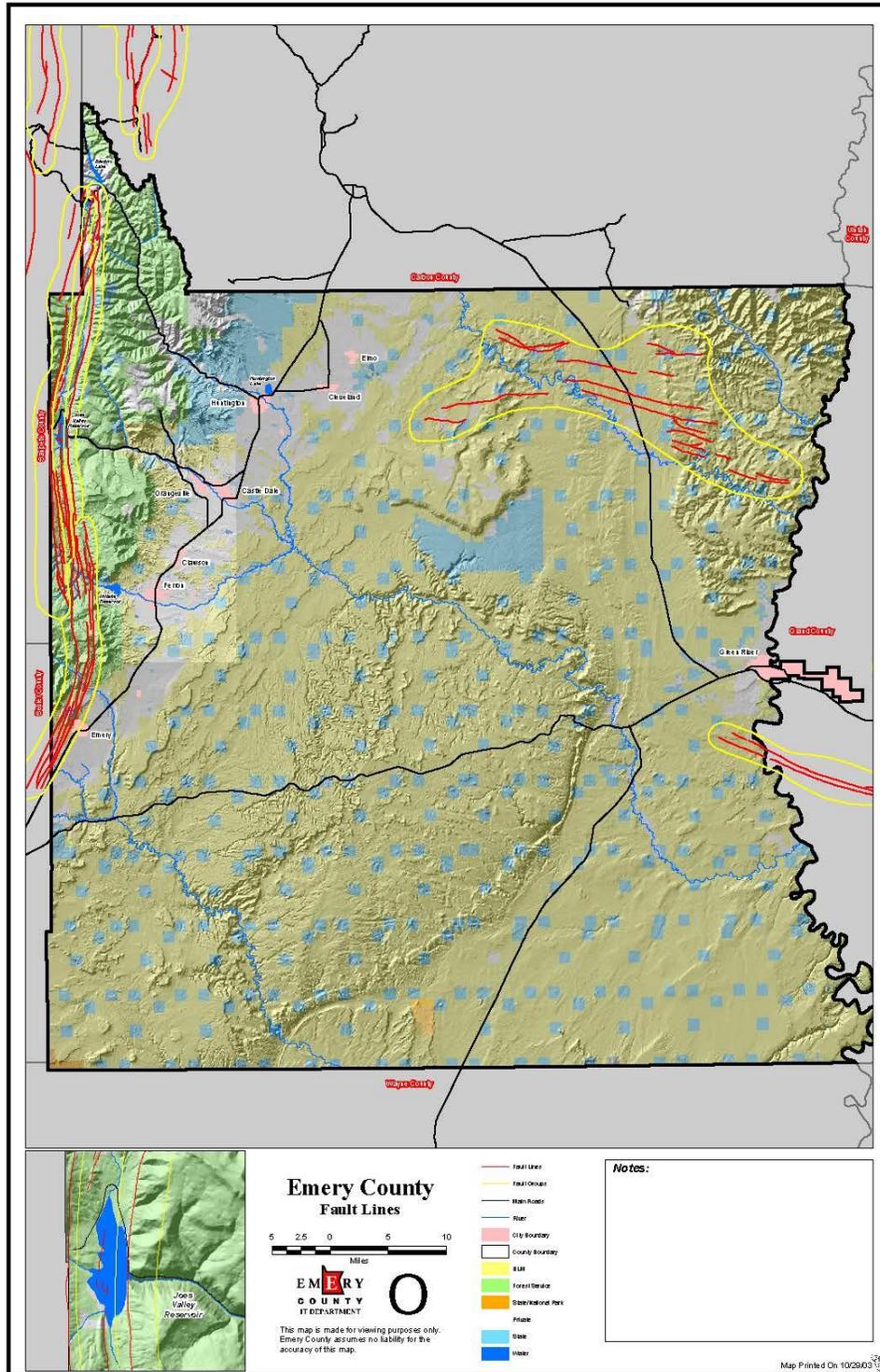
Potential Magnitude		Negligible	Less than 10%
	X	Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
	X	Likely	
		Possible	
		Unlikely	
Location	Countywide		
Seasonal Pattern or Conditions	Earthquakes may occur at any time		
Duration	Event may be short, recovery may be days or months		
Analysis Used	USGS Report, HAZUS MH: Earthquake Global Risk Report 2018 DEM (Appendix 1)		

Description of Location and 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 unhabitated areas of the San Rafael Swell. There have been no reported damage or injuries from these earthquakes.

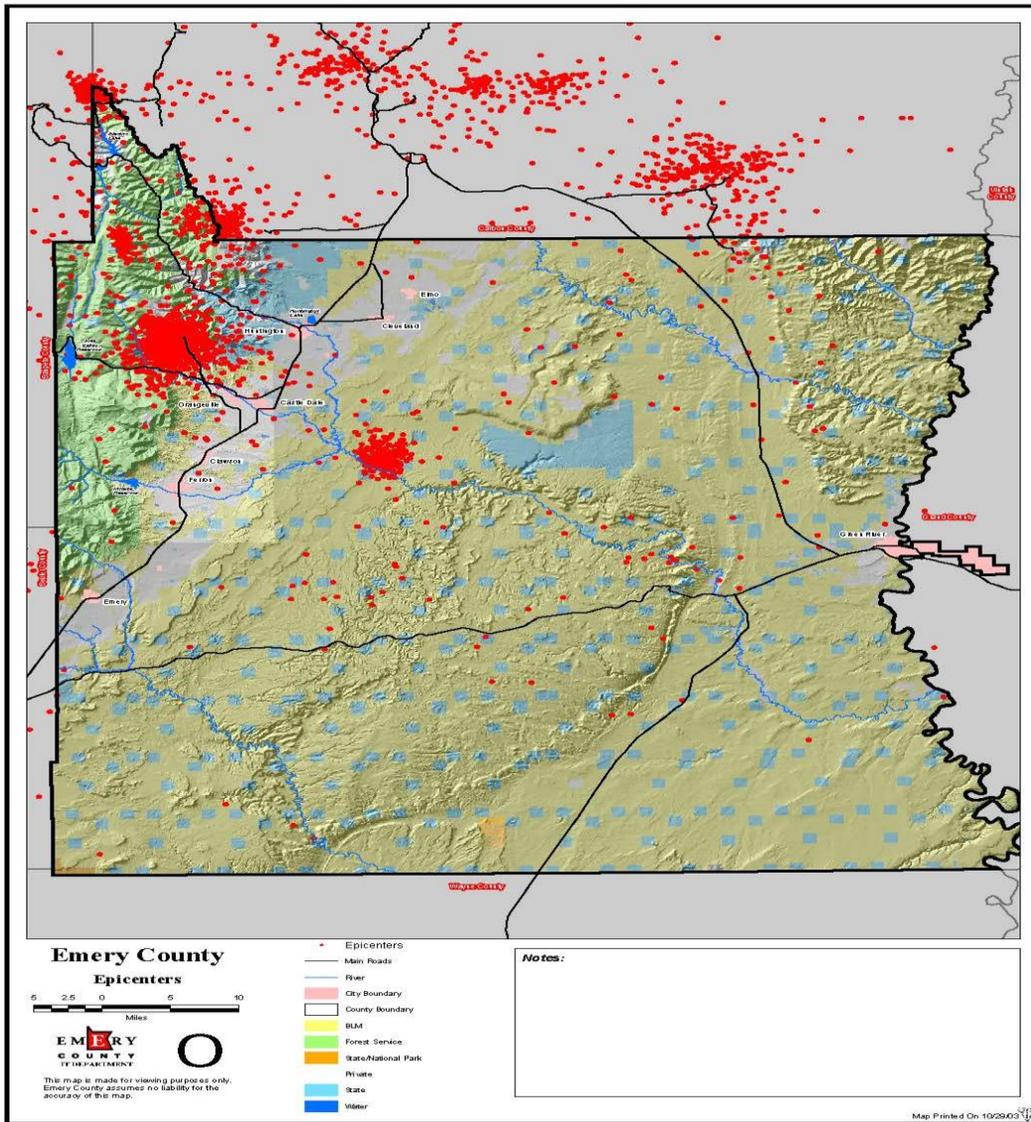
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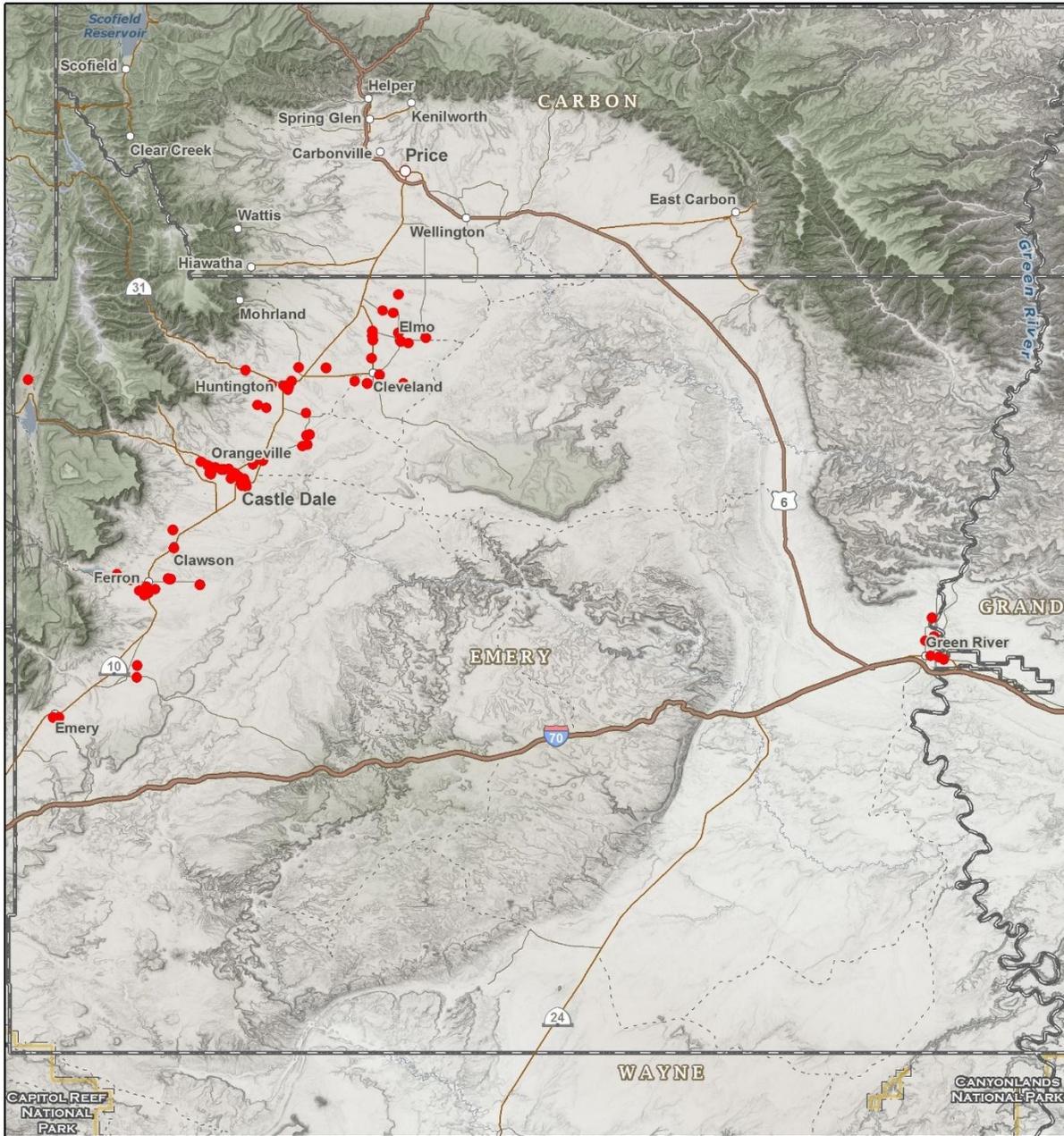


Vulnerability Assessment

The Hazus Earthquake Global Risk Report, January 3, 2018, based on a 6.50 MAG Earthquake indicates 1385 buildings will be damaged, of those 69 buildings will be damaged beyond repair and 56 households will be displaced. 36 citizens will seek temporary shelter in public shelters. The transportation systems will be at more than 50% functionality after day 1. The total economic loss is estimated at 185.76 million dollars. See maps below

Emery County Pre-Disaster Hazard Mitigation Plan

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Direct Building Economic Loss

Emery County 2,500 Year Earthquake

• 1 Dot = \$1,000,000
(By Census Tract)

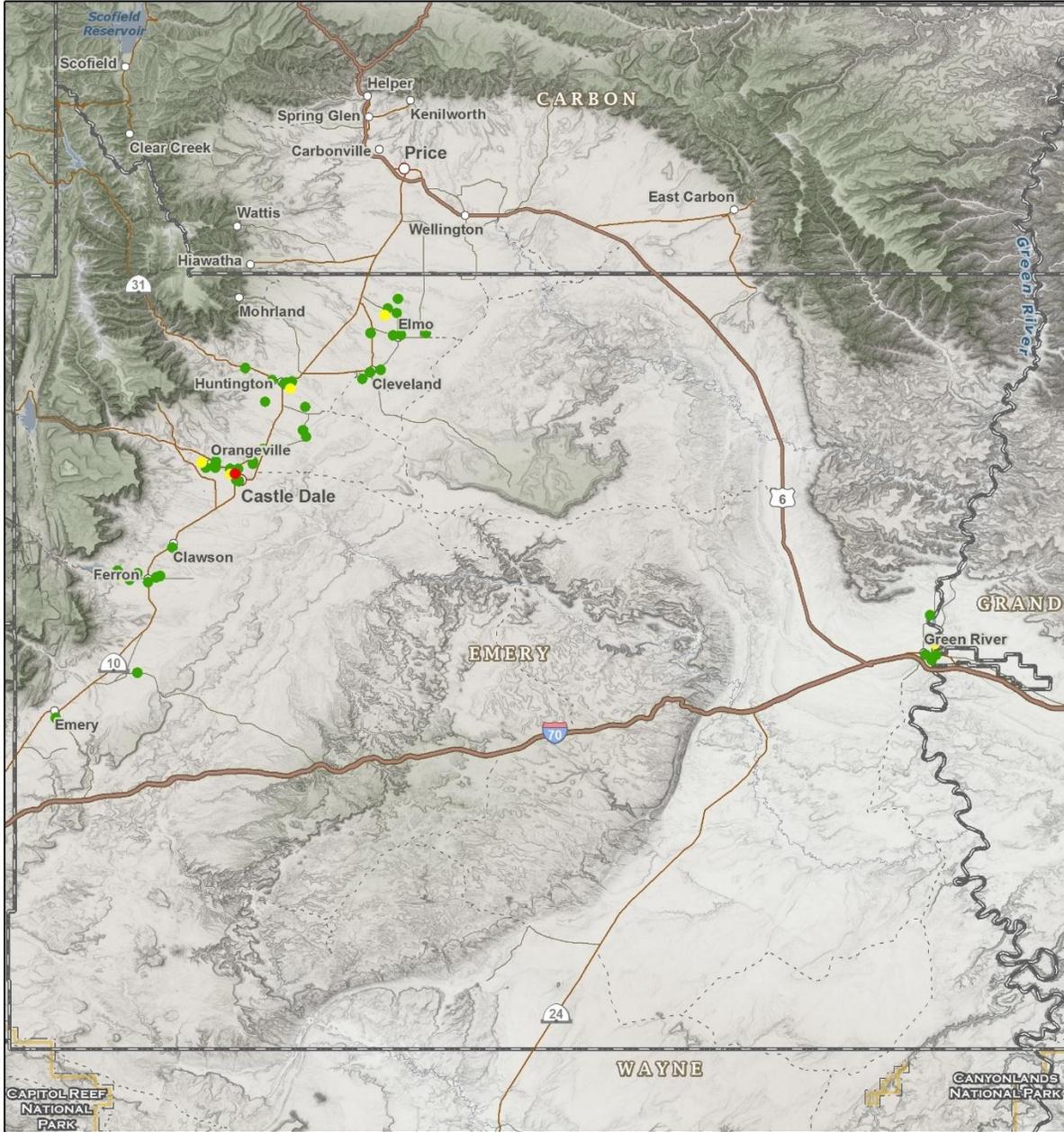
Direct building economic loss includes structural losses, non-structural losses, content and inventory losses, as well as income-related losses such as relocation costs, capital related loss, wages losses and rental income loss.

Loss Estimation Data: HAZUS-MH 3.2
Level 2 Building and Parcel Data Imported into the HAZUS General Building Stock from: Emery County GIS, Infogroup and the Utah Automated Geographic Reference Center
Reference Data: Utah Automated Geographic Reference Center
Analysis Performed By: Utah Division of Emergency Management



Emery County Pre-Disaster Hazard Mitigation Plan

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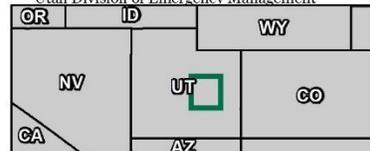


Building Inspection Needs

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, Infogroup and the Utah Automated Geographic Reference Center
 Reference Data: Utah Automated Geographic Reference Center
 Analysis Performed By: Utah Division of Emergency Management



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Drought

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
		Critical	25-50%
	X	Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	Countywide		
Seasonal Pattern or Conditions	Generally, summer and early fall.		
Duration	Can be a month to several months.		
Analysis Used	National Integrated Drought Information System, Utah State University Climate Information.		

Description of Location and Extent

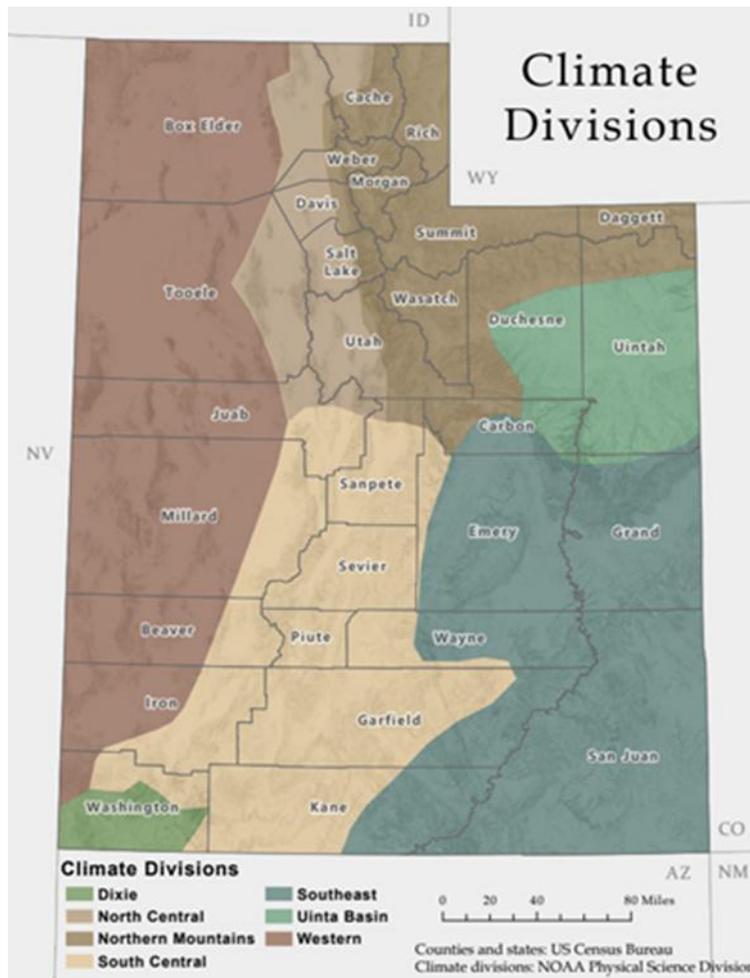
The drought events affect the County, incorporated cities, and the unincorporated communities. The culinary water supply, irrigation water supply, reservoirs used for recreation, and the stock ponds are depleted during a drought event. Emery County declared a Drought Disaster in April 2018 and has renewed the declaration. The cumulative effect of the prolonged drought has affected the economic, social, and environmental fabric of the county.

Vulnerability Assessment

Emery County is subject to drought events due to its location on the high desert in Eastern Utah. The county is intersected by two Utah Climate Divisions; the South Central and the South Eastern Climate Divisions. These climatic divisions have experienced seven drought events since 1898 and eight if you include the current drought event.

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Bar Graph showing Palmer Drought Severity Index (PDSI) values from 1895 – 2017 for the Southeast Climate Division of Utah. Data from: <https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/>

Definition of Drought based on 2007 “Drought in Utah” report:

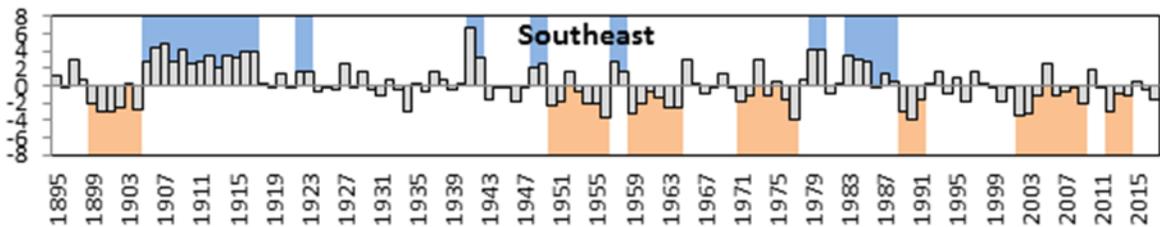
1. A drought was considered to have started with two consecutive years of annual average PDSI values less than or equal to -1.0.
2. A drought was terminated with two consecutive years of near of above normal conditions (annual average PDSI greater than -0.5).

Emery County Pre-Disaster Hazard Mitigation Plan

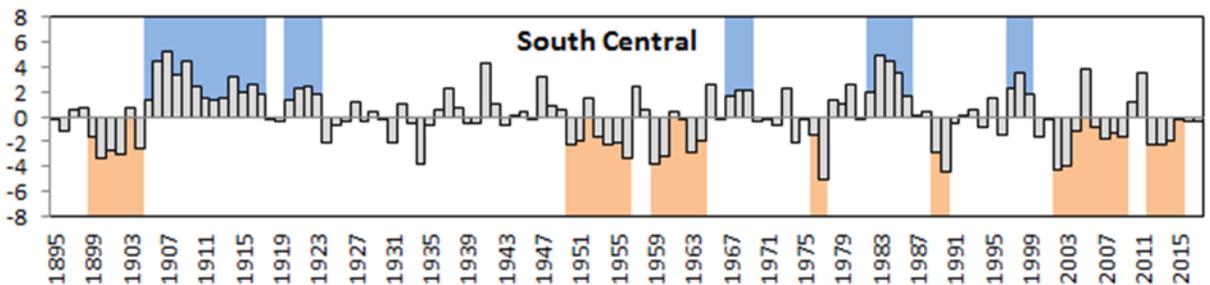
2018

PDSI value	PDSI category
Above 4.00	Extreme wet spell
3.00–3.99	Severe wet spell
2.00–2.99	Moderate wet spell
1.00–1.99	Mild wet spell
0.50–0.99	Incipient wet spell
0.49 to -0.49	Normal
-0.50 to -0.99	Incipient drought
-1.00 to -1.99	Mild drought
-2.00 to -2.99	Moderate drought
-3.00 to -3.99	Severe drought
Below -4.00	Extreme drought

The orange areas indicate drought years. The blue areas indicate exceptional wet periods.



Southeast Climate Division from 1895 - 2017 - 7 major drought events (8 if you include the current one into 2018). The average PDSI value for the total 123-year record is 0.21.



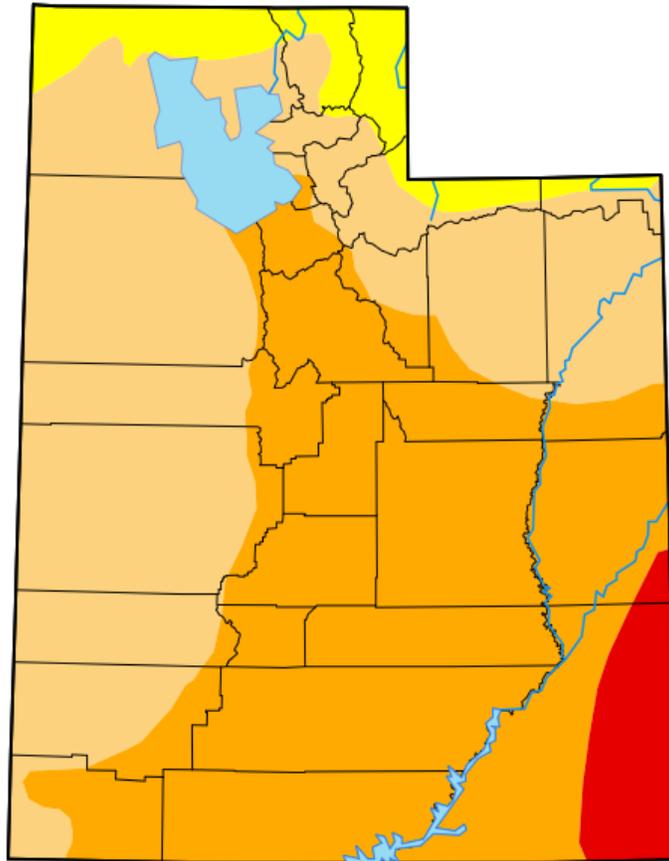
South Central Climate Division from 1895 - 2017 - 7 major drought events. The average PDSI value for the total 123-year record is 0.16.

Emery County Pre-Disaster Hazard Mitigation Plan

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Drought

U.S Drought Monitor- Utah 2018



Drought Intensities

	None	No Drought
	D0	Abnormally Drought
	D1	Moderate Drought
	D2	Severe Drought

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	D3	Extreme Drought
	D4	Exceptional Drought

Hazard History

Within the mitigation planning process, it is important to remember that knowledge of the past is the key to planning for the future. Identifying past hazard events is a means in predicting potential location of future hazards. Included in Table 18 are hazard events with as much relevant information that was available. The data includes the natural hazard event, date, location, area of impact, and comments on the damage and costs associated with it.

Table 18: Natural Hazard History (may contain events caused by human error and hazmat events)

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 City		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		1" magnitude
Flash Flood	September 21, 1962	Woodside	Saleratus Wash	Destroyed section of Highway 6 and railroad track

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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	<i>Intensity: F2</i> , 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

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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		57 miles per hour winds with rain and severe lightning and thunder
Severe Weather	July 21, 1984	Emery Town		63.4 mile per hour winds with rain and severe lightning and thunder
Hail	August 30, 1986	Emery Town		1.00 inch
Earthquake	August 18, 1988	San Rafael Swell	Buckhorn	Richter magnitude 5.3
Earthquake	June 10, 1905	Fish Lake		Richter magnitude 6.0
Hail	September 21, 1988	Emery Town		1.00 inch
Hail	September 21, 1988	Emery Town		0.75 inch
Earthquake	January 29, 1989	South Wasatch Plateau	Between Salina and Freemont Junction	Richter magnitude 5.4
Tornado	July 26, 1991	Emery Town	Northwest of Green River, Emery County	FO Time: 1610 MST, 39 01'N, 110 13'W http://www.wrh.noaa.gov/slc/climate/tornado.php
Tornado	July 26, 1991	Emery County	West of Green River, Emery County	FO Time: 1615 MST, 38 59'N, 110 18'W http://www.wrh.noaa.gov/slc/climate/tornado.php
Earthquake**	June 24, 1992	Emery County	45.4 miles away from county center.	Felt throughout county. Occurred at 07:31:20, a magnitude 4.4 (4.4 MB, 4.4 ML, Depth: 0.1 mi). <i>Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)</i>
Heavy Snow	January 11, 1993	Emery County		1 injury, 1k in property damage

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Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Heavy Snow	January 29, 1993	Emery County-	not specific	
Heavy Snow	February 1, 1993	Emery County-	not specific	
Heavy Snow	February 8, 1993	Emery County-	not specific	
Heavy Snow	February 16, 1993	Emery County-	not specific	
Lightning	February 4, 1994	Orangeville City		1 injury
Heavy Snow	February 4, 1994	Emery County-	not specific	
Drought (Heat)	June 1, 1994	Countywide		
Flash Flood	June 19, 1994	Orangeville City		
Flash Flood	August 11, 1995	Ferron City		
Flash Flood	August 23, 1995	Huntington City		
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). <i>Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)</i>
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		0.75 inch
Flash Flood	July 28, 1997	Emery Town		40k in property damage

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Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Thunderstorm/ Wind	August 12, 1997	Green River		61kts. 1 injury, 10k in property damage
Flood	September 13, 1997	Ferron City		
Thunderstorm/ Wind	September 19, 1997	Green River		61kts. 8k in property damage
Heavy Rain	July 28, 1998	Green River		45k in property damage, 2k in crop damage
Flash Flood	August 21, 1998	Green River		2k in property damage, 1k in crop damage
Hail	September 29, 1998	Ferron		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). <i>Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)</i>
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) <i>Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)</i>
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

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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) <i>Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML)</i>
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.

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Hazard	Date	Location	Critical Facility or Area Impacted	Comments
Infestation	July 1, 2007	Emery County	Electric Lake & Countywide	Skyline Cooperative Weed Management Area teamed together to control three noxious weeds: dalmation toadflax (<i>linaria genistifolia</i>), musk thistle (<i>carduus nutans</i>), and whitetop/hoary cress (<i>cardaria draba</i>).
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)

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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

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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

USGS dtd Jan 2018

Mitigation Goals, Objectives, Actions

Prioritization ranking is significantly based upon environmental condition(s) and sometimes on economic situations and political philosophy at the time of reviewing the information.

Mitigation actions are set up with Goal Priority being High, Medium, or Low. Conditions to this type of priority system fluctuate with economic, environmental and sometimes political relations; therefore, it is only used to understand that the priority of ensuring this project is completed more readily than others. The Objective is a general statement of the project(s) to be accomplished, and the Action is the specific mitigation project. The prioritization high, medium, low for each goal and associated action project was established based on the perceived need, ability to support the action project, and cost of the action project. The Emery

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County Working Group, Subject Matter Experts (SMEs), and the Emery County Emergency Manager finalized the priority of each action project.

High: Priority goal and project to complete.

The project can be supported.

A portion of the funding is obtainable.

Medium: Would like to complete goal and project.

The project can be supported.

The funding is questionable.

Low: Nice to complete the goal and project.

May be able to support the project.

Funding may not be available.

The following Emery County and Green River City Codes, Ordinances, and Plans were reviewed for updates and applicability to the mitigation strategies and actions. The remaining Emery County Cities and Towns adopt and apply the Emery County Codes, Ordinances and Plans.

Emery County General Plan revised 2016

Emery County Natural Resources Master Plan 2017

Emery County Public Lands Management Act of 2017

Emery County Emergency Operations Plan revised 2014

Green River City Ordinances Adopted in 2003, updated 2017

DROUGHT (D)

Countywide Problem Identification 1: Limited water supplies, increasing population and several years of drought place a strain on availability of community culinary water resources and water storage. Ninety five percent of the residential population will use culinary water for landscaping needs.

Goal 1	Priority: High	
Objective 1: D1	Develop more water storage tanks in several jurisdictions.	
Action project: D1	Install needed water storage tanks for these specific jurisdictions; Ferron, Castle Dale, Orangeville, and Elmo.	
	Time Frame:	5 years
	Funding:	Local Funding, State and Federal Grants
	Estimated Cost:	\$3,000,000

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	Staff:	Cities, County, State
	Background	Water storage is always an issue in times of drought. The ability to adequately store water lessens the impact in these jurisdictions. Ferron City can store 2-3 days of water; this amount could be stretched if prior knowledge and educational processes on water consumption are met earlier on. However, Ferron City wants to develop a second storage water tank. Orangeville and Elmo also need to build additional water storage tanks. Water supplied to the Hunter Power Plant located southeast of Castle Dale, is a large user that takes a full constant flow of a storage tank. Castle Dale needs to build an additional tank to meet their future needs.

Countywide Problem Identification 2: Earthen type irrigation systems run throughout the county.

Goal 2	Priority: Medium	
Objective 3: D2-D3	Upgrading jurisdictional irrigation canal systems.	
Action project: D2	Improve the irrigation canal systems in the following jurisdictions; Clawson, Emery, Ferron, Cleveland, Huntington City, to have better efficiency of water usage.	
	Time Frame:	In Progress approximately 5 years.
	Funding:	Private, City, State and Federal grants and loans.
	Estimated Cost:	\$500,000
	Staff:	BOR, NRCS, UACD, USU Extension and the irrigation companies (Cottonwood Creek Consolidated Irrigation Company, Huntington-Cleveland Irrigation Company, Ferron Canal and Reservoir Company, Lawrence South Irrigation Company, Green River Canal Company, Muddy Creek Canal Company, East Side Irrigation Company).
	Background	Several years of drought and a need for water conservation. Currently, all canals are being piped to reduce salinity content downstream while preserving soil nutrients.
Action project: D3	Install field sprinkler systems (pressurized, secondary lines) in Emery County	

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	Time Frame:	Ongoing
	Funding:	Private, State and Federal
	Estimated Cost:	\$27,000,000
	Staff:	Private with assistance from Federal agencies.
	Background	Better usage of agricultural water. Reduction of salinity for downstream users, and preservation of soil nutrients.

Countywide Problem Identification 3: Lack of public awareness of efficient water usage

Goal 3	Priority: High	
Objective 4: D4	Education	
Action project: D4	Use several ways, Public Service Announcements, Newsletters, Social Media Posting in educating the public on efficient water usage.	
	Time Frame:	Ongoing
	Funding:	State and Federal grants; city and county funds; irrigation companies.
	Estimated Cost:	\$10,000
	Staff:	LEPC, County, Cities and Towns to include the Citizens Corp Council, School District, and the Utah Association of Conservation Districts (UACD).
	Background	Creation of public programs, use of conservational lesson plans in the schools throughout K-12 grade, and using the UASD to initiate membership and partnerships for the protection of soil, water, and other natural resources. Utilizing newsletters and the local newspapers to distribute information to the general public.

FLOOD (F)

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Countywide Problem Identification 1: There is seasonal flooding throughout the county.

Goal 1	Priority: Medium	
Objective 1: F1-F2	Identify additional flood prone areas in county.	
Action project: F1	Evaluate need for additional County flood mapping of potential flood hazard areas.	
	Time Frame:	-Ongoing
	Funding:	FEMA
	Estimated Cost:	\$2,000,000
	Staff:	State and FEMA personnel.
	Background	Contact DEM flood map specialist.
Action project: F2	Participate in the FEMA Flood Map Modernization Program	
	Time Frame:	Ongoing
	Funding:	FEMA
	Estimated Cost:	Some cost share may be required.
	Staff:	County Emergency Management and State Floodplain Office.
	Background	Emery County has areas that should be reevaluated for flood hazards. Town of Cleveland and City of Green River and Ferron have indicated their current flood map does not reflect the flood hazard and boundaries are inconsistent.

Countywide Problem Identification 2: Unstable canals are a flood threat.

Goal 2	Priority: Medium	
Objective 2: F3	To reduce the threat of flood from canal failures in Cleveland, Ferron, Huntington City, Green River and in the County.	
Action project: F3	Technical analysis on the irrigation canals within these jurisdictions .	
	Time Frame:	Ongoing
	Funding:	Private, City, County
	Estimated Cost:	\$750,000
	Staff:	Private and irrigation companies (Cottonwood Creek

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		Consolidated Irrigation Company, Huntington-Cleveland Cities Irrigation Company, Ferron Canal and Reservoir Company, Lawrence South Irrigation Company, Green River Canal Company, Muddy Creek Canal Company, East Side Irrigation Company).
	Background	Private canals and irrigation systems have proven to breach or fail causing flooding.

Countywide Problem Identification 3: Participation in the National Flood Insurance Program (NFIP) allows citizens to mitigate flood damage through purchasing of flood insurance. Communities are not aware of flood damage prevention ordinances that are in place for development in floodplains. Residents of existing homes may be unaware that their home and property is in an identified floodplain. Residents that are in a floodplain will need the knowledge and awareness that they are able to purchase flood insurance. The county will need to establish some type of public notices and awareness activities. People buying new or existing homes on mortgage, are made aware of the NFIP through Planning and Zoning permits and mortgage lenders are unable to lend unless home buyers purchase flood insurance according to Federal Emergency Management Agency (FEMA). FEMA oversees the NFIP, has been required by law to send an annual flood insurance information packet to each flood insurance policyholder. The law that requires the mailing is the Flood Insurance Reform Act of 2004, or "FIRA 2004." (Its full name is the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, codified as Public Law 108-264.) FIRA 2004 also required other changes in the NFIP.

Goal 3	Priority: Medium	
Objective 3: F4	Promote purchase of National Flood Insurance and educate local Floodplain Administrators on floodplain compliance.	
Action project: F4	Obtain outreach materials on flood insurance while making training available on flood compliance programs like NFIP.	
	Time Frame:	Ongoing each year.
	Funding:	Grants
	Estimated Cost:	\$5,000 Printing and distribution of FEMA documents.
	Staff:	County and City Floodplain Administrators, County Emergency Management, Planning and Zoning, and State Floodplain Manager.
	Background	Flood insurance is an effective mitigation measure. Contact with the State Floodplain Manager will help

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		ensure documents and ongoing training is being given appropriately.
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Countywide Problem Identification: 4: Throughout Emery County, there are numerous culverts that are undersized and therefore inadequate to channel flood waters. There are also several dips that have been damaged by erosion and wash out during heavy rains. Some of the problem areas are on roads that are the single access to residences. If these areas are damaged during severe storms or flooding, the ability to self-evacuate and our ability to respond with emergency vehicles is eliminated.

Objective 4: F5	Design and construct two dips; one for the main road and a second dip for the access road under the railroad tracks. Design and construct retaining walls to retain the embankment of the railroad tracks and to channel the wash. Resize the culverts on the access road to handle the 25-year storm or design and construct a headwall with a debris wall between each culvert upstream and a headwall downstream along with a concrete dip for the high flows.	
Action project: F5	Mounds Road – Location: 39°27'02" N; 110°32'14" W ('S' & 'T' Dirt Dips and Undersized Culverts) in Emery County	
	Time Frame:	5 years
	Funding:	State and Federal Grants
	Estimated Cost:	\$600,000
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The main dirt road and the dirt access road that cross the dry wash are washed out every time a large storm hits. The rock retaining wall along the bank of the wash is falling down. The culverts along the access road are undersized and the road washes out when the high flow over tops the roadway. The culverts catch a lot of debris upstream.

Objective 5: F6	Size and place a concrete box culvert. Construct a dip with culvert under the dip to handle the low flows.	
Action project: F6	Horn Silver Gulch – Location: 39°02'56" N; 110°55'13" W (Dip #22/Q) in Emery County	
	Time Frame:	5 years
	Funding:	State and Federal Grants
	Estimated	\$100,000

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	Cost:	
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete dip is covered in mud. The sediment is too wet to clean off the mud. The channel doesn't match the dip.

Objective 6: F7	Place rip rap along the bank downstream of the dip. Place a concrete apron down to the flow line of the wash. Fill in the cavitation cavity under the dip with concrete. Place 10 feet of grouted rip rap downstream of the dip.	
Action project: F7	Quitcupah – Location: 38*53'03" N; 111*17'45" W (Dip #23) Emery City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$60,000
	Staff:	Emery City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete dip is in good shape. There is a lot of erosion downstream of the dip. The water has undercut back under the dip as well. The channel downstream is falling into the wash.

Objective 7: F8	Clean out the sediment on the upstream side of the dip until it is below the flow line of the concrete dip. Remove rock, fix the erosion area by filling the voids with flow able fill or concrete and reconstruct the concrete apron on the upstream side of the dip. Replace the cable anchors with new cables for the swing gate.	
Action project: F8	Castle Dale South Spur – Location: 39*12'8" N; 111*00'37" W (Dip #13) Castle Dale City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$1,000,000
	Staff:	Castle Dale City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The roadway concrete is in good condition and the downstream rip rap is in good shape. There is

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		sediment build up in the upstream alignment of the dip. A lot of erosion has occurred in the upstream side of the dip where the concrete and the culvert have separated. This may have caused some erosion under the dip as well. The cables for the swing gate have been corroded off of their concrete foundation and reattached to the metal frame. This may be a concern for the other cable anchors.
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Objective 8: F9	Place a box culvert in the wash if it is possible to build the road up over the top. This will depend on the size required for the wash. Design and construct a concrete dip over the top of a series of culverts that will be designed to handle the lower flows.	
Action project: F9	Buckhorn Reservoir – Location: 39*12'27" N; 110*48'12" W (Dirt Dip 'A') in Emery County	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$100,000
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The road needs to be reshaped down through the wash every time a significant storm hits. The road has lost the untreated base course surface due to flooding.

Objective 9: F10	Clean out the existing channel. Re-grout the rip rap before we lose the rip rap. Haul in more rip-rap to fill in the holes before it is grouted. Replace the wall downstream with more rip rap and concrete.	
Action project: F10	Molen Lane – Location: 39*04'27" N; 111*04'30" W (Dip #17) in Ferron City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$600,000
	Staff:	Ferron City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete dip and the culverts are in good shape. The channel has a lot of sediment build up to the dip. The grouted rip rap on the downstream side of the

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		dip is eroded away and is cutting back into the dip. The wall downstream is falling apart.
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Objective 10: F11	Clean out the existing channel. Re-grout the rip rap before we lose the rip rap. Bend the culvert back into place if possible.	
Action project: F11	Muddy Lane – Location: 39*04’39” N; 111*05’38” W (Dip #18) in Ferron City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$250,000
	Staff:	Ferron City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete dip is in good shape. The channel upstream has rerouted slightly. The grouted rip rap has been broken up downstream. The culverts are slightly bent on the upstream end.

Objective 11: F12	Place rip rap downstream of the box culverts. Design and construct a headwall with a middle debris wall upstream of the double box culvert. Clean out the debris upstream of the box culverts.	
Action project: F12	Huntington Creek – Location: 39*17’51” N; 110*54’48” W (Double Box Culvert #5) Huntington City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$500,000
	Staff:	Huntington City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The asphalt surface on the double box culvert is in good shape. There is a small amount of erosion on the downstream side of the bridge. The channel has a lot of debris upstream side of the bridge, mainly the east box culvert. The wing walls are in good shape.

Objective 12: F13	Replace the dip. Clean out the channel downstream so that the water will flow better through the culvert. Clean out the overflow channel to and from the deep to blend into the dip. Enlarge the box culvert to handle higher flows and build up the roadway to go over the larger
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	culverts.	
Action project: F13	Grange Spur – Location: 39*18'57" N; 110*55'24" W (Dip #2/Box Culvert) Huntington City	
	Time Frame:	5 years
	Funding:	State and Federal Grants
	Estimated Cost:	\$400,000
	Staff:	Huntington City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete dip has been torn apart. The concrete cutoff wall has dug out in several different areas. There is a lot of sediment build up upstream and downstream of the dip. The box culvert is undersized even for normal flows. There is a small amount of sediment build up on the south or downstream side.

Objective 13: F14	Place a geo textile fabric and rip rap down the bar ditches to stop the erosion. Clean out the downstream channel to eliminate restricted flow through the culverts and to clean out the sediment inside the culverts. Place grouted rip rap on the downstream side of the dip or extend the concrete apron down around the culverts.	
Action project: F14	Buckhorn Site – Location: 39*5'47" N; 110*39'54" W (Dip #8) Emery County	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$40,000
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete dip is in good shape. The dip has a small amount of erosion from water that has ran down the bar ditches on the east side. The grouted rip rap is in good shape. The 2 culverts have a small amount of sediment buildup inside. The downstream side has sediment buildup impeding the water flow through one of the culverts. The rip rap downstream has moved during high flows.

Objective 14: F15-	Construct a concrete dip.
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F19	
Action project: F15	Road Draw – Location: 39*2’8” N; 110*41’18” W (Dirt Dip ‘C’) Emery County
	Time Frame: 5 years
	Funding: Local, State and Federal Grants
	Estimated Cost: \$250,000
	Staff: Emery County Emergency Management, Emery County Road Department, County Engineer
	Background: The existing dirt dip at this location needs to be maintained every time it rains.
Action project: F16	Oil Well Draw – Location: 38*59’22” N; 110*40’22” W (Dirt Dip ‘D’) Emery County
	Time Frame: 5 years
	Funding: Local, State and Federal Grants
	Estimated Cost: \$200,000
	Staff: Emery County Emergency Management, Emery County Road Department, County Engineer
	Background: The existing dirt dip at this location needs to be maintained every time it rains at Oil Well Draw.
Action project: F17	Cottonwood Draw #1 – Location: 38*58’19” N; 110*39’43” W (Dirt Dip ‘F’) Emery County
	Time Frame: 5 years
	Funding: Local, State and Federal Grants
	Estimated Cost: \$80,000
	Staff: Emery County Emergency Management, Emery County Road Department, County Engineer
	Background: The existing dirt dip at this location needs to be maintained every time it rains at Cottonwood Draw.
Action project: F18	Cottonwood Draw #2 – Location: 38*58’5”; 110*39’30” W (Dirt Dip ‘G’) Emery County
	Time Frame: 5 years
	Funding: Local, State and Federal Grants
	Estimated Cost: \$300,000
	Staff: Emery County Emergency Management, Emery County Road Department, County Engineer
	Background: The existing dirt and rock dip makes the existing road

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		rough.
Action project: F19	Price River Road – Location: 39*24'50" N; 110*29'06" W ('U' Dirt Dip) in Green River	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$250,000
	Staff:	Green River City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The road crosses the wash on a rock ledge that is slowly eating back into the roadway. This might eventually make the road impassible.

Objective 15: F20-F21	Size the drainage for the 25-year storm for a future concrete box culvert.	
Action project: F20	Dinosaur Road – Location: 39*20'23" N; 110*45'07" W ('V' 2 - 36" Culverts) Cleveland	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$70,000
	Staff:	Cleveland City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The culverts are undersized and high flows will overtop the road surface.
Action project: F21	Dinosaur Road – Location: 39*20'25" N; 110*44'45" W ('W' 2 - 24" Culverts) Cleveland	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$100,000
	Staff:	Cleveland City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The culverts are undersize and high flows will overtop the road surface.

Objective 16: F22	Resize the culvert with a hydraulic model for the 25 and 100-year
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	storms. Design and construct a box culvert that will pass the 25-year storm.	
Action project: F22	Red Ledge – Location: 39*02’21” N; 110*57’17” W (‘P’ Undersized 6’ Culvert) Dutch Flat Road Emery County	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$100,000
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The 72-inch culvert is undersized and overtops the road during high flows. The existing wash has scoured downstream of the culvert. The shoulder of the road has to be dressed up when the flows overtop the road.

Objective 17: F23	Resize the culverts or construct a concrete dip. Clean out the channel upstream and downstream of the culvert.	
Action project: F23	Huntington Back Road – Location: 39*21’15” N; 111*01’43” W (‘R’ 36-inch Culvert/Dirt Dip) Huntington City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$50,000
	Staff:	Huntington City Staff, Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The culverts are undersized, and the gravel road is used as a dip. There is vegetation built up upstream and downstream of the culverts.

Objective 18: F24	Install resized culverts or concrete dips at sections ‘M’, ‘N’ and ‘O’.	
Action project: F24	Millsite – Location: 39*05’37” N; 111*12’01” W (‘M’ ‘N’ & ‘O’) in Ferron City	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$1,500,000
	Staff:	Ferron City Staff, Emery County Emergency Management, Emery County Road Department,

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		County Engineer
	Background	There are three different spots where the culverts are undersized, and the asphalt road is used as a dip.

Objective 19: F25	Construct concrete apron to blend the top of the concrete dip to the flow line of the wash or place 20 feet of grouted rip rap downstream of the dip.	
Action project: F25	Hadden Draw – Location: 39*12'48" N; 110*53'48" W (Dip #11) Emery County	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$20,000
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	The concrete is in good shape, but the rip rap downstream has washed away.

Objective 20: F26	Extend the south abutment back further under the roadway. Reinforce the south bank with rip rap or retaining walls. Replace the existing bridge with a new wider bridge.	
Action project: F26	Lone Tree Bridge – Location: 38*45'53" N; 111*07'37" W (Bridge #15) Emery County	
	Time Frame:	5 years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	\$2,000,000
	Staff:	Emery County Emergency Management, Emery County Road Department, County Engineer
	Background	Muddy Creek water flow is all on the south side of the bridge. There has been a lot of sediment build up on the north side of the bridge. The bridge is very narrow, approximately 10 feet wide. The sediment around the south abutment is eroding into the river. Either the north abutment is buried in the sediment or there is not a north abutment, because half of the bridge is sitting on the bank. The decking of the bridge is warped in spots. The existing road blending into the south end of the bridge is slumping into the river. Debris has built up on the upstream end of the bridge.

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Objective 21: F27	Obtain and Evaluate GPS and Maps for refurbishing Dike West westside of Green River City.	
Action project: F27	Obtain funding for engineering and evaluating the current Dike West to upgrade and maintain. Green River City	
	Time Frame:	5 years
	Funding:	Federal, State, and Other Emergency Management Grants
	Estimated Cost:	\$400,000
	Staff:	Emery County Employees (GIS/GPS office), Green River City Employees, Corps of Engineers, State, Natural Resources Conservation Service (NRCS), and the Building Information Modeling (BIM)
	Background	Historical flash flooding of the Green River, recent land development for diverting flood water directly to Green River City instead of diverting the water ways toward washes has increased the city flooding. One occurred in the 1000-year flood plain in October 2006.

Countywide Problem Identification 5: Due to the Seeley Fire burn area; there are secondary emergencies that were created from rain fall that could not be absorbed on the scarred land area. Debris flows have created numerous problems in Huntington Canyon and Huntington City as well as numerous irrigation systems in Emery County.

Goal 5	Priority: HIGH
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Objective 22: F28	Repair and replace diversion structure on Quitchupah Creek that was washed out by a flood. This diversion supplies irrigation water to 265 acres of farmland.	
Action project: F28	Quitcupah Creek; Southside of Emery Town. 38* 52.9266 N 111*17.0869W	
	Time Frame:	Two Years
	Funding:	Local, State and Federal Grants
	Estimated Cost:	Up to \$300,000
	Staff:	Emery Town Staff, County Engineer and Emery County Emergency Management
	Background	On July 24, 2012 a flood event came down

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		Quitcupah Creek and washed out the only diversion structure in the creek that provides irrigation water to Bill Stansfield’s entire farm adjacent to the creek. The diversion structure consisted of large concrete blocks that spanned the creek. Some are still intact, but the majority of them were moved so that there is no irrigation water diverted to the farmland.
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Objective 23: F29	Stabilize eroded stream bank and siphon discharge end of Avery Ditch	
Action project: F29	Location: 39*19.5962 N 110* 56.7355 W in Emery County	
	Time Frame:	Three Years
	Funding:	Private, Local, State and Federal Grants
	Estimated Cost:	\$300,000
	Staff:	Avery Ditch users, Emery County Emergency Management
	Background	Due to major flood events from the Seeley Fire burn area and subsequent debris and sediment flows, damage has been caused to the stream bank which is affecting the Avery Ditch and the siphon discharge end

Wildland (WF)

Countywide Problem Identification 1: Throughout the years more residential and summer homes are being built in or encroaching upon the wildland interface.

Goal	Priority High	
Objective 1 WF1	To Mitigate fire impact from homes being built in the wildland fire interface without defensible space within Emery County.	
Action Project WF1	Provide Firewise Workshop materials and Firewise Brochure in new building permit applications.	
	Time Frame	2018-2023
	Funding	County, State
	Estimated Cost	\$7,000
	Staff	County

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	Background	Previously no Firewise educational material has been provided.
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SEVERE WEATHER (SW)

Countywide Problem Identification: Winter storms, summer thunderstorms, flash floods hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and provide prediction challenges for local meteorologists.

Goal	Priority: HIGH	
Objective 1: SW1-SW2	Protect County from adverse effects of severe weather.	
Action project: SW1	County participates in the Storm Ready program.	
	Time Frame:	Continuous cycle of every 2 years
	Funding:	State and Federal
	Estimated Cost:	\$50,000
	Staff:	City and County Emergency Management and Local Emergency Planning Committee (LEPC).
	Background	Set up within the county emergency management and encourage all cities to participate, all requirements of the National Weather Service Storm Ready program.
Action project: SW2	Mitigate avalanche injuries and deaths for Emery County backcountry users.	
	Time Frame:	Ongoing
	Funding:	County
	Estimated Cost:	\$5,000
	Staff:	County Emergency Management, State Hazard Mitigation Team members, Utah Avalanche Forecast Center.
	Background	Avalanches and avalanche preparedness is not often considered when discussing mitigation on the county or city level, yet several people die each year in Utah's backcountry. While the avalanche terrain is mainly being on land that is managed by the US Forest Service. The search and rescue for the lost individuals is in more often than not coordinated by emergency managers with search parties comprised of county and city staff. Introductory and avalanche awareness training could lessen the costs to Emery County and the cities within

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		the county. Snowmobile training is conducted by the State instructor, Mark H. Williams in Orangeville. Most avalanche victims die in avalanches started by themselves or someone in their party. Thus, education can limit the number of avalanche related searches each year. Most training has occurred in Sanpete County.
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Objective 2:	Provide to residents training so they may assist local fire, police and other emergency managers in safety and medical responsibilities.	
Action project: SW3	Establish CERT (Community Emergency Response Team) Training to Huntington residents.	
	Time Frame:	Ongoing
	Funding:	Supplies from local sheriff's offices obtain through Federal grants. Quarterly training sessions supplied by Huntington City.
	Estimated Cost:	\$5,000 per year –meals, trainers, city utilities.
	Staff:	Local Fire, police, Emergency Manager, and official CERT trainers.
	Background	Having a volunteer pool of residents that are trained to help with hazards is a viable source for mitigation.

EARTHQUAKE (E)

Countywide Problem Identification 1: Emery County's western periphery boarder the Intermountain Seismic Belt (ISB) way; which is part of hundreds of fault lines running north and south through Utah State. Joe's Valley Reservoir and downstream county cities, Orangeville and Castle Dale, could be in jeopardy if there were an earthquake-induced dam failure. An analysis is needed to evaluate earthquake faults and subsequent risk of damage to buildings and infrastructure in the county.

Goal 1	Priority: Medium
Objective 1E1	Have a study done to determine seismic resistance of structures within the county such as school buildings, public buildings, and highways.
Action project: E1	Structural and non-structural earthquake hazard assessment.

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	Time Frame:	3-5 years
	Funding:	Federal Emergency Management Agency (FEMA)
	Estimated Cost:	\$1,500,000
	Staff:	GIS, School District, County Emergency Management
	Background	A representative from the Utah Division of Emergency Management (DEM) and earthquake program specialist will be contacted. Several seismographic tests have been done within the county most likely for oil and gas drilling. School Districts have not had a study done since 2001.

Countywide Problem Identification 2: Residents are uneducated about earthquakes and the damage that one may present to the region.

Goal 2	Priority: Medium	
Objective 2: E2	Public Awareness	
Action project: E2	Conduct public awareness campaign. Enhance earthquake instructions in schools.	
	Time Frame:	Ongoing
	Funding:	Federal and State grants with local sources.
	Estimated Cost:	\$5,000
	Staff:	LEPC, volunteers and school administration.
	Background	Earthquake drills are continually being presented and performed by the students and staff throughout all schools in the district, and the emergency manager's website addresses general public concern on the potential and preparation for earthquakes.

Countywide Problem Identification 3: Requiring building code(s) and zoning ordinance enforcement

Goal 3	Priority: Medium	
Objective 3: E3	Verification of Building Codes and Zoning Ordinances are being updated.	
Action project: E3	Planning and Zoning Departments adjust building codes.	
	Time Frame:	Ongoing

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	Funding:	Local sources, in house manpower.
	Estimated Cost:	\$1,000
	Staff:	County, cities and town Building Officials, and Planning and Zoning Dept.
	Background	Ensure building codes are updated and are being implemented. County building codes were recently updated (2015).

LANDSLIDE (L)

Countywide Problem Identification: There is a potential risk to structures located in areas identified by Federal and State agencies and depicted in GIS as landslide risk areas.

Goal	Priority: LOW	
Objective: L1	Minimize loss of life, damage to property and disruption in residents, commerce and government services caused by landslides through structural measures.	
Action project: L1	Dislodge large rocks along highways	
	Time Frame:	On Going
	Funding:	Federal, State, Local
	Estimated Cost:	\$100,000
	Staff:	UDOT, County Road Dept.
	Background	Steep slopes and freeze thaw conditions create hazardous conditions.

DAM FAILURE (DF)

Countywide Problem Identification: --Also downstream of Huntington (Mammoth) Reservoir, and Huntington North Reservoir. Several Emery County jurisdictions are located directly downstream from dam 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 boarder. The Emery County's Sherriff's Office Command Post is the designated area for all current dam inundation maps.

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Goal 1	Priority: High	
Objective 1 DF1	Obtain and evaluate inundation maps for all major dams in the County	
Action project: DF1	Obtain funding for engineering in the evaluation of current dam inundation maps.	
	Time Frame:	Two years
	Funding:	FEMA, State, Local
	Estimated Cost:	\$100,000
	Staff:	NRCS (Natural Resources Conservation Service) Emery County GIS
	Background	Evaluation of current dam inundation maps is essential for warning and notification systems.

Objective 2: DF2-DF4	Maintain Communication/Warning Systems for dam failure.	
Action project: DF2	Evaluate existing warning systems for dam failure	
	Time Frame:	2018-2021
	Funding:	County and State grants
	Estimated Cost:	\$10,000
	Staff:	BOR, Dam Engineers, County Emergency Management
	Background	Evaluation of current communication and warning systems can be viewed as a base line for future warning and communication needs. An emergency warning system in place on Joe's Valley Dam will send information to West Virginia to Salt Lake City to Provo then to Emery Water Conservancy District. The Pacific Corp Huntington Power Plant also has regulators on the stream coming from Electric Lake; a change of two cubic feet per second (2 cfs) will alarm the control room at the power plant.
Action project: DF3	Install additional warning systems at Joe's Valley Reservoir and the Left Fork of Huntington Canyon.	
	Time Frame:	2018-2023
	Funding:	Grants, Local
	Estimated Cost:	\$15,000
	Staff:	County, BOR, State Dam Safety

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	Background	The Emery County School District has established protocol where they contact the parents of their students. The reverse 911 warning systems currently in place as well as the “call down tree” system. There needs to be development for warning systems for Joe’s Valley and the Left Fork of Huntington Canyon. Left Fork is a creek running out of Cleveland Reservoir that joins the Huntington Creek.
Action project: DF4	Establish evacuation routes for dam failure.	
	Time Frame:	2018-2021
	Funding:	Local
	Estimated Cost:	\$1,000
	Staff:	County Sheriff, City Police, and County Emergency Management.
	Background	Evacuation routes are established; the overview and update of evacuation route maps are essential to post on websites and public county/city buildings.

Objective 3: DF5	Develop public information on dam failure to include evacuation routes and sheltering plans.	
Action project: DF5	Establish agreements for emergency shelters.	
	Time Frame:	2018-2019
	Funding:	Local
	Estimated Cost:	\$5,000
	Staff:	County Emergency Management, Red Cross, and School District
	Background	Pre-identifying shelters will assist in evacuation process; the Emery County School District has recognized shelter places for school staff and students for such disasters. The Red Cross has been contacted by the County Emergency Manager but there has been no response to inquiries.

Goal 2	Priority: Medium
Objective	Update PacifiCorp’s Emergency Action Plan for Electric Lake Dam Failure on a regular basis.
Action project: DF6	To have a plan in place to handle a dam break.

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	Time Frame:	Ongoing 2018-2023
	Funding:	Private, County
	Estimated Cost:	\$500
	Staff:	PacifiCorp
	Background	PacifiCorp provides an emergency action plan incase Electric Lake has a dam failure. This plan is updated on a regular basis with the most current plan being March 2018.

PROBLEM SOILS (PS)

Countywide Problem Identification: Problem soils are a risk to property and life due to its instability.

Goal	Priority: LOW	
Objective: PS1-PS3	Protect roadways	
Action project: PS1	Increase width of slope adjacent to roadways as funding permits.	
	Time Frame:	Ongoing
	Funding:	Federal, State, and Local
	Estimated Cost:	\$15,000,000
	Staff:	State, county and city
	Background	Allows for buffer zone.
Action project: PS2	Educate homeowners about problem soil risk	
	Time Frame:	2018-2021
	Funding:	Local
	Estimated Cost:	\$3,000
	Staff:	Local
	Background	County Building Official should produce and have information available to citizens.
Action project: PS3	Identify, monitor and control water on alkali soils.	
	Time Frame:	Ongoing 2018-2023

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	Funding:	Local, NRCS, USU
	Estimated Cost:	\$100,000
	Staff:	Local
	Background	Identifying areas of concern will help with planning.

INFESTATION (I)

Countywide Problem Identification: Infestation of destructive insects and non-native vegetation can impact the health, safety and welfare of County land and residents.

Goal 1	Priority: LOW	
Objective: I1	Control insects	
Action project: I1	Insecticide spray	
	Time Frame:	Ongoing 2018-2023
	Funding:	Local, State and Federal
	Estimated Cost:	\$200,000
	Staff:	Local and Federal
	Background	Insect abatement districts and federal insect control should be coordinated.
Action project: I2	Remove dead and diseased trees.	
	Time Frame:	Ongoing 2018-2023
	Funding:	Private, County, State
	Estimated Cost:	\$250,000
	Staff:	Private
	Background	This could be a partnership with the fire management program and limited spread of infestation.

Goal 2	Priority: HIGH	
Objective L2: I3	Coordinate Tree and Foliage Removal.	
Action project: I3	Obtain funding for engineering to mitigate excessive growth of vegetation which allows for pooling of water runoff.	
	Time Frame:	2018-2023
	Funding:	Green River City, Special Service Districts, County, State and Federal Grants.

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	Estimated Cost:	\$50,000
	Staff:	State Wild Fire Mitigation Team, Forest Fire and State Lands (FFSL), Emery County GPS/GIS, Green River City employees, and private and local residents.
	Background	The vegetation allows for pooling of water which increases the living climate for mosquitoes. The excess of vegetation in and around the city make it a potential health risk to humans and livestock. Coordinating vegetation removal with other organizations and city residents along irrigation canal and drainage ditches throughout the city will help alleviate the risk of fire hazards.

Appendix 1 Emery County Hazus

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Hazus-MH: Earthquake Global Risk Report

Region Name: Emery_L2_EQ_V2

Earthquake Scenario: Emery_County_L2_2500_Year_EQ

Print Date: January 03, 2018

Disclaimer:

*This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.*

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

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FEMA

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General Description of the Region

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

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

Utah

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

The geographical size of the region is 4,470.68 square miles and contains 3 census tracts. There are over 3 thousand households in the region which has a total population of 10,976 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 753 (millions of dollars). Approximately 89.00 % of the buildings (and 53.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,263 and 476 (millions of dollars) , respectively.

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Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 4 thousand buildings in the region which have an aggregate total replacement value of 753 (millions of dollars). Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 49% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

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

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 10 schools, 8 fire stations, 6 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 7 dams identified within the inventory. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 23 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

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

The total value of the lifeline inventory is over 2,739.00 (millions of dollars). This inventory includes over 359 kilometers of highways, 120 bridges, 930 kilometers of pipes.

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Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	120	308.30
	Segments	24	1,728.80
	Tunnels	0	0.00
	Subtotal		2,037.10
Railways	Bridges	1	0.00
	Facilities	1	2.70
	Segments	44	99.20
	Tunnels	0	0.00
	Subtotal		101.90
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		0.00
Bus	Facilities	0	0.00
	Subtotal		0.00
Ferry	Facilities	0	0.00
	Subtotal		0.00
Port	Facilities	0	0.00
	Subtotal		0.00
Airport	Facilities	1	10.70
	Runways	3	113.90
	Subtotal		124.50
		Total	2,263.50

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Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	9.30
	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		9.30
Waste Water	Distribution Lines	NA	5.60
	Facilities	4	261.10
	Pipelines	0	0.00
	Subtotal		266.70
Natural Gas	Distribution Lines	NA	3.70
	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		3.70
Oil Systems	Facilities	1	0.10
	Pipelines	0	0.00
	Subtotal		0.10
Electrical Power	Facilities	2	215.60
	Subtotal		215.60
Communication	Facilities	0	0.00
	Subtotal		0.00
Total			495.40

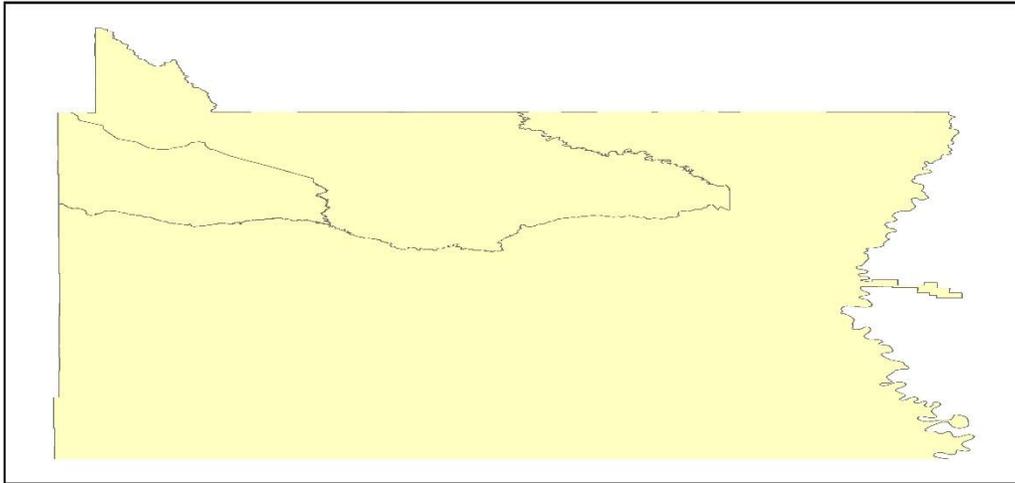
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Earthquake Scenario

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



Scenario Name	Emery_County_L2_2500_Year_EQ
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	6.50
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

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Building Damage

Building Damage

Hazus estimates that about 1,385 buildings will be at least moderately damaged. This is over 29.00 % of the buildings in the region. There are an estimated 69 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage categories by General Occupancy Type

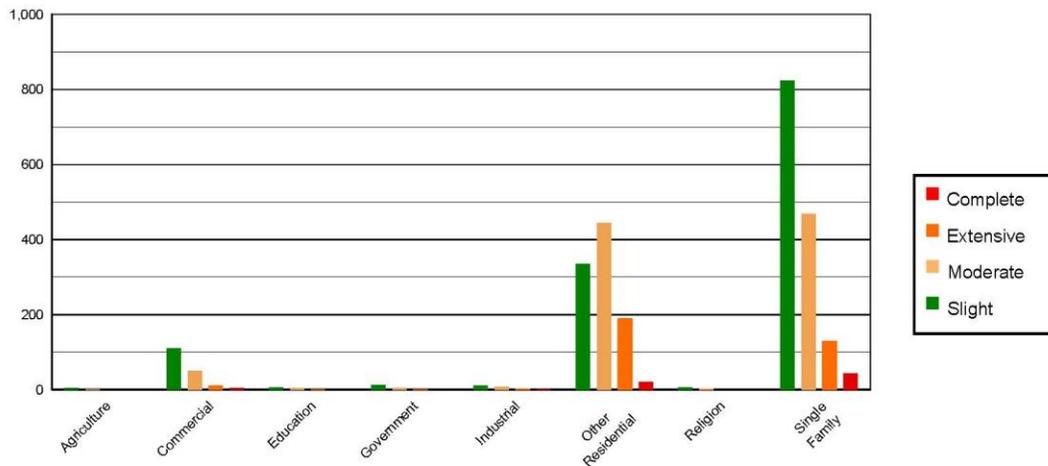


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	9	0.41	4	0.29	1	0.14	0	0.06	0	0.07
Commercial	206	9.78	110	8.42	49	5.02	11	3.21	4	6.06
Education	12	0.58	6	0.48	4	0.40	1	0.16	0	0.11
Government	25	1.21	13	1.00	5	0.50	0	0.13	0	0.07
Industrial	22	1.05	12	0.92	8	0.84	2	0.57	1	0.91
Other Residential	295	13.98	334	25.50	443	45.12	190	56.91	21	29.73
Religion	13	0.63	7	0.52	3	0.27	0	0.06	0	0.02
Single Family	1,528	72.37	824	62.87	469	47.71	130	38.89	44	63.03
Total	2,111		1,311		983		333		70	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,280	60.62	744	56.77	301	30.60	38	11.30	5	7.25
Steel	26	1.25	15	1.12	14	1.44	3	0.99	1	1.15
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Precast	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
RM	458	21.70	139	10.63	101	10.29	22	6.46	1	1.08
URM	115	5.44	108	8.26	138	14.04	84	25.19	43	61.67
MH	232	11.00	304	23.23	429	43.62	187	56.05	20	28.86
Total	2,111		1,311		983		333		70	

*Note:

- RM Reinforced Masonry
- URM Unreinforced Masonry
- MH Manufactured Housing

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Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 5: Expected Damage to Essential Facilities

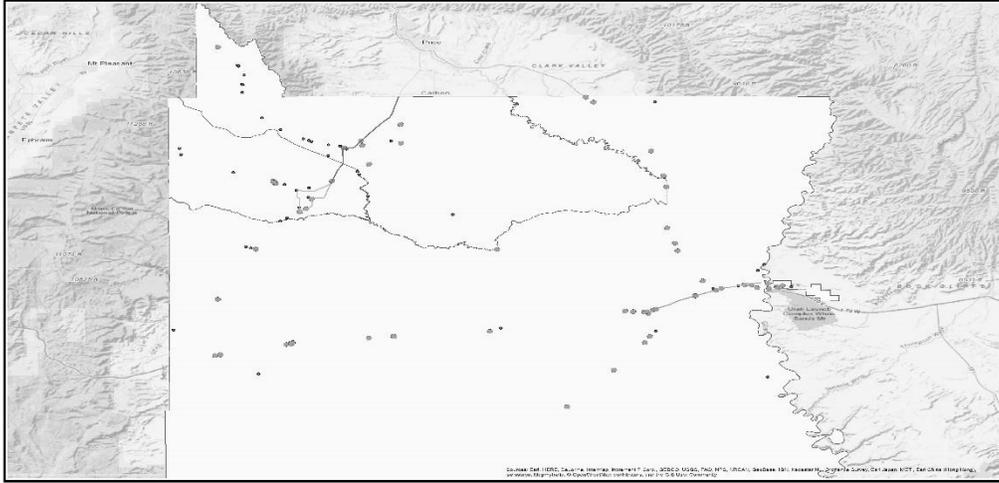
Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	10	0	0	7
EOCs	1	0	0	1
PoliceStations	6	0	0	6
FireStations	8	0	0	8

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Transportation Lifeline Damage



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Table 6: Expected Damage to the Transportation Systems

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	24	0	0	24	24
	Bridges	120	6	0	117	120
	Tunnels	0	0	0	0	0
Railways	Segments	44	0	0	44	44
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	0	0	1	1
	Runways	3	0	0	3	3

Table 6 provides damage estimates for the transportation system.

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

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

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Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	4	3	0	0	4
Natural Gas	0	0	0	0	0
Oil Systems	1	1	0	0	1
Electrical Power	2	2	0	0	2
Communication	0	0	0	0	0

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

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	465	38	10
Waste Water	279	27	7
Natural Gas	186	8	2
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,732	0	0	0	0	0
Electric Power		0	0	0	0	0

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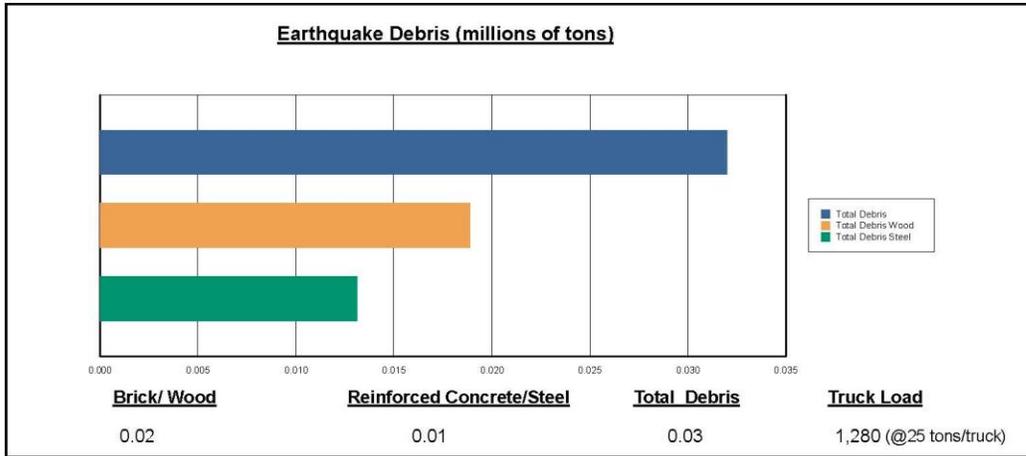


Induced Earthquake Damage

Debris Generation

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

The model estimates that a total of 0.03 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 59.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 1,280 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.



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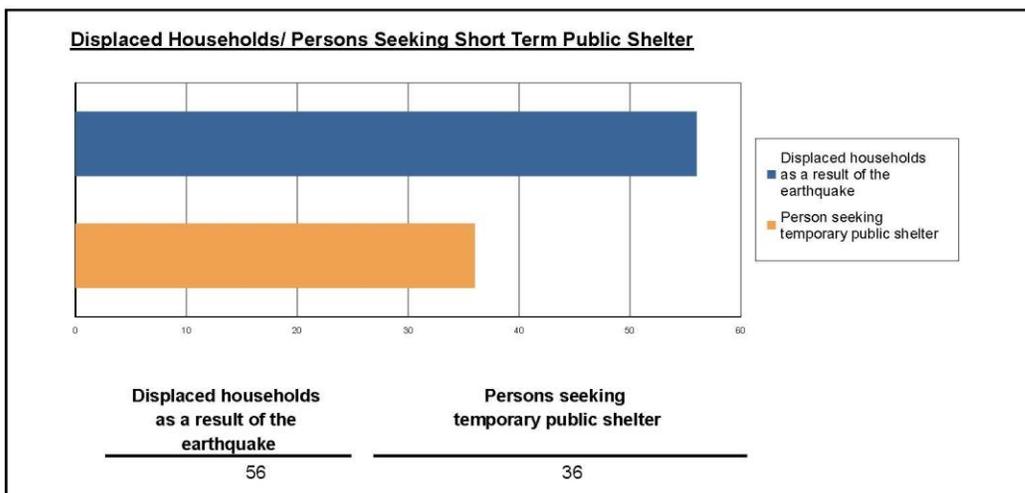
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Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 56 households to be displaced due to the earthquake. Of these, 36 people (out of a total population of 10,976) will seek temporary shelter in public shelters.



Casualties

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

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

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

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

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Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	11	2	0	0
	Single Family	23	5	1	1
	Total	34	7	1	2
2 PM	Commercial	5	1	0	0
	Commuting	0	0	0	0
	Educational	2	0	0	0
	Hotels	0	0	0	0
	Industrial	2	0	0	0
	Other-Residential	2	0	0	0
	Single Family	5	1	0	0
	Total	17	4	1	1
5 PM	Commercial	4	1	0	0
	Commuting	0	1	1	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	4	1	0	0
	Single Family	9	2	0	1
	Total	19	5	2	1

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Economic Loss

The total economic loss estimated for the earthquake is 185.76 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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Building-Related Losses

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

The total building-related losses were 78.51 (millions of dollars); 24 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 56 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

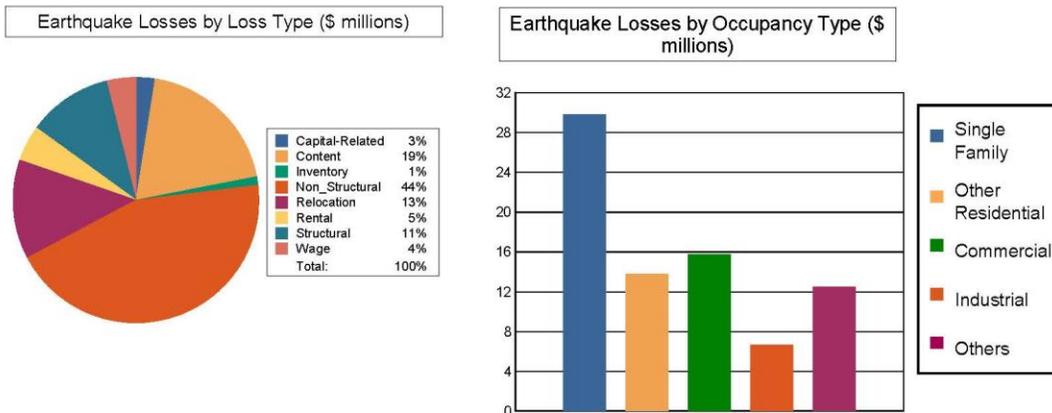


Table 11: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.78	1.79	0.09	0.45	3.11
	Capital-Related	0.00	0.33	1.52	0.08	0.07	2.01
	Rental	1.62	1.09	0.92	0.06	0.12	3.80
	Relocation	5.65	1.77	1.30	0.32	1.13	10.17
	Subtotal	7.26	3.97	5.54	0.55	1.77	19.09
Capital Stock Losses							
	Structural	4.02	1.94	1.11	0.55	0.94	8.57
	Non_Structural	13.81	6.63	5.43	2.89	6.09	34.85
	Content	4.72	1.22	3.45	2.21	3.68	15.27
	Inventory	0.00	0.00	0.25	0.45	0.03	0.73
	Subtotal	22.55	9.80	10.23	6.09	10.75	59.42
	Total	29.81	13.77	15.77	6.64	12.52	78.51

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Transportation and Utility Lifeline Losses

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

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

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,728.76	\$0.00	0.00
	Bridges	308.31	\$4.34	1.41
	Tunnels	0.00	\$0.00	0.00
	Subtotal	2,037	4.30	
Railways	Segments	99.22	\$0.00	0.00
	Bridges	0.04	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	2.66	\$0.60	22.45
	Subtotal	102	0.60	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Bus	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0	0.00	
Airport	Facilities	10.65	\$3.20	30.03
	Runways	113.89	\$0.00	0.00
	Subtotal	125	3.20	
Total		2,263.50	8.10	

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Table 13: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Lines	9.30	\$0.17	1.84
	Subtotal	9.31	\$0.17	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	261.10	\$53.77	20.59
	Distribution Lines	5.60	\$0.12	2.20
	Subtotal	266.66	\$53.89	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Lines	3.70	\$0.04	0.95
	Subtotal	3.72	\$0.04	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.10	\$0.02	17.86
	Subtotal	0.10	\$0.02	
Electrical Power	Facilities	215.60	\$44.99	20.87
	Subtotal	215.60	\$44.99	
Communication	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
	Total	495.39	\$99.11	

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Appendix A: County Listing for the Region

Emery, UT

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Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Utah	Emery	10,976	402	350	753
Total State		10,976	402	350	753
Total Region		10,976	402	350	753

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Hazus-MH: Flood Global Risk Report

Region Name: Emery_County_L2_FL
Flood Scenario: Emery_County_L1_Flood
Print Date: Wednesday, January 03, 2018

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

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

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



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General Description of the Region

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

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Utah

Note:

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

The geographical size of the region is 4,472 square miles and contains 2,818 census blocks. The region contains over 4 thousand households and has a total population of 10,976 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 4,807 buildings in the region with a total building replacement value (excluding contents) of 753 million dollars (2010 dollars). Approximately 88.97% of the buildings (and 53.42% of the building value) are associated with residential housing.



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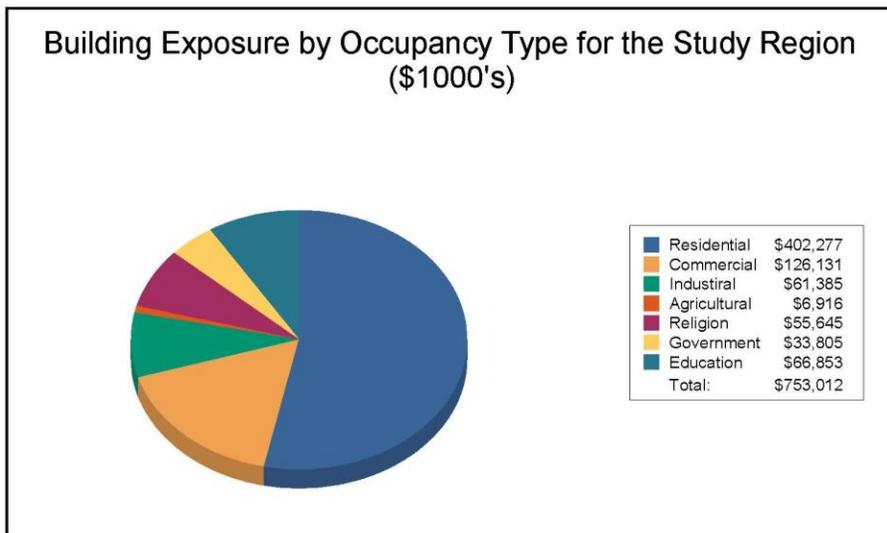
Building Inventory

General Building Stock

Hazus estimates that there are 4,807 buildings in the region which have an aggregate total replacement value of 753 million (2014 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (\$1000)	Percent of Total
Residential	402,277	53.4%
Commercial	126,131	16.8%
Industrial	61,385	8.2%
Agricultural	6,916	0.9%
Religion	55,645	7.4%
Government	33,805	4.5%
Education	66,853	8.9%
Total	753,012	100.0%



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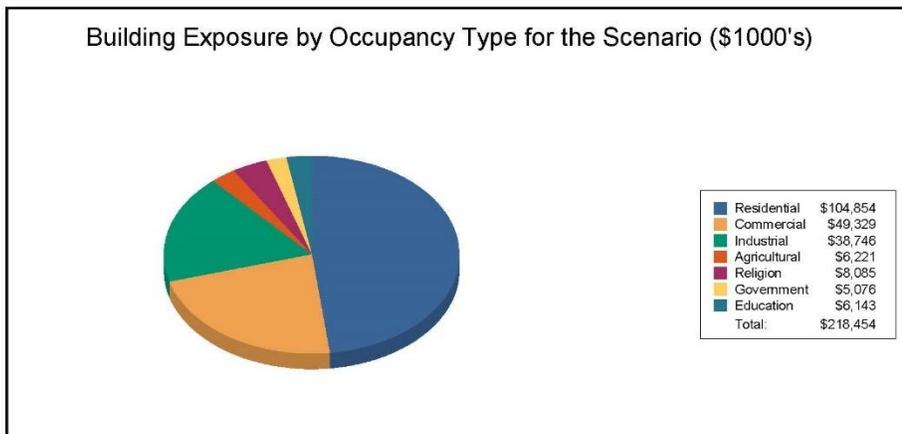
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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	104,854	48.0%
Commercial	49,329	22.6%
Industrial	38,746	17.7%
Agricultural	6,221	2.8%
Religion	8,085	3.7%
Government	5,076	2.3%
Education	6,143	2.8%
Total	218,464	100.0%



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 10 schools, 8 fire stations, 6 police stations and 1 emergency operation center.



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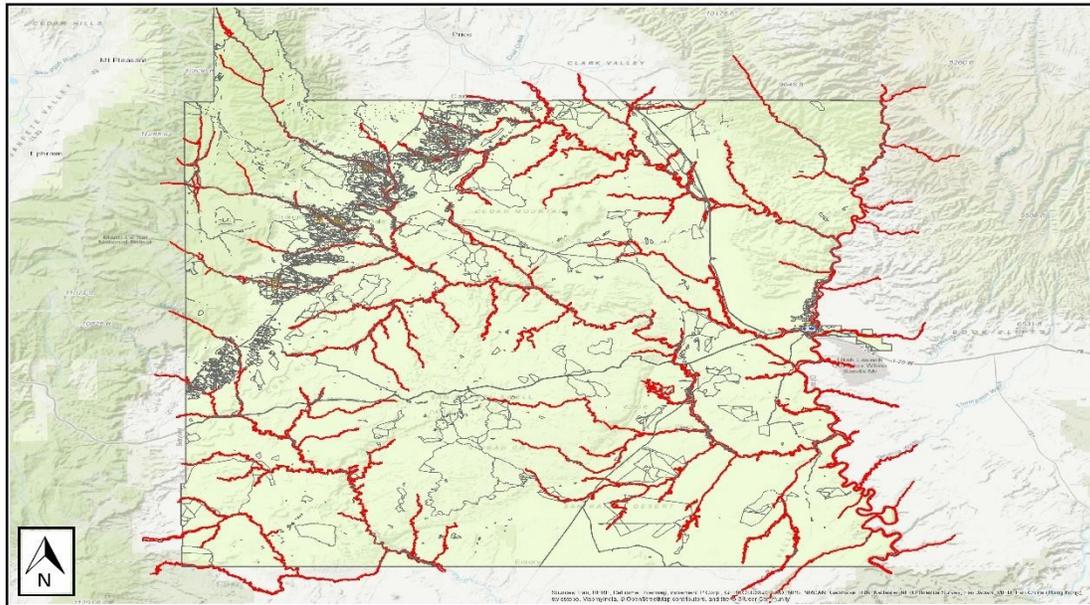
Flood Scenario Parameters

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

Study Region Name:	Emery_County_L2_FL
Scenario Name:	Emery_County_L1_Flood
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



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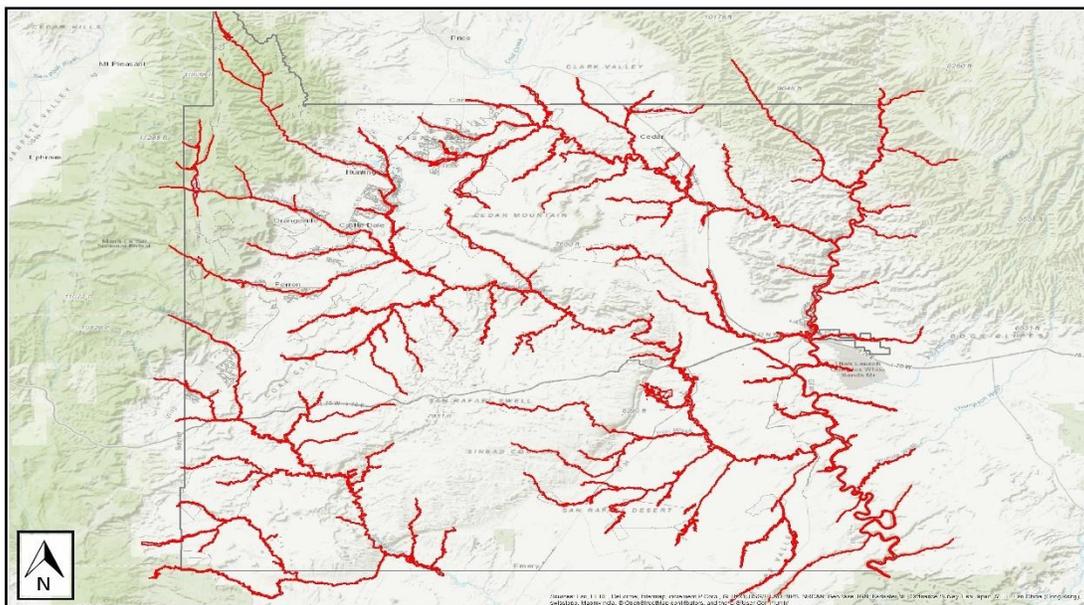


Building Damage

General Building Stock Damage

Hazus estimates that about 11 buildings will be at least moderately damaged. This is over 42% of the total number of buildings in the scenario. There are an estimated 5 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = \$300K) Overview Map



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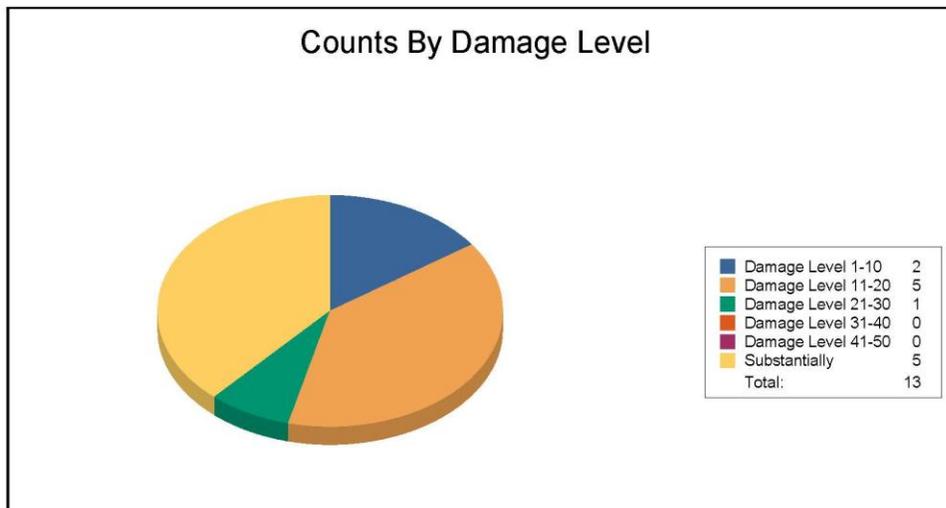
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Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	1	50.00	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	1	9.09	4	36.36	1	9.09	0	0.00	0	0.00	5	45.45
Total	2		5		1		0		0		5	



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Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
Manuf/Housing	0	0	0	0	0	0	0	0	0	0	3	100
Masonry	0	0	0	0	1	100	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	1	14	4	57	0	0	0	0	0	0	2	29



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	8	0	0	0
Hospitals	0	0	0	0
Police Stations	6	2	0	2
Schools	10	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.



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Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.



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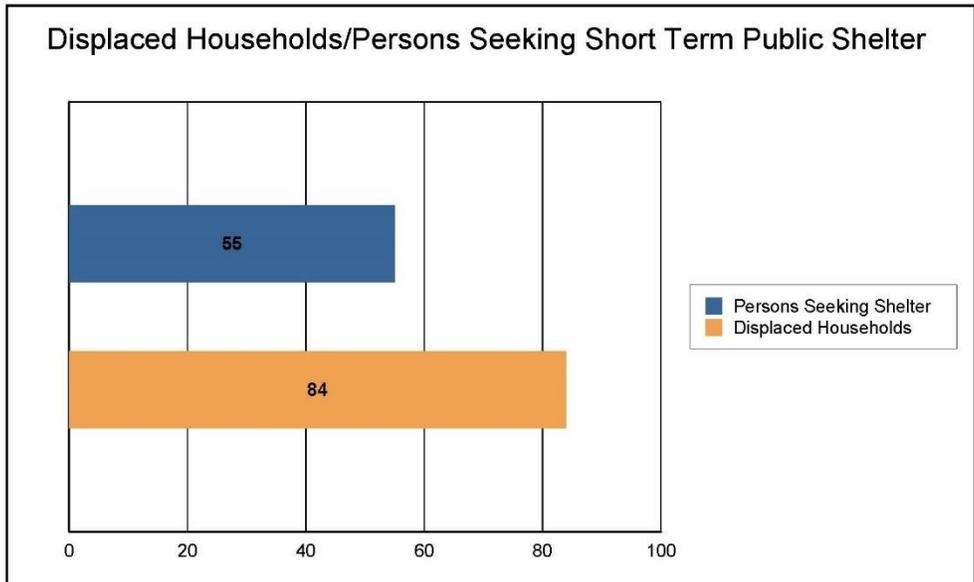
2018



Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 84 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 55 people (out of a total population of 10,976) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 12.35 million dollars, which represents 5.65 % of the total replacement value of the scenario buildings.

Building-Related Losses

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

The total building-related losses were 12.25 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 32.92% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



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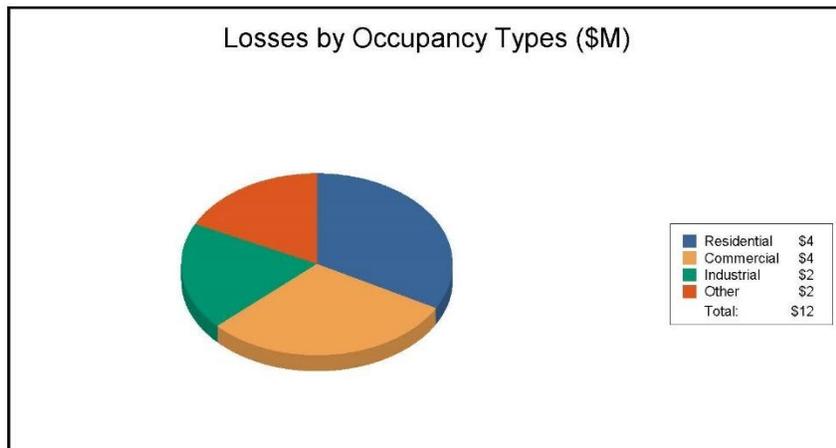
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	2.73	0.82	0.66	0.39	4.61
	Content	1.32	2.74	1.47	1.62	7.15
	Inventory	0.00	0.13	0.25	0.12	0.49
	Subtotal	4.05	3.69	2.38	2.14	12.25
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.02
	Relocation	0.01	0.00	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.01	0.02	0.00	0.04	0.06
	Subtotal	0.02	0.03	0.00	0.05	0.09
ALL	Total	4.06	3.72	2.38	2.19	12.35



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Appendix A: County Listing for the Region

Utah
- Emery



FEMA

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RiskMAP
Increasing Resilience Together

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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Utah				
Emery	10,976	402,277	350,735	753,012
Total	10,976	402,277	350,735	753,012
Total Study Region	10,976	402,277	350,735	753,012



FEMA

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RiskMAP
Increasing Resilience Together

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Appendix 2

Plan Maintenance, Evaluation, and Implementation

Monitoring, Evaluating, and Updating the Plan

Periodic monitoring and updates to this Plan are required to ensure the goals and objectives for the Emery County Pre-Disaster Mitigation Plan 2018 are kept current and the mitigation strategies are being carried out. This Plan has been designed to be user-friendly in terms of maintenance and implementation. 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.

The Emery County LEPC meets quarterly to review emergency management efforts within the county. This meeting is open to the public and attended by County and City governmental officials, local businesses, EMS, hospitals, fire departments, and local citizens. To keep the Emery County Pre-Disaster Mitigation Plan 2018 up-to date the LEPC will conduct an annual review to discuss the incorporation of new hazards, mitigations, or other data into the Plan.

Annual Review Procedures

Emery County will annually review the mitigation strategies described in this plan or as situations dictate, such as following a disaster declaration. The process will include Emery County Emergency Manager organizing a Hazard Mitigation Planning Working Group comprised of individuals from organizations responsible for implementing the described mitigation strategies. Progress towards the completion of the strategies will be assessed and revised as warranted. The Emery County Emergency Manager will regularly monitor the Plan and is responsible for making revisions and updates.

Five Year Plan Review

The entire Plan including, background studies and analysis shall be revised and updated every five years by the participating jurisdictions to determine if there have been any significant changes in the County that would affect the Plan.

Increased development, increased exposure to certain hazards, the development of new mitigation capabilities or techniques, and changes to State or Federal legislation are examples of changes that may affect the applicability of the Plan.

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The Emery County Pre-Disaster Hazard Mitigation Working Group 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 the Utah Division of Emergency Management determine the recommendations require modifications, an amendment may be initiated as described below.

Plan Amendments

The State of Utah Division of Emergency Management Hazard Mitigation Officer, members of the Local Hazard Mitigation Working Group, County Emergency Manager, or County Commissioner/Mayor/City Manager of an affected jurisdiction may initiate amendments and updates to the Plan.

Upon initiation of an amendment to the Plan, the Emery County Emergency Manager will forward information on the proposed amendment to all interested parties including, but not limited to, all affected county and city departments, residents and businesses. Depending on the magnitude of the amendment, the full Pre-Disaster Hazard Mitigation Planning Working Group may be reconstituted.

At a minimum the information will be made available through a public notice in a newspaper of general distribution within the county providing a comment period of no less than forty-five 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. The Utah Division of Emergency Management will review the proposed amendment along with comments received from other parties and submit a recommendation to FEMA within sixty days.

In determining 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. Contemporary 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 which the Plan was based.
4. The nature or magnitude of the risks have changed.
5. There are implementation problems such as technical, political, legal, or coordination with other agencies.

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Upon receiving the recommendation from the Utah Division of Emergency Management, a public hearing will be held by the Emery County Emergency Manager. The Division of Emergency Management will review the recommendation (including the factors listed above) any oral or written comments received at the public hearing. Following the review, the Division of Emergency Management 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 hearings.
4. Reject the Amendment request.

Implementation Through Existing Programs

Once the Plan has been promulgated, participating cities and the County 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, County, and/or City Mitigation Plans. Many of the mitigation actions developed by the cities and county have mitigation elements of other programs such as the National Flood Insurance Program, the Utah Wildland-Interface Code, the Building Code Effectiveness Grading System, and the Community Rating System.

Process

It will be the responsibility of the participating jurisdiction's political body to ensure that these mitigation projects are carried out no later than the target dates unless reasonable circumstances prevent their implementation. (i.e. Lack of funding)

Funding Sources

Although all mitigation techniques will likely save money by avoiding future losses, projects may be costly to implement. The County and participating jurisdiction will continue to seek funding sources to assist funding the completion of mitigation projects. This portion of the Plan identifies primary Federal and State Grant Programs, local and non-governmental funding sources.

Federal Programs

The following Federal Grant Programs have been identified as funding sources which specifically target hazard mitigation projects:

The Pre-Disaster Hazard Mitigation Program administered by FEMA. The program provides funding to States, Counties, and Cities for cost effective hazard mitigation activities that complement a comprehensive mitigation program that reduces loss of life, reduces injuries, or

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damage to property.

The funding is based on a 75% Federal Share and a 25% Non-Federal Share. The Non-Federal Share may be in the form of cash or in-kind or a combination. The following may be eligible mitigation activities:

1. Pre-Disaster Mitigation Planning
2. Technical Assistance (i.e. risk assessments, project development)
3. Mitigation Projects
4. Acquisition or relocation of vulnerable properties
5. Hazard Retrofits
6. Minor structural hazard control or protection projects
7. Community outreach and education

The Flood Mitigation Assistance Program is provided by FEMA and administered by the State. The program provides funds to reduce or eliminate the risks of long term flood damage to structures insurable under the National Flood Insurance Program. The funding is available for mitigation planning and the implementation of mitigation measures only. The funding levels are a 75% Federal Share and 25% Non-Federal Share.

State Grant Programs

Local Funding

Local government depends on property taxes as a primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine, regular basis to the public. If local budgets permit these funds may be used as matching funds for State and Federal Grants.

Non-Governmental Funding

Another potential source of funding for implementing mitigation projects are monetary contributions from private sector companies, faith-based organizations, charities, or other non-profit organizations.

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Appendix 3 Emery County PDM Process

Integrating into other Plans

The most direct application for local jurisdictions is to create or update a natural hazards zone or overlay in the local General Plans, zoning, and land use ordinances. Regulating land uses in natural hazard areas can effectively reduce losses of life and property. Communities should be updating their General Plan about every five years at a minimum anyway. This regular update process is a fantastic opportunity for communities to review their sections of the Emery County Pre-Disaster Mitigation Plan 2018, identify risks documented in the plan, and to update their local General Plan, zoning, and ordinances accordingly.

The responsibility and authority to regulate development in natural hazard areas lies with the County, City, or Town. The State of Utah does not regulate most development, and while the Utah Geological Survey and others aid Counties/communities, they do not have authority to regulate. Public health, safety, and welfare can be protected most effectively as communities exercise the authority given them and use the resources available to them to plan development responsibly near hazard areas.

Local emergency management officials train for emergency response to all types of natural hazards. This plan can serve as a reference to them providing historical hazard events, points of contact, general geographic locations of hazards, and potential losses per jurisdiction per hazard. Also, continued involvement in several follow-up Pre-Disaster Mitigation planning meetings will provide useful forums for discussion and collaboration among various organizations and levels of government.

Public Works and Roads Departments can also implement the information from this plan. As communities view the natural hazards data and mapping in this plan, they can accordingly identify where infrastructure could be damaged in the event of a natural disaster or where weak sections are in the various systems. Data sets for the various hazards identified in this plan are continually being updated and refined. The Utah Geological Survey and others can provide zoning and ordinance assistance for geological hazard areas and can provide the most up-to-date data and mapping.

As far as Flood Mitigation Plans, those communities that do have a plan can update it referencing the data and statistics in this plan. Potential losses and the general number of structures in FEMA floodplains can be very beneficial in those plan updates. However, the best resource for updating floodplain planning efforts is the Utah Division of Emergency Management. The State

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Floodplain Manager has the necessary training and resources to assist communities in this respect. Likewise, for wildfire protection, the Utah Division of Forestry, Fire, and State Lands can aid communities which can help them become eligible for funding. The cooperative and collaborative development of the Community Wildfire Preparedness Plans and the Pre-Disaster Natural Hazard Mitigation Plans enhances the community's preparedness for all-natural hazards. For general pre-disaster mitigation funding and project assistance, the Utah Division of Emergency Management hazard mitigation planning staff can provide the most up-to-date knowledge and experience.

Perhaps the most direct way communities in Emery County can implement this plan into current planning mechanisms is by completing the mitigation strategies for their respective community found in this plan. These strategies were written by the Emery County Working Group comprised of representatives from throughout the county to find ways to decrease potential losses to life and property. As communities strive to improve natural hazards planning within their jurisdictional boundaries, they will more effectively protect the public's health, safety, and welfare by implementing these mitigation strategies.

Emery County 2018 Pre-Disaster Natural Hazard Mitigation Planning Process Overview

The Emery County 2018 Pre-Disaster Natural Hazard Mitigation Plan update began after a Request for Proposal and a bid award with the selection of Scott Mabe LLC, a Disabled Veteran Small Business, as the contractor to work with and assist Emery County with updating the 2013 Pre-Disaster Natural Hazard Mitigation Plan. The contractor hired Ron Mosher of Ron Mosher Consulting, a sole proprietorship, to assist the contractor with the task.

The Emery County 2018 Pre-Disaster Natural Hazard Mitigation Plan Kick-Off Meeting was held on June 23, 2016. In attendance were Kyle Ekker, Emery County Emergency Manager, Janalee Luke, Emery County Emergency Management Office, Angelia Crowther, Utah Division of Emergency Management Southeastern Utah Liaison, Scott Mabe, Lead Contractor, and Ron Mosher, Contractor. The content of the signed contract, the billing procedure, and expectations were discussed and accepted. The composition of the Emery County 2018 Pre-Disaster Natural Hazard Mitigation Plan Working Group was discussed. The intent was articulated to be all inclusive as the list was developed. As a result of this Kick-Off Meeting the 2018 Emery County Pre-Disaster Natural Hazard Mitigation Plan Working Group was formed. The developed list of invitees to the Working Group included elected and appointed officials from the County, Cities, and Towns, representatives from utility companies, water companies, police, local and state fire agencies, EMS, surrounding county Emergency Managers, road department, and the County GIS department.

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Emery County 2018 Pre-Disaster Natural Hazard Mitigation Plan Working Group Letter of Invitation

Emery County is in the process of drafting a new Pre-Disaster Mitigation Plan. FEMA requires Emery County to form a Working Group comprised of individuals from key agencies, cities and towns, public works and critical infrastructure. You are receiving this email because we feel you would be a valuable member of the Working Group.

The Working Group will meet with plan developers to review the current plan, identify hazards that could impact Emery County, identify infrastructure that is vulnerable to losses, and identify mitigation projects. We went through this same process a few years ago and were actually able to federally fund some projects that were listed in our current plan. A large percentage of the other projects identified were completed using local resources.

Our first meeting will be held in Castle Dale on October 14, 2016 from Noon-2:00 p.m., so SAVE THE DATE. Lunch will be provided. If unable to attend in person, we will have GoToMeeting available which will allow you to participate from your phone or computer.

Please RSVP to this email and let us know if you are willing to be part of the Working Group. If you are unable to participate in the Working Group, please refer a representative from your agency.

Emery County 2018 Pre-Disaster Natural Hazard Mitigation Working Group

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2018 Emery County PDM Core Planning Group

NAME	AGENCY
Kyle Ekker	Emery County Emergency Manager
Janalee Luke	Emery County Emergency Management Office
Jeff Guymon	Emery County GSI/IT Department
Jay Mark Humphrey	Emery Water Conservancy District
Darrell Cunningham	Pacific Corp, Huntington Power Plant
Wayde Nielsen	Emery County Road Dept.
Lynn Sittured	Emery County Commissioner
Scott Mabe	Lead Contractor
Ron Mosher	Contractor

The first Emery County 2018 Pre-Disaster Natural Hazard Mitigation Plan Working Group meeting was held on October 14, 2016 and was facilitated by the contractor. The key stakeholders were present, and the contractors were introduced to the Working Group. It was emphasized by the contractor that the development of their Emery County 2018 Pre-Disaster Natural Hazard Plan is dependent on the cooperation, collaboration, and

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communication with and between members of the Emery County 2018 PDM Working Group. A tentative time line was presented setting expectations for accomplishing goals to complete the Plan. A key element of the mitigation planning process, emphasized to the Working Group, was the discussion it promotes among community members about creating a safer, more disaster-resilient community is as important as the plan itself. A plan that accurately reflects the community's values and priorities is likely to have greater legitimacy and "buy-in" and greater success in implementing mitigation actions and projects to reduce risk.

The nine natural hazards identified in the 2013 Pre-Disaster Natural Hazard Mitigation Plan Affecting Emery County were reviewed with the Working Group to start the risk assessment process of the potential impacts to their community and critical infrastructure.

As a result of this meeting the contractor was assigned to update all the Emery County demographic information, contact the State Forestry, Fire, and State Lands to obtain a chronological five-year update for the wildland fires in Emery County, research and update the natural hazard history for the county. The Emery County Emergency Manager committed to updating the list of Critical Facilities and the Working Group would examine their respective areas to evaluate the risk associated with the identified natural hazards.

The second meeting of the Emery County 2018 Pre-Disaster Natural Hazard Mitigation Working Group was held on May 30, 2017. The contractor facilitated the meeting after welcoming remarks by Captain Ekker, Emery County Emergency Manager. The basic Emery County demographic information was reviewed and comments from members of the Working Group incorporated into the Plan. Randy Sandoval, Utah Division of Forestry, Fire, and State Lands was present, and he committed he would provide to Captain Ekker the five-year Emery County fire history. The Critical Facilities list was reviewed, and suggested changes were made to the list. The requirements of the National Flood Insurance Program (NFIP) were reviewed, and the status of the participating jurisdictions discussed. During the discussion a concern was raised about the outdated maps and inaccurate information on the maps. An outcome was the possibility of arranging a meeting with a representative from the State of Utah Division of Emergency Management concerning the NFIP. The Natural Hazard Mitigation Projects reflected in the 2013 Emery County Natural Hazard Mitigation Plan were reviewed. The subject matter experts commented on the status of the mitigation projects and it was noted a majority were completed, some on going, and a limited number not started. New mitigation projects were discussed and as a result an action project

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template would be provided by the contractor for documenting the information for new projects.

In the interim between the second and third Emery County Working Group Meetings information flowed between the contractors and the Emery County Emergency Management Office as the impacts of natural hazards on the jurisdictions were identified, updated hazard profiles completed, and the hazard mitigation action projects were developed and prioritized for presentation to Emery County Working Group.

The third Emery County 2018 Pre-Disaster Natural Hazard Mitigation Working Group meeting was conducted on May 30, 2018. The contractor presented a Draft 2018 Emery County Pre-Disaster Natural Hazard Mitigation Plan for review and comment by the Working Group. The contractor facilitated a point by point review of the document seeking additional input from the Working Group. The Working Group responded with changes they identified as needing to be made. As a direct result of this in-depth discussion the Emery County Director of Public Lands requested an electronic copy of the entire plan, stating that there is valuable data in the plan he can use in his work assignments. An additional result of this meeting was the Emery County IT/GIS Director put a link to the plan on the Emery County website for public access and comment. There were no comments received.

A Public Hearing was scheduled for and held during the July 3, 2018, Emery County Commission Meeting. The Notice of Public Hearing was published in the ETV10 News, a weekly newspaper, on June 20, 2018 and June 27, 2018. The Public Hearing was attended by the Emery County Commissioners and the Emery County Emergency Manager. There were no public comments received.

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PROOF OF PUBLICATION AFFIDAVIT

I, Shannon Childs, being first duly sworn, state that I am the Publisher of ETV 10 News, a weekly newspaper of general circulation published at Price, County of Carbon, State of Utah; and that the advertisement or notice, a printed copy of which is attached hereto, was printed and published in said newspaper for two issues and on www.utahlegals.com website on the same day as the first newspaper publication date as follows:

June 20, 2018

S. Childs
Shannon Childs, Publisher/Editor

Subscribed to and sworn before me this 27th day of June,
2018.



Scottie Draper
Notary Public
My Commission Expires:
May 17, 2021

NOTICE OF PUBLIC HEARING

Notice is hereby given that Emery County Emergency Management will hold a public hearing on Tuesday, July 3, 2018 at 3:00 p.m. in the Emery County Commission Chambers, 75 East Main Street, Castle Dale, UT, in conjunction with the regularly scheduled Emery County Commission Meeting.

The purpose of the public hearing is to receive public comment on a draft of the Emery County Pre-Disaster Hazard Mitigation Plan.

The plan is available for review on the Emery County website link as follows: http://www.emerycounty.com/commission/Emery-County-PDM-V18-06_07_18-BRM.pdf

Published in etv10news June 20 and June 27, 2018.

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The meeting agendas, sign-in forms, and notes for the Emery County 2018 PDM Working Group Meetings follow:

Initial Pre-Disaster Mitigation Planning Meeting

Agenda

1. Signature of any contracts or other documents to begin the planning process
2. Billing process; as individuals or through Scott Mabe LLC
3. Client Expectations of Us..... Our Expectations
 - Assist with the formation of the Working Groups
 - Send out invitations for the Working Group meetings under their name
 - Printing, supplies
 - Assist with arranging an appropriate meeting location
 - Maintain a presence at the meetings
 - Cooperation of the County GIS office with map creation
 - Coordination and participation by the State of Utah DEM Regional Liaison
4. Establish target dates for accomplishing key goals and the quarterly payments based on reaching the goals as outlined in the SOW and the Budget documents
5. Set date, time, and location for the 1st. meeting of the Pre-Disaster Mitigation Working Group.

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Agenda

Emery County 2018 PDM

Working Group Meeting

May 30, 2017

11:00 AM – 1:00 PM

1. Review the Emery County updated basic demographic information
2. Review the Emery County Critical Infrastructure information
3. Review the Emery County Natural Hazards prioritization
4. Examine the status of the current Emery County Natural Hazard Mitigation Projects
5. Discuss the ideas, concepts, implementation, and cost estimates for the Emery County 2018 Pre-Disaster Hazard Mitigation Plan Projects
6. Establish Points of Contact for follow up on each of the proposed projects in Emery County

Presentation by the representatives of the Department of Natural Resources, Division of Forestry, Fire, and State Lands on the concurrent development of the Community Wildfire Preparedness Plan within Emery County

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EMERY COUNTY EMERGENCY MANAGEMENT



Kyle Ekker, Captain, Emergency Manager

PDM WORKING GROUP MEETING

MAY 30, 2017

EMERY COUNTY SHERIFF'S OFFICE

1:00 P.M.

Captain Kyle Ekker welcomed the group and opened the meeting with a brief introduction before turning the time over to Scott Mabe and Ron Mosher. Discussion was held and assignments/information gathering were assigned as follows:

Rudy Sandoval will provide a wildfire history and give it to Captain Ekker.

Note was made that Emery County junior high schools are changing over to middle schools. Plan needs to reflect new school names.

Gagon Family Medicine in Huntington is a new health care facility and needs to be added to the plan.

IT/GIS Department will get lat/longs for the communications towers.

Under the fuel storage section, we need to add PacifiCorp, Bowie, Mac's Mining, Emery School District bus garage, Huntington Airport, Green River Airport and the Cleveland Corner Store.

Someone will check on the substation at Wilberg Mine to see if it is still in existence.

IT/GIS will provide lat/longs for Green River Aviation and Adobe Reservoir. The new reservoir by our office is called Lower Mammoth. Need lat/longs for that also.

Other reservoirs that need to be added are the ones at Hunter Power Plant and Huntington Power Plant, Rolfson Reservoir, Jethro Pond, and Snowball Pond.

Comment was made that maps for Emery County from NFIP are very inaccurate and outdated.

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SIGN-IN SHEET PRE-DISASTER MITIGATION PLAN MEETING

Date: May 30, 2017

Place: ECSO, Castle Dale, UT

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EMERY COUNTY EMERGENCY MANAGEMENT



Kyle Ekker, Captain, Emergency Manager

PDM WORKING GROUP MEETING

MAY 30, 2018

EMERY COUNTY SHERIFF'S OFFICE

11:30 P.M.

Captain Kyle Ekker welcomed the group and opened the meeting before turning the time over to Ron Mosher. Ron presented the entire plan on the overhead projector. The group interjected with changes they could see needed to be made.

Changes that needed to be made:

Update the names of the Emery County Commissioners. They have changed since the beginning of this project.

Change the names of the schools because they have changed from junior high schools to middle schools.

Add the name of the pond that is by ECSO -- it is Lower Mammoth Pond.

Ray Peterson, Emery County Public Lands, requested a copy of the entire plan electronically, stating that there is valuable data in the plan that he could use in his work assignments.

Ron Mosher advised ECSO that they could now do a notice in the newspaper announcing a public hearing on the plan and stating that the plan would be available to review on the Emery County website. The notice in the newspaper should run for 2 consecutive weeks. Janalee was assigned to draft the notice and send it to the newspaper.

Jeff Guymon, Emery County IT/GIS, was assigned to put a link to the plan on the Emery County website for public access.

It was decided that the Emery County CCC/LEPC will review the plan yearly.

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Ron Mosher requested a list of mayors for each city/town in Emery County, including their contact information. Janalee was assigned to provide this.

Emery County Commission Resolution of Adoption

(Place Holder)

Green River City Council Resolution of Adoption

(Place Holder)

Castle Dale City Council Resolution of Adoption

(Place Holder)

Emery Town Council Resolution of Adoption

(Place Holder)

Ferron City Council Resolution of Adoption

(Place Holder)

Huntington City Council Resolution of Adoption

(Place Holder)

Orangeville City Council Resolution of Adoption

(Place Holder)

Clawson Town Council Resolution of Adoption

(Place Holder)

Cleveland City Council Resolution of Adoption

(Place Holder)

Elmo Town Council Resolution of Adoption

(Place Holder)

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Appendix 4 General Mitigation Strategies

Section 1. Mitigation Categories

For the purpose of this mitigation plan, the mitigation strategies were divided into one of six categories according to how they accomplish mitigation. Below are the categories with examples; following, in **Section 2**, the regional natural hazard mitigation strategies are addressed using this categorization.

- A. *Emergency Services*
- B. *Natural Resource Protection*
- C. *Prevention*
- D. *Property Protection*
- E. *Public Information and Involvement*
- F. *Structural Protection*

A. Emergency Service: Emergency Services protect people during and after a disaster.

Examples include:

- Mutual aid agreements
- Protection of critical facilities
- Health and safety maintenances
- Inventory of assets
- EMS/Police/Fire response and skill

B. Natural Resource Protection: Natural Resource Protection includes strategies that preserve or restore natural areas or the natural function that an area provides.

Examples include:

- Wetlands protection
- Pollution reduction
- Erosion and sediment control
- Fuels reduction
- Watershed maintenance

C. Prevention: Prevention measures are intended to prevent the problem from occurring and/or keep it from getting worse.

Examples include:

- Planning, zoning, and ordinance regulations
- Open space preservation
- Floodplain and wetland development regulations
- Storm water management
- Minimum set back requirements

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- Evacuation plans

D. **Property Protection:** Property Protection measures are used to modify buildings within high-risk areas in an attempt to reduce damage. For the most part property protection measures do not affect a buildings appearance of use making them less expensive and particularly suitable for historical sites and landmarks.

Examples include:

- Utility relocation
- Burying or flood proofing
- Non-structural earthquake mitigation
- Backup protections
- Insurance and other monetary loss minimization actions
- Technical evaluations and mapping

E. **Public Information and Involvement:** *Public Information and Involvement activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property and ways to protect people and property from these hazards.*

Examples include:

- Education
- NFIP
- URWIN areas
- Hazard Identification
- Maps with high hazard locations identified
- Informational mailings
- Workshops
- Real Estate disclosures for natural hazards
- Real Estate insurance

F. **Structural Protection/Projects:** are man-made structures, which prevent damage from impacting property.

Examples include:

- Detention/Retention basins
- Larger culverts
- Elevated seismic design
- Floodwalls
- Debris basins
- Landslide stabilization and levees

Section 2. General Mitigation Strategies

Flood/ Riverine Mitigation

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Generic Mitigation: The following are generic mitigation strategies appropriate for addressing the hazard of flooding. Many of these strategies are expanded upon in the text that follows.

- Avoidance, land-use planning and zoning ordinances
- Better flood routing through communities
- Annual warning of risk information on how to protect property and lives
- Flood insurance awareness, emphasis, and marketing
- Projects such as levees/dams
- Funding by a storm water tax in cooperation with Federal and State programs
- Additional SNOwpack TELemetry (SNOTEL) sites and enhanced instrumentation
- Protection of roads and bridges
- Greater reservoir capacities
- Curtail development in flood-prone areas
- General infrastructure protection
- Develop river corridor parkways
- Protection of wastewater treatment facilities from excessive inflows
- Protection of drinking water supply systems
- Gather hazard and risk data/information
- Development of improved mitigation techniques
- Education of local officials, developers, and citizens
- Protecting natural floodplain resources
- Good watershed management

A. *Emergency Services*

Flood Warning: Warning systems designed to alert residence of rising floodwaters. Warning systems can disseminate the information through many means such as sirens, radio, television, mobile public-address system, reverse 911, or door-to-door contact. Multiple or redundant warning systems are most effective, giving people more than one opportunity to be warned.

Flood Response: Flood response refers to the actions that are taken to prevent or reduce damage once a flood starts, and example of flood response is the turning of State Street into a river during the 1983 flood event. Many of the below actions should be part of an emergency response plan EOP developed in coordination with the agencies that share responsibilities. The EOP once developed should be exercised and continually evaluated so when the plan is needed key players know what to do. Flood response actions might include:

- Activation of the emergency operations center
- Sandbagging designated areas
- Closing streets and bridges
- Shutting off power to threatened areas
- Releasing children from school
- Ordering an evacuation
- Opening evacuation shelters

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Critical Facilities Protection: Protecting critical facilities is vital, yet this protection draws workers and resources away from protecting other parts of a town or county. For this reason, listed below are vital facilities and facilities with the potential of causing a secondary disaster if destroyed. It is important to keep these locations in mind with considering potential mitigation projects.

Facilities or locations vital to flood response efforts:

- Emergency operations centers
- Police and fire stations
- Hospitals
- Highway garages
- Selected roads and bridges
- Evacuation routes

Facilities and locations, which if flooded would create a secondary disaster, applicable to all disasters:

- Facilities housing hazardous materials
- Wastewater treatment plants
- Schools
- Nursing homes

Health and Safety Maintenance: Response to floods or other natural disasters should include measures to prevent damage to health and safety such as:

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Vaccination of residents for tetanus
- Clearing streets
- Cleaning up debris

Many of these recommendations should be integrated into a public information program to educate citizens on the benefits of health and safety precautions.

B. Natural Resource Protection

Wetlands Protection: Wetlands are capable of storing copious amounts of floodwater, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice, however, since it takes many years for a new wetland to achieve the same level of quality as an existing one.

Erosion and Sedimentation Control: Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in

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downstream waterways. Sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters. Sediment and erosion control have two principal components: minimize erosion with vegetation and capture sediment before it leaves the site. Slowing runoff increases infiltration into the soil, thereby controlling the loss of topsoil from erosion and the resulting sedimentation. Runoff and erosion control can be done through vegetation, terraces, contour strip farming, no-till farm practices, and impoundments.

C. Prevention

Planning and Zoning: Land use plans are put in place to guide future development, they recommend where development should and should not take place. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events. The zoning ordinances can regulate development in these sensitive areas by limiting or preventing some or all development.

Open Space Preservation: Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not be limited to the flood plain. Other areas within the watershed may contribute to controlling the runoff that exacerbates flooding.

Floodplain Development Regulations: Floodplain development regulations typically do not prohibit development in the special flood hazard areas, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential. Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and/or floodplain ordinances.

Subdivision regulations: These regulations govern how land will be divided into separate lots or sites. In some Utah cities these are known as Site Based Ordinances.

Building Codes: Standards can be incorporated into building codes that address flood proofing from all new and improved or repaired buildings.

Floodplain Ordinances: Communities that participate in the National Flood Insurance Program NFIP are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

Storm Water Management: Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increase storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required

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to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Larger cities and counties within Utah enforce an ordinance prohibiting storm water from leaving a site at a rate higher than it did before the development.

Drainage System Maintenance: Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering watercourses or storage basins; regarding and filling should also be regulated.

D. Property Protection

Relocation: Moving structures out of the floodplain are the surest and safest way to protect against damage. Relocation is expensive, so this approach will probably not be used except in extreme circumstances.

Acquisition: Acquisition by governmental entity of land in a floodplain serves two main purposes: it ensures that the problem structure is addressed; and it has the potential to convert problem areas into community assets

Building Elevation: Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits.

Insurance: Above and beyond standard homeowner's insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Although this doesn't mitigate the problem it does allow the homeowner to shift the monetary loss/risk onto another party. Two of the most common insurances offered against flood loss are:

- National Flood Insurance: when a community participates in the NFIP, any local insurance agent can sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.
- Basement Backup Insurance: National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet.

E. Public Information and Involvement

Outreach Programs: Outreach projects are proactive; giving the public information even if they have not asked for it. Outreach projects should be designed to encourage people to seek out more information and take steps to protect themselves and their properties.

Examples include:

- Mass mailing or newsletters to all residents

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- Notices directed to high risk area residents
- Displays in public buildings
- Newspaper articles and special sections
- Radio and TV news releases and interviews
- A detailed property owner's handbook tailored for local conditions
- Presentations at meetings and neighborhood groups

Real Estate Disclosure: Disclosure of information regarding flood or hazard prone properties is important if potential buyers are to be able to mitigate damage. Federally regulated lending institutions are required to advise applicant that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. This only includes flood prone areas, at the exclusion of other hazards.

Map Information: Flood plain maps developed by FEMA outline the boundaries or the flood hazard areas. These maps can be used by anyone interested in a property to determine if it is in the floodplain. These maps are available from FEMA, the Utah Division of Emergency Management, and at many city and county planning offices. In addition, the Utah Geologic Survey creates and maintains maps illustrating geologic hazards. These maps are available for sell at the Division of Natural Resources books store.

F. Structural Projects

The intent behind structural projects for flood mitigation is to prevent floodwaters from reaching properties. The shortcomings of almost all structural mitigation projects are that:

- They can be very expensive
- They disturb the land, disrupt natural water flows, and destroy natural habitats.
- They are built to an anticipated flood event, and maybe exceeded by a greater-than-expected flood.
- They can create a false sense of security

Reservoirs: Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle. Reservoirs are expensive to build, occupy large tracts of land, require maintenance, and if they fail often result in greater downstream flooding than would occur during a natural flooding event.

Levees/Floodwalls: One of the best-known structural flood control measure levees and floodwalls are steel or concrete structures placed between the watercourse and the land.

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Diversions: A diversion is simply a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions structures can consist of surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel but during flooding events floodwaters spill over into the diversion channel.

Channel Modifications: Channel modifications include making a channel wider, deeper, smoother, or straighter. Common channel modifications include:

- Dredging: Dredging is often cost-prohibitive because the dredged material must be disposed of somewhere else, and dredged streams usually fill back in with sediment.
- Drainage Modifications: These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive.

Storm Water Management: Mitigation techniques for managing storm water include installing storm water systems, enlarging pipes, and street improvements in existing storm water systems.

Earthquakes

Generic Mitigation is a list of generic earthquake mitigation strategies pertaining to secondary threats often associated with earthquakes.

Generic Ground Shaking Mitigation

- Understand peak horizontal acceleration and recurrence interval
- Design appropriately
- Zoning ordinances and building codes

Generic Liquefaction Mitigation

- Move soil out
- Density soils in place
- Remove ground water
- Structural design

Generic Surface Fault Rupture Mitigation

- Avoidance
- Zoning ordinances
- Earthquake resistant building design codes
- Retrofitting of critical facilities and supporting equipment
- Retrofitting under-designed buildings
- Annual warning of risk/info on how to protect property and lives
- Projects to seismically upgrade critical public facilities/utilities and shelters

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- Gather hazard and risk data/information
- Protection of roads and bridges
- General infrastructure protection
- Development of improved mitigation techniques
- Education of local officials, developers, and citizens

A. Emergency Services

Emergency Operations Planning: Maintain an earthquake response plan to account for secondary problems, such as fire and hazardous material spills.

Critical Facilities Protection: Protecting critical facilities are vital as the facilities play a significant role in coordinating response and recovery following an earthquake. For this reason, listed below are vital facilities and facilities with the potential of causing a secondary disaster if destroyed.

- Facilities or locations vital to earthquake response efforts
- Emergency operations centers
- Police and fire stations
- Hospitals
- Highway garages
- Selected roads and bridges
- Evacuation routes

Facilities and locations, which if destroyed would create a secondary disaster:

- Facilities housing hazardous materials
- Wastewater treatment plants
- Schools
- Nursing homes

B. Natural Resource Protection

- Design of pipelines
- Land-use planning
- Community master plans and zoning ordinances

C. Prevention

While earthquakes are not preventable proper planning, zoning, and building codes can prevent much of the damage common with earthquakes. Planning, zoning, and building codes should address minimum setbacks, critical facility locations, steep slopes, areas with liquefiable soils, and insure high factor of safety ratings for critical facilities. Community master plans and zoning

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ordinances define hazard areas and require developers to show that any existing hazards have been investigated and new construction will not be exposed to unacceptable risk.

D. Property Protection

Nonstructural Mitigation: Nonstructural mitigation consist of mitigation measures that do not affect the overall look or purpose of the building yet prevent damage to non-structural aspects and lessen the loss of life. In addition, buildings with non-structural mitigation are frequently usable after an event.

- Tie downs
- Flexible utility connections
- Mylar film on windows to prevent the glass from shattering
- Added bracing.

Retrofitting: consists of upgrading the seismic safety of a building through structural and nonstructural mitigation techniques.

Insurance: Above and beyond standard homeowner's insurance, there is other coverage a homeowner can purchase to protect against earthquake hazard, something not covered under most homeowner's insurance plans. Although this doesn't mitigate the problem it does allow the homeowner to shift the monetary loss/risk onto another party.

E. Public Information and Involvement

Public information and involvement for earthquakes is like the mitigation strategies outlined in the flood and riverine section mentioned above.

Real Estate Disclosure: Disclosure of information regarding earthquakes and hazard prone properties are important if potential buyers can mitigate damage. Unlike floodplains there are no federal laws, which require disclosure of earthquakes.

F. Structural Protection

Mitigation measures can be any type of activity that reduces the likelihood or modifies what is at risk from the hazard. Earthquake mitigation can be accomplished through building codes that ensure safe and adequate construction including earthquake resistant designs and construction. Older building should be retrofitted to comply with the codes.

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Dam Failure

Generic Mitigation

- Proper floodplain maps, including dam breach flood potential
- Public knowledge of floodplains for the public and emergency managers
- Updated Emergency Operation Plans (EOP) integration with GIS Systems
- Maintain proper floodplain/ wetland geometry and vegetation for flood routing
- Floodplain usage compatible with floodplain needs
- More debris dams; they help to maintain flooding, debris, and mud
- Flood control pool in existing dams
- Protection of roads and bridges
- General infrastructure protection
- More authority to order releases and better forecasting would help in snowmelt floods and runoff
- Gather hazard and risk data/information
- Development of improved mitigation techniques
- Education of local officials, developers, and citizens

A. Emergency Service

- Good emergency management and emergency action plans
- Dam conditioning monitoring
- Warning system and monitoring
- Understand standard operating procedures

C. Natural Resource Protection

- Zoning of downstream usage
- Risk assessment
- Good watershed management

C. Prevention

- Dam failure inundation maps
- Planning/zoning/open space preservation to keep down stream areas clear
- Building codes with flood elevations based on dam failure
- Dam safety inspections
- Draining the reservoir when conditions appear unsafe

D. Property Protection

- Acquisition of building in the path of a dam breach flood

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- Flood insurance

E. Public Information and Involvement

- Communication and education of dam owners
- Communication and education with the public
- Evacuation procedures

F. Structural Protection

- Dam improvements
- Spillway enlargements
- Remove unsafe dams
- Design and construction review
- Direction for consulting engineers
- Instrumentations and monitoring of dams
- Remedial repair procedures
- Incremental damage assessment

Wildfire

Generic Wildfire Mitigation

- Avoidance
- Define, create, and maintain a defensible space
- Plant drought and fire-resistant vegetation
- Ordinances
- Modification of fuel loading in high hazard interface areas
- Wildland fire training and experience for fire department personnel
- Public education effort for people living in the interface
- Additional suppression equipment needs of fire departments and the Utah Division of Forestry, Fire, and State Lands
- Fuel modification in moderate hazard interface areas
- Protection of roads and bridges
- Annual warning of risk/info on how to protect life and property
- Gather hazard and risk data/information
- General infrastructure protection
- Development of improved mitigation techniques
- Education of local officials, developers, and citizens
- Protection of drinking water supply systems

A. Emergency Service

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- Fire fighting

B. Natural Resource Protection

- Prohibit development in high-risk areas.
- Vegetation control

C. Prevention

- Zoning ordinances to reflect fire risk zones
- Planning and zoning to restrict development in areas near fire protection and water resources
- Requiring new subdivisions to space buildings provide firebreaks, on-site water storage, wide roads and multiple accesses.
- Building code standards for roof materials spark arrestors.
- Maintenance programs to clear dead and dry bush trees
- Regulations on open fires.

D. Property Protection

- Retrofitting of roofs and adding spark arrestors
- Landscaping to keep bushes and trees away from structures
- Insurance rates based on distance from fire protection
- Planning how to deal with URWIN fires before they occur
- Good visibility

E. Public Information and Involvement

- Educating homeowners and future homeowners about risk
- Planning how to deal with URWIN fires before they occur
- Emergency warning system, action plan
- Communication tree between fire departments and homeowners
- Community actions
- Adequate water supply and systems

F. Structural Protection

- Building and property assessments
- Use appropriate construction materials
- Adequate access to buildings

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Landslides

Generic Mitigation

- Avoidance
- Recognize landslide area
- Zoning ordinances
- Remove landslide materials
- Drain subsurface materials
- Install surface drains
- Remove materials for the head of the landslide
- Re-grade
- Build buttress or retaining wall at the toe of the slope
- Install soil nails and rock anchors
- Maintain natural vegetation
- Improved geologic mapping to identify potential landslide problems
- Zoning ordinances prohibiting construction in or adjacent to areas with high landslide potential
- Soil moisture sensors at SNOTEL sites
- Gather hazard and risk data/information
- Protection of roads and bridges
- Development of improved mitigation techniques
- Education of local officials, developers, and citizens
- Protection of drinking water supply systems
- Generic Rock Fall Mitigation
- Avoidance
- Stabilize rocks
- Prerelease
- Build berms or benches
- Build structures to stop rocks

A. Emergency Services

- Warning systems
- Hazard identification and areas at risk

B. Natural Resource Protection

C. Prevention

- Land use planning ordinances

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- Identify old landslides
 - Old landslides usually show irregular or subdued hill-like topography
 - Younger or more recently occurring landslides show signs of hummocky terrain, scarps, inclined trees, ground cracks, sharp vegetation differences, and numerous depressions or ponds.
- Identify unstable slopes
- Identify areas that could be affected by slope failures
 - Potential rock falls can be found in steep cliff areas or where bedrock crops out onto mountain slopes.

D. Property Protection

- Good land-use practices
- Avoid slope-irrigation, undercutting, and over-steepening

E. Public Information and Involvement

- Communications systems
- Proper property assessments of slope conditions

F. Structural Protection

- Proper assessments of slope conditions
- Grading or removing the material from the top and placing it at the toe of a slope can lessen the slope gradient
- Subsurface drainage control used to dewater and stabilize slopes
- Retaining structures: Concrete block walls or large masses of compacted earth
- Constructing debris basins
- Building deflection walls upslope of structures
- Avoiding ground level windows that face upslope
- Catchment fences
- Tieback walls
- Rock bolts
- Cut benches and berms

Severe Weather

A. Emergency Services

- Early warning systems
- Communication systems

B. Natural Resource Protection

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C. Prevention

- Building code standards for light frame construction
- Ordinances that include weather resistant designs

D. Property Protection

E. Public Information and Involvement

- Listen to a weather radio
- Watch and listen to weather forecasts and warnings
- Develop a plan so you know where to take your family for shelter
- Understand risk and identify ways of reducing the impacts

F. Structural Protection

- Strengthen un-reinforced masonry

Problem Soils

Generic Mitigation

- Avoidance
- Presoak and Compact
- Remove problem soil
- Landscape so that runoff moves away from foundations

A. Emergency Service

B. Natural Resource Protection

a. Soil awareness

C. Prevention

- Landscaping with vegetation that does not concentrate or draw substantial amounts of water from the soil near foundations
- Insulating floors or walls near heating or cooling units to prevent evaporation that could cause local changes in soil moisture
- Avoid areas underlain by limestone and dolomite to prevent ground water contamination and foundation problems in karst terrain
- Use soil tests to find gypsum; do not plant high level of water plants near the house
- Reduce piping damage by limiting construction that disturbs natural drainage
- Peat deposits should be removed or avoided at construction sites
- Avoid abandoned mine areas
- Sands and calcareous loamy soils are highly erodible

D. Property Protection

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- Special foundation designs
- Installing gutters and downspouts that direct water at least 10 feet away from foundation slabs
- Landscape with vegetation that does not concentrate or draw substantial amounts of water from the soil near foundations

E. Public Information and Involvement

F. Structural Protection

- Special foundation designs
- Installing gutters and downspouts
- Proper drainage along roads and around structures

Drought

A. Emergency Service

- Provide low interest loans or private assistance for farmers and ranchers

B. Natural Resource Protection

- Manage wildlife during drought periods
- Incorporate wildfire hazard mitigation planning
- Integrate financial assistance for transportation or water hauling for livestock

C. Prevention

- Implement cloud seeding during drought years to enhance precipitation
- Protect culinary water systems and/or provide culinary water to people or systems
- Incorporate a drought management plan
- Introduce more water resources such as wells, ponds, reservoirs, and reservoir capacity

D. Property Protection

E. Public Information and Involvement

- Create or join water conservation programs that are designed to reduce water consumption
- Incorporate a drought management plan
- Drought resource coordination

F. Structural Protection/Projects

N/A

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Appendix 5 Environmental Considerations

Natural disasters are any major, adverse event which occurs from the natural Meteorologic, hydrologic, or geologic processes of the Earth. These events can include floods, severe weather, volcanic eruptions, and earthquakes. Any natural disaster can result in loss of life or property damage, often with concomitant economic damage. The affected population's resilience or ability to recover will impact the severity of any economic damage.

Natural disasters are an integral part of the environment's capacity to maintain balance. Over millions of years, the processes of wind, water, and geology have shaped Utah as we know it, and they will continue to do so—affecting humans and their structures. This meeting of natural events and human communities is what constitutes a natural disaster, and while modern engineering has made it possible to mitigate some of the effects of natural disasters, the potential for economic and environmental costs can be high. Human tampering with natural systems can also create an imbalance in the environment which might create problems in the future which cannot yet be seen. As such, it seems living with a small amount of risk (respecting the natural processes as much as possible), rather than constructing mitigation for every eventuality, might be best in the long run.

In order to work harmoniously with the environment, nature's own mitigation measures need to be identified, protected and/or strengthened. In addition, all applicable city codes, county codes, and state and federal laws pertaining to the environment must be followed, doing the utmost to ensure that our environment is not harmed through mitigation measures. In the main, mitigation programs proposed in this plan will be funded through federal, state, or local programs/funding. During the planning process, the following acts were evaluated, and their consideration and incorporation was deemed necessary while organizing and implementing the PDM plan.

The Clean Air Act (CAA) 1970: The Clean Air Act is the comprehensive Federal Law that covers the entire country under the Environmental Policy Act (EPA) 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, this controls the emissions of air pollutants. These limits ensure that all Americans have the same basic health and environmental protections. Maximum pollutant standards were set, and states may have stronger pollution controls on an individual basis, but not weaker pollution controls than those set for the whole country.

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 EPA. The 1977 amendment was to

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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 toxics. This act required that facilities with copious amounts of certain hazardous chemicals to have special emergency planning requirement; based on a facilities potential threat or risk from chemical spills, fires, explosions, etc. A Risk Management Plan (RMP) is prepared 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 (Clean Air).

The Clean Water Act (CWA): The Federal Water Pollution Control Act Amendments of 1972 came about because of the growing awareness for controlling 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 veracity. The act gave the Environmental Protection Agency (EPA) the authority to set wastewater standards for industry.

The act also required 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 city in the United States, under construction grant programs from the EPA and recognized the need for planning for future problems that posed a threat from nonpoint source pollution (Clean Water).

Endangered Species Act of 1973: This act provides a plan for the protection of threatened and endangered plants and animals and the habitats in which they are found. Congress finds and declares 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, because 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 in 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 connections with conservation of endangered species (Endangered).

Floodplain Management Policy: The main points of the 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

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competing, uses of floodplains in a way that makes the most benefit to society. To pursue and encourage appropriate use of floodplains and to avoid long and short term negative impacts associated with the inhabitants and modification of floodplains and to avoid direct and indirect support of floodplain development, whenever there is a practicable alternative.

“Functions (Natural) of floodplains include natural moderation of floods; fish, wildlife, and plant resources and habitat; groundwater recharge; and water quality maintenance. Uses of floodplains include the following: storm water 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” (Floodplain, Reclamation).

National Historic Preservation Act of 1966: This act was found and declared 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 to give a sense of orientation to the American people.” Some of the other main points of the act include 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 would like to use measures that will foster conditions in which historic resources can exist in productive harmony with present and future generations (National). Section 106 of NHPA “requires all Federal agencies to take into account the effects of their actions on historic properties, and that provide the Advisory Council on Historic Preservation (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 (Section 106).

Utah’s Noxious Weed Control Act, July 2008: was established to provide a means to control destructive noxious weeds. The act goes hand in hand with helping to prevent wildfires as well as control insects that are both destructive to our economic and environmental landscapes. The invasive noxious weeds can spread rapidly causing enormous economic losses. It is reported that millions of acres in North America have been invaded or are at risk of being invaded by weeds which include destruction of cropland, pastures, rangelands, forests, wilderness areas, national parks, recreation sites, wildlife management areas, transportation corridors, waterways, wetlands, parks, golf courses, even yards and gardens. The Utah Weed Control Association reports that the spread of noxious weeds is spreading at a rate of more than 4,600 acres per day on federal lands in the United States.

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Noxious weeds can cause damage to watersheds and increase soil erosion leaving the land permanently damaged. The economic losses from weeds exceed \$20 billion annually in the United States, and the cost continues to grow. The mitigation efforts in each county help protect and preserve our lands.

Utah's Noxious Weed List: Weeds are prioritized into four levels. effective December 2017 under the Rule R68-9. Authority R689-9-1, Designation and Publication of State Noxious Weeds
Source: Utah Office of Administrative Rules, <https://rules.utah.gov/publicat/code/r068/r068-009.htm>.

Class 1A: Early Detection Rapid Response (EDRR) Watch List Declared noxious and invasive weeds not native to the state of Utah and not known to exist in the State that pose a serious threat to the state and should be considered as a very high priority.

Common crupina	Crupina vulgaris
African rue	Peganum harmala
Small bugloss	Anchusa arvensis
Mediterranean sage	Salvia aethiopis
Spring millet	Milium vernale
Ventenata (North Africa grass)	Zygophyllum fabago
Plumeless thistle	Ventenata dubia
Malta starthistle	Carduus acanthoides
Syrian beancaper	Centaurea melitensis

Class 1B: (Control) Declared noxious weeds not native to the state of Utah, which pose a threat to the state and should be considered a high priority for control.

Camelthorn	Alhagi maurorum
Garlic	Alliaria petiolata
Purple starthistle	Centaurea calcitrapa
Goatsrue	Galega officinalis
African mustard	Brassica tournefortii
Giant reed	Arundo donax
Japanese knotweed	Polygonum cuspidatum
Blueweed (Vipers bugloss)	Echium vulgare
Elongated mustard	Brassica elongata
Common St. Johnswort	Hypericum perforatum
Oxeye daisy	Leucanthemum vulgare
Cutleaf vipergrass	Scorzonera laciniata

Class 2: (Control) Declared noxious and invasive weeds not native to the state of Utah, that pose a threat to the state and should be considered a high priority for control. Weeds listed in the control list are known to exist in varying populations throughout the state. The concentration of these weeds is at a level where control or eradication may be possible.

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Leafy spurge	Euphorbia esula
Medusahead	Taeniatherum caput-medusae
Rush skeletonweed	Chondrilla juncea
Spotted knapweed	Centaurea stoebe
Purple loosestrife	Lythrum salicaria
Squarrose knapweed	Centaurea virgata
Dyers	Isatis tinctoria
Yellow starthistle	Centaurea solstitialis
Yellow toadflax	Linaria vulgaris
Diffuse knapweed	Centaurea diffusa
Black henbane	Hyoscyamus niger
Dalmation toadflax	Linaria dalmatica

Class 3: (Containment) Declared noxious and invasive weeds not native to the State of Utah that are widely spread. Weeds listed in the containment noxious weeds list are known to exist in various populations throughout the state. Weed control efforts may be directed at reducing or eliminating new or expanding weed populations. Known and established weed populations, as determined by the weed control authority, may be managed by any approved weed control methodology, as determined by the weed control authority. These weeds pose a threat to the agricultural industry and agricultural products.

Russian knapweed	Acroptilon repens
Houndstounge	Cynoglossum officianale
Perennial pepperweed (Tall whitetop)	Lepidium latifolium
Phragmites (Common reed)	Phragmites australis ssp.
Tamarisk(Saltcedar)	Tamarix ramosissima
Hoary cress	Cardaria spp.
Canada thistle	Cirsium arvense
Poison hemlock	Conium maculatum
Musk thistle	Carduus nutans
Quackgrass	Elymus repens
Jointed goatgrass	Aegilops cylindrica
Bermudagrass*	Cynodon dactylon
Perennial Sorghum spp	including but not limited to Johnson Grass (Sorghum halepense and alnum)
Scotch thistle (Cotton thistle)	Onopordum acanthium
Field bindweed (Wild Morning-glory)	Convolvulus spp.

* Bermudagrass *Cynodon dactylon* : shall not be a noxious weed in Washington County and shall not be subject to provisions of the Utah Noxious Weed Law within the boundaries of that county. It shall be a noxious weed throughout all other areas of the State of Utah and shall be subject to the laws therein.

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Class 4: (Prohibited) Declared noxious and invasive weeds, not native to the state of Utah, that pose a threat to the state through the retail sale or propagation in the nursery and greenhouse industry. Prohibited noxious weeds are annual, biennial, or perennial plants that the commissioner designates as having the potential or are known to be detrimental to human or animal health, the environment, public roads, crops, or other property.

Cogongrass (Japanese blood grass)	Imperata cylindrica
Myrtle spurge	Euphorbia myrsinites
Dames Rocket	Hesperis matronalis
Scotch broom	Cytisus scoparius

Each county in Utah may have different priorities regarding specific State Designated Noxious Weeds and is therefore able to reprioritize these weeds for their own needs.

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APPENDIX 6 Research Sources

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The Clean Water Act (CWA)

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Endangered Species Act of 1973

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Utah Weed Control Association

<http://utahweed.org/index.html>

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Utah Water Rights Dam Inventory 2018

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APPENDIX 7

Emery County Community Wildfire Preparedness Plan