

Carbon County Pre-Disaster Hazard Mitigation Plan

2018



Carbon County Pre-Disaster Hazard Mitigation Plan

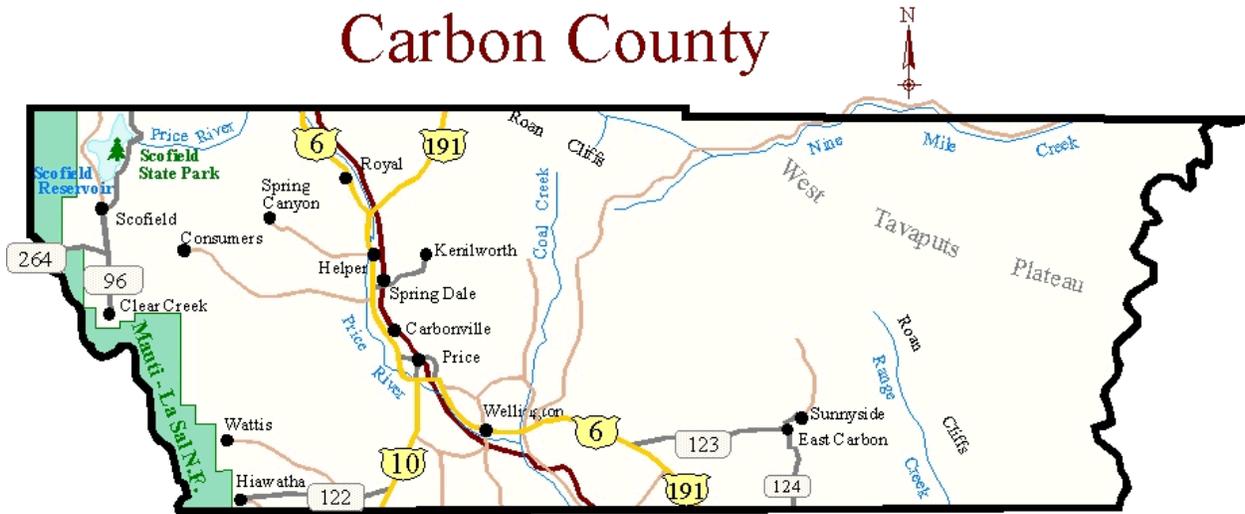
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Carbon County



(Utah Birds)

Carbon County is the 14th largest county, within the State of Utah, in terms of land area and is made up of five municipalities: East Carbon/Sunnyside City, Helper City, Price City, Scofield Town and Wellington City. Carbon County is in the mid-eastern portion of the State.

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

Date Started	Project Name and Brief Description	Project Status
March 21, 2017	NRCS/ EWP Project Wellington and Price River Water Improvement District (PRWID)	50% Complete. Completion Date April 2018. On Going
June 6, 2016	NRCS/ EWP Project Carbon Canal and Helper City Project.	Helper City Complete Carbon Canal Completion Date April, 2018
October 2015	Westwood Detention Basin	Complete
September 26, 2016	Wellington City 100 East Debris Removal	Complete
Nov. 16, 2017	Circle K Ranch Fuels Reduction Project	Complete
September 16, 2016	Temporary Berm for Homes along 100 East in Wellington	Complete
January 1, 2018 January 1, 2019 January 1, 2020 January 1, 2021	FFSL Fuels Reduction Match Projects	0% Complete On Going
Funding Based	Debris Basins in multiple locations throughout Carbon County	0%
June, 2016	Reconstruct Grassy Trails Dam Outlet	Complete
June, 2017	Bull Wash Project	Complete
October, 2017	Helper City Capital Improvement Facilities Projects	Complete

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October, 2017	Project to provide piping for the enclosed irrigation system in Helper City	Complete
May, 2018	Increase height of berm surrounding the PRWID Waste Water Treatment Plant	Complete
2018-2023	Install multiple automatic flood water discharge points on Carbon Canal in Drunkards Wash	New Project

Mission

The Carbon 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 Carbon 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 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.

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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 Carbon County and the communities within Carbon County to develop projects that provide for both the safety of their populations and the protection of the environment.

Plan Financing

The Carbon 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 Carbon County Pre-Disaster Natural Hazards Mitigation Plan was completed through the collaborative efforts of the Utah Department of Public Safety Division of Emergency Management, County Emergency Manager, Fire Departments, Carbon 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 Carbon County. Feedback was solicited through the Carbon 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 Carbon County website. All comments, questions, and discussions resulting from these activities were given thoughtful consideration as the plan was developed.

Purpose

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 Carbon 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

Carbon County and the municipalities of Helper City, Price City, Wellington City, and East Carbon City face many challenges to improve the natural hazard mitigation efforts and sustain the Carbon County Pre-Disaster Natural Hazards Mitigation 2018 Plan. The following

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capabilities have been identified for consideration for discussion and strengthening to implement and sustain the plan.

Financial:

Carbon County nor the municipalities of Helper City, Price City, Wellington City, and East Carbon City maintain a natural hazard mitigation specific fund or funding mechanism. The county does participate in an agreement Utah Fire, Forestry and State Lands and has developed a Community Wildfire Preparedness Plan (Appendix 7). This agreement provides for some mitigation funding that must be spent on fuel reduction in Carbon County. The challenge as acknowledged in the Carbon County General Plan is 60% of the county is owned by other Federal or State government agencies and 40% of the county is providing the tax base for county and municipal services.

Planning and Technical Services:

The planning and technical capabilities of Carbon 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 Carbon County there is not a GIS trained staff member. 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:

Carbon County has an elected County Commission consisting of three commissioners. The emergency manager is assigned multiple duties that include developing the CWPP, supervise the Carbon County HazMat Team, develop and conduct multifunctional exercises, and other duties as assigned. The county has a Building and Zoning Department with a building inspector. The elected Sheriff provides law enforcement services throughout the county, and the unincorporated towns with a limited staff. Helper City, Price City, and Wellington City do provide law enforcement services. 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 except for East Carbon City. East Carbon City does not have a planning and zoning department.

The ability of Carbon 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

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

Carbon County Plan Goals and Objectives

The goals of the Pre-Disaster Natural Hazard Mitigation Plan include coordinating with local governments to develop Carbon 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.
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.

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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.
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:

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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.

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 Carbon County and the Cities and Towns of Carbon County, the local executives responsible for implementing plans and policies are the Carbon 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

The significance of knowing the population of a county will give direct insight to the impact a natural hazard may have on the local community residents.

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Table 1 Carbon County Population

Year	2010	2013	2014	2015	2016
Carbon County Unincorporated	2,212	1,885	1,627	1,690	6,672
Price City	13,612	13,456	13,469	13,323	8,371
Helper City	2,201	2,302	2,218	2,169	2,112
Wellington City	1,676	1,669	1,674	1,694	1,615
East Carbon/Sunnyside City	1,678	1,600	1,600	1,569	1,606
Scofield Town	24	39	32	34	23
Total Carbon County Population	21,403	20,951	20,620	20,479	20,399

(census.gov/quickfacts/table/carboncountyutah) Jan2018

Table 1A Carbon County, Utah Population Age Breakdown

Age Group	Number	Percent	National Avg.
Under 5 Years	1,632	7.8%	6.2
5 to 9 Years	1,366	6.5%	6.4
10 to 14 Years	1,734	8.3%	6.4
15 to 19 Years	1,577	7.5%	6.7
20 to 24 Years	1,473	7.0%	7.0
25 to 34 Years	2,648	12.7%	13.7
35 to 44 Years	2,346	11.2%	12.7
45 to 54 Years	2,297	11.0%	13.4
55 to 59 Years	1,479	7.1%	6.7
60 to 64 Years	1,311	6.3%	6.0
65 to 74 Years	1,727	8.3%	8.6
75 to 84 Years	903	4.3%	4.4
85 Years and Over	434	2.1%	1.9

<https://www.homefacts.com/demographics/Utah/Carbon-County.html> Dec. 2017

Table 1B Carbon County Ethnic Breakout

Race	Number	Percent	National Avg
One Race	20,367	97.3%	96.9
White	19,341	92.4%	73.1
African American	137	0.7%	12.7

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American Indian	166	0.8%	0.8
Asian	136	0.6%	5.4
Asian Indian	4	0.0%	1.2
Chinese	0	0.0%	1.3
Filipino	28	0.1%	0.9
Japanese	12	0.1%	0.2
Korean	36	0.2%	0.5
Vietnamese	10	0.0%	0.5
Other Asian	26	0.2%	0.8
Pacific Islander	14	0.1%	0.2
Native Hawaiian	0	0.0%	0.1
Guamanian	0	0.0%	0.0
Samoan	14	0.1%	0.0
Other Pac Islander	0	0.0%	0.1
Other Races	573	2.7%	4.8
Two or more Races	560	2.7%	3.1
Hispanic	Number	Percent	National Avg
Latino	2,714	13.0%	17.6
Mexican	2,113	10.1%	11.1
Puerto Rican	3	0.0%	1.7
Cuban	5	0.0%	0.7
Other Hispanic	593	2.8%	4.1
Non-Hispanic	18,213	87.0%	82.4

<https://www.homefacts.com/demographics/Utah/Carbon-County.html> Dec.2017

Economy

The County's economy relies on education, government, coal mining, healthcare, transportation/railroad, energy, trade, and tourism. Shown in Table 2 is a brief list of the county's largest employers according to Utah Department of Workforce Service. The national economy has seen some turbulent times through the last eight years. All sectors were impacted by this nationwide event with the coal industry hit particularly hard. Table 3 shows unemployment rates for 2017. This information offers a glimpse in to the labor force, employment and unemployment for Carbon County. (County and Statewide Information

Table 2 Carbon County's Largest Employers

Industry	Company	Employment Range
Public Education	Carbon County School District	500-699

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State Government	State of Utah	250-499
Coal Mining	Canyon Fuels Company	
Healthcare	Castleview Hospital	
Warehouse Clubs and Supercenters	Wal-Mart	
Coal Mining	West Ridge Resources	
Local Government	Carbon County	100-249
Trucking	Savage Industries	
Oil and Gas Extraction	Anadarko Petroleum Corp.	
Federal Government	United States Government (BLM, FFSL, etc.)	

(Utah Department of Workforce Service)

Table 3 Carbon County's Employment Rates as July 2017

Employment	Carbon County %
Mining	-1.0
Construction	-23.7
Manufacturing	5.6
Trade/Transport/Utilities	-6.4
Leisure/Hospitality	4.8
Information	-5.2
Financial Activities	1.0
Prof/Business Services	2.0
Education/Health/Social Services	-4.6
Other Services	6.9
Government	2.0

(Utah Department of Workforce Service)

Transportation and Commuting Patterns

The transportation routes within Carbon County are Highways 6/191, 10, 123, SR96 and Nine Mile Road. The principle north-south corridors through the county are Highways 6/191 and 10.

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State Highway 10 begins in the county seat of Carbon County, Price City, and continues southbound into Emery County to I-70 while Highway 6 begins in Spanish Fork where it merges with Highway 191 tracking through Helper, Price and Wellington heading southeast toward the eastern side of Emery County connecting into the I-70. Highway 123 runs east of Highway 6 through the town of East Carbon City/Sunnyside. State Route 96 is a state highway connecting SR-264 and the town of Scofield to US6 in a span of about 23 miles. The route is known as Eccles Canyon Scenic Byway and is part of The Energy Loop, a National Scenic Byway. The newest route due to natural gas development over the years is Nine-Mile Canyon running with winding turns roughly southwest to northeast 96 and north of the mountains known as the Book Cliffs and southeast of Ashley National Forest with a 78-mile canyon route formerly SR53 through Gate Canyon which connects the towns of Wellington and Myton. Amtrak passenger rail service passes through Carbon County and the Amtrak Train Depot is located in Helper, Utah.

Land Use and Development Trends

Forty Seven percent (47%) of the property in Carbon County is owned and managed by the federal government, 13% is owned by the State, and 40% is privately owned (Consolidated Plan). These land ownership patterns are like many of Utah's rural counties. Because the Federal government administers most of the land within Carbon County they play a large part in mitigation efforts identified in subsequent sections of this plan. In many cases city development is limited as they are surrounded by federal or state lands.

Land development trends for have been principally influenced by the mining and energy industries. Over the past 5 years Carbon County's development and growth has slightly declined with the reduced national dependence on coal.

Carbon County is surrounded by Sanpete, Utah, Emery, Grand, Duchesne, and Uintah Counties. The challenge that faces Carbon County is water. Low rainfall and poor-quality ground water for the area make clean water resources vital. The main soil in the inhabited areas is Mancos Shale, which is heavy clay like soil with high salt content. As more people move into the county, small acreage owners like the verdant green pastures to feed their horse, cows and other farm animals. The main water resource is the Price River. The suburban development in the larger communities has increased the demand for more community services and infrastructure. Price City hosts the county seat and retains most of the County's businesses. Table 4 Carbon County Land Ownership gives snap shot of the amount of acreage owned by government vs. private ownership. Table 5 reflects the percentage for each type of land use in the county. (NRCS Carbon County Resource Assessment Jan.2018)

Table 4 Carbon County Land Ownership

Carbon County Land Ownership Acentage

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BLM	420,734 Acres
Forest Service	30,264 Acres
SITLA	102,842 Acres
UDWR	20,323 Acres
Private	376,217 Acres
Public Lands Total	574,163 Acres
Carbon County Total	950,380 Acres
Percentage	
BLM	44%
Forest Service	3%
SITLA	11%
UDWR	2%
Public	60%
Private	40%

(United States Department of Agriculture (USDA))

Table 5. Carbon County Land Use and Acreage

Carbon County Acreage per Land Type	
Developed	9,670
Forest	5,530
Grain Crops	550
Conservation Reserve Program	0
Grass/Pasture/Hay	15,500
Orchards/Vineyards	10
Row Corps	0
Shrub/Rangelands	23,160
Water	2,800
Wetlands	0
Carbon County Total	57,229

(NRCS Carbon County Resource Assessment Jan. 2018)

Table 6 Carbon County Residential Building Permits Issued

Year	2011	2012	2013	2014	2015	2016	2017

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Number of Building Permits Issued	34	36	7	25	23	7	12
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(Utah Department of Workforce Service) Jan. 2018

Residential, Commercial, Industrial

Residential growth in Carbon County occurs in small subdivisions outside of the Price City boundaries. The median value of an owner-occupied single-family residence is \$126,800. (2016 census quick facts) While commercial development occurs in and around Price City limits additional industrial development has occurred south of Price along Highway 10 and on Ridge Road.

Roads and Infrastructure, Water, Power

Utah Department of Transportation (UDOT) has widened U.S. 6 from Price to Wellington from two lanes to four. State Road 10 between Carbon County and Emery County south toward Interstate 70 has had a passing lane added in several areas for north and south bound traffic. Nine-Mile Canyon road has been recently paved and repaired for heavier usage. Water—Price, Helper and Price River Water Improvement District (PRWID) have their own water treatment transmission and distribution. PRWID conveys waste water to its treatment plant in Wellington. East Carbon/Sunnyside and adjacent communities operate their water service through Grassy Trail Reservoir. Power- Price City and Helper City own their own power infrastructure (poles, lines, substations, transformers).

Future thought:

Carbon County adopted a community wide Master plan in October of 1997 where Resolution NO. 2005-03 revised the plan and adopted in August of 2005. This was to recognize the threat to property rights and the economy of the county by the energy and mineral developments through Nine Mile Canyon area as well as to protect natural setting and use of zoning regulation in the Development Code for Carbon County. Industrial development will be compatible with the limited water supply. Carbon County is also looking at rezoning the areas that are not appropriately zoned to ensure that industry types will remain consistent with their locations. Carbon County will continue to allow for several types of residential development and will keep these areas away from industrial zones and high-volume traffic corridors. The Plan was Amended with the adoption of the Carbon County Resource Management Plan on December 26, 2017.

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Carbon County will preserve open lands and assist farmers to keep these lands in agricultural production. Preservation can take place through the formation of Agriculture Protection Areas, zoning, and by easing the demand for those lands. The county will also preserve some areas of the mountains and hillsides for no development. Areas that provide critical wildlife winter range and critical watershed will be excluded from development. The county will also preserve the quality of its communities and rural areas and develop an outdoor advertising sign ordinance.

The county will also protect and enhance those areas that have potential for outdoor activities. The Price River corridor will be developed and enhanced with trails. Preservation of access to the trails systems and planning of residential areas near parks and trails will be encouraged.

Risk Assessment

History- During the initial risk assessment for this plan (2000-2003), the assessment found that Carbon County could be vulnerable to the following natural hazards: Dam Failure, Flood, Wildland Fire, Landslide, Problem Soil, and Infestation. Carbon County is also vulnerable to Drought, Severe Weather and to a lesser degree – Earthquake.

During a May 2011 Pre-Disaster Mitigation planning meeting with Carbon County PDM participants; the group agreed on all-natural hazard vulnerabilities previously identified. Furthermore, Problem Soil was discussed at length. The group proclaims that Problem Soil is not a natural hazard; it is a problem throughout the county and may have the potential to be an engineering problem. It is described that landslides are hazards, if a foundation cracks due to the soil it is built upon then it is due to an engineering failure that causes economic issues not failure to a disaster. However, it was decided to keep it as an identified hazard since mitigation efforts can be made. It is identified as a low goal priority because it does not establish immediate action for loss of life or land.

During the June 1, 2017 Pre-Disaster Mitigation Plan 2018 Working Group meeting the Working Group did agree to the identified natural hazards that may affect Carbon County as Earthquake, Landslide, Wildfire, Problem Soils, Dam Failures, Flooding, Drought, Infestation, and Severe Weather.

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 Carbon County. The Carbon County Working Group primarily used available GIS maps and FEMA Floodplain 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.

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Table 7 Carbon County Natural Hazards Rankings

The following table summarizes each of the natural hazards: Ranked accordingly from 1 through 9 (one (1) being the most apparent problem in the county), rated as to Risk/Probability (the likelihood of an event occurring in any given period), and Severity of the Hazard (lives and property that would be affected).

Type of Natural Hazard	Risk/Probability	Severity	County Rank
Severe Weather	Likely	Critical	1
Wildland Fire	Highly Likely	Critical	2
Drought	Highly Likely	Critical	3
Flood	Highly Likely	Critical	4
Earthquake	Likely	Critical	5
Landslide	Possible	Limited	6
Problem Soils	Highly Likely	Limited	7
Infestation	Possible	Negligible	8
Dam Failure	Possible	Negligible	9

Critical Facilities

The Carbon County Working Group identified the following Critical Facilities in Table 8 as the facilities to be considered during the risk assessment process.

Natural Hazard Impact Legend:

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Grand 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, Very Low (VVL), Very Low (VL), Low (L), Low-Moderate (L-M), Moderate (M), Moderate-High (M-H, High (H), Very High (VH), Extreme (E), and Urban, Agriculture, Water, or Barren (W).

(DNR for the Utah Wildfire Risk Assessment Portal has identified)

Dam Failure has High (H) = facility is in inundation area, Moderate (M) = facility is within 0.10 mile of inundation area, and Low (L) = facility is >0.10 mile of inundation area.

Earthquake Peak Ground Acceleration has High (H), Moderate (M) and Low (L) based on data from USGS.

Landslide has High (H), Moderate (M), Low (L) and Very Low (VL) based 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), LW (L), Very Low (VL) Based on Flood Plain Maps and input from the County Emergency Manager.

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).

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 8 Carbon County Critical Facilities

Carbon County Critical Facilities									
Facility Name	DF	DR	EQ	FL	IN	LS	SW	PS	WF
Castlevew Hospital 300 North Hospital Drive Price Utah 840501	L	D2	M	L	L	VL	M	M	L

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(435) 637-4800									
Eastern Utah Surgical Center 200 N Fairgrounds Rd. #1 Price Utah 84501 (435) 637-1744	VL	D2	M	L	L	VL	M	M	L
Carbon Medical Service Association 305 Center Street East Carbon, UT 84520 (435) 888-4411	L	D2	H	L	L	VL	M	M	L
Helper Clinic 125 South Main Helper, UT 84526 (435) 472-7000	H	D2	M	M	L	VL	M	M	L
Utah State University—College of Eastern Utah 451 E 400 N Price, Utah 84501 (435) 613-5000 www.ceu.edu or http://price.usu.edu	VL	D2	M	L	L	VL	M	M	L
Carbon High School 750 East 400 North Price, UT 84501 Phone: 435-637-2463	VL	D2	M	L	L	VL	M	M	L
Castle Heights Elementary School 750 North Homestead Blvd. Price, UT 84501 Phone: 435-637-7177	VL	D2	M	L	L	VL	M	M	L
Castle Valley Center 755 North Cedar Hills Drive Price, UT 84501 Phone: 435-637-9150	VL	D2	M	H	L	VL	M	M	L
Creekview Elementary School 590 West 500 South Price, UT 84501 Phone: 435-637-0828	H	D2	M	H	L	VL	M	M	L
Lighthouse Learning Center 251 West 400 North Price, UT 84501 Phone: 637-7540	VL	D2	M	L	L	VL	M	M	L

Carbon County Pre-Disaster Hazard Mitigation Plan

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Mount Harmon Junior High School 60 West 400 North Price, UT 84501 Phone: 435-637-0510	VL	D2	M	L	L	VL	M	M	L
Wellington Elementary School P.O. Box 407 Wellington, UT 84542 Phone: 435-637-2570	VL	D2	L	L	L	VL	M	M	L
Helper Junior High School 130 Uintah Street Helper, UT 84526 Phone: 435-472-5441	VL	D2	M	L	L	VL	M	M	L
Pinnacle Canyon Academy 210 North 600 East Price, Utah 84501	VL	D2	M	L	L	VL	M	M	L
Sally Mauro Elementary School 20 2nd Avenue Helper, UT 84526 Phone: 472-5311	VL	D2	M	L	L	VL	M	M	L
Bruin Point Elementary 100 Viking Blvd. Sunnyside, UT 84539 Phone: (435) 888-4474	L	D2	H	M	L	VL	M	M	L
Carbon County Children's Justice Center 108 North 300 East Price, UT 84501 (435) 637-0281	VL	D2	M	L	L	VL	M	M	L
Carbon County Sherriff Office and Carbon County Jail 240 W. Main, Price UT. 84501 (435)636-3254	L	D2	M	L	L	VL	M	M	L
Juvenile Justice Center and Castle County Youth Center 1395 South Carbon Price, UT 84501 (801) 636-4720 (435) 636-4740	VL	D2	M	L	L	VL	M	M	L
Price Water Treatment Plant 10030 N 3100 W Price, UT 84501 (435) 472-5718	VVH	D2	M	H	L	VL	M	M	M

Carbon County Pre-Disaster Hazard Mitigation Plan

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Price River Water Improvement District—Water Treatment Plant (435) 472-3103	VVH	D2	M	H	L	VL	M	M	M
Water Storage & Treatment Plant Carbon Ave. Hwy 10	L	D2	M	L	L	VL	M	M	L
Water Storage Wood Hill- buried Northeast Price- above ground	VL	D2	M	L	L	VL	M	M	L
Sunnyside Cogeneration Association I Power Plant Road Sunnyside, UT 84539 (435) 888-4476	M	D2	H	L	L	VL	M	M	L
Carbon County Airport 3085 East Airport Road Price, UT 84501	VL	D2	M	L	L	VL	M	M	M
County Road Department 2660 East Airport Road Price, Utah 84501	VL	D2	M	H	L	VL	M	M	L
Three-State of Utah DOT Facilities -940 South Carbon Ave. Price, Utah 84501 -Highway 6 Junction of 191 Helper UT 84526 -195 North 1435 East Wellington, UT 84542	VL M VL	D2 D2 D2	M H L	M M L	L M L	VL VL VL	M M M	M M M	L L L
Road Departments -450 West 6 TH South Price, UT 84501 -73 South Main Street Helper, UT 84526 (435) 472-5391 -111 Whitmore Sunnyside, UT 84520 (435) 888-6613 Savage Coal Terminal (SCT) Savage Services Corporation Wildcat Loadout Facility - Andalex Resources Inc.	M M L M	D2 D2 D2 D2	M M H L	H M M L	L L L L	VL VL VL VL	M M M M	M M M M	L L L L
Compressor Facilities Consumer Site 39.653266 lat		D2							

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

-110.979938 lon -Pinnacle Peak Location 39.579648 lat -110.949054 lon -Dominion Energy Plant 322 West 1100 North Price, UT 84501	VL VL VL		M M M	L L L	L L L	VL VL VL	M M M	M M M	M L L
Substations -80 North 200 East Price, UT 84501 -533 North 1200 East Price UT 84501 -50 North 50 East Price, Utah 84501 - 641 West Price River Drive	VL VL VL H	D2	M M M M	L H L M	L L L L	VL VL VL VL	M M M M	M M M M	L L L L
Substation -Helper Substation Wilson Street between Palmer and Railroad Ave. -Martin Sub Station 10 North Helper, UT 84526	L VH	D2 D2	M M	L H	L L	VL VL	M M	M M	L L
Substation -Columbia, UT 90.3114.7 Lat 110.2324.6 Lon	VL	D2	H	L	L	VL	M	M	L
Substation Meridian St. Helper, UT 84526	VL	D2	M	M	L	VL	M	M	M
Substation -2816 US 191 Price, UT 84501	VL	D2	M	H	M	VL	M	M	M
East Carbon Fire Department 105 West Geneva Drive East Carbon (435) 888-2100	H	D2	H	H	L	VL	M	M	L
Helper Fire Department 97 South Main Street Helper, Utah 84526 (435) 472-3572	H	D2	M	M	L	VL	M	M	L
Scofield Fire Department 155 Ivy Street Helper	VL	D2	M	M	L	VL	M	M	L

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

(435) 448-9221									
Wellington Volunteer Fire Department 150 W Main Wellington, UT 84542 435-637-5213	L	D2	L	L	L	VL	M	M	L
East Carbon Police Department 101 West Geneva Drive East Carbon (435) 888-2081	VL	D2	H	L	L	VL	M	M	L
Helper Police Department 97 South Main Street Helper (435) 472-3719	H	D2	M	M	L	VL	M	M	L
Price Police Department 910 North 700 East Price, UT 84501 (435) 636-3190	VL	D2	M	L	L	VL	M	M	L
Highway Patrol 1367 South Carbon Avenue Price (435) 637-0980	VL	D2	M	L	L	VL	M	M	L
Wellington Police Department 150 West Main Street Wellington, Utah (435) 637-4830	L	D2	L	L	L	VL	M	M	L
Eastern Utah Broadcasting KOAL 750AM KARB 98.3FM KRPX 95.3FM 1899 Carbonville Rd Helper, UT 84526 (435) 637-1167	M	D2	M	M	L	VL	M	M	L
Emery Telcom ETV News 625 East 100 North Price, UT 84501 (435) 613-9605	VL	D2	M	L	L	VL	M	M	L
AJB Broadcasting KUSA 100.1FM KSL 104.9FM KARB 1080AM 6 East Main Price, UT 84501	VL	D2	M	L	L	VL	M	M	L

Carbon County Pre-Disaster Hazard Mitigation Plan

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(435) 637-1080									
Sun Advocate 845 East Main Price, UT 84501 (435) 637-0732	VL	D2	M	L	L	VL	M	M	L

Carbon County Natural Hazard Profiles

Dam Failure

Hazard Profile

Potential Magnitude	X	Negligible	Less than 10%
		Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	Possible	
		Unlikely	
Location	Scofield Dam is in the Northwestern area of the County while Grassy Trail Dam is in the Northeastern area of the County.		
Seasonal Pattern or Conditions	Rainy Day Failure happens mainly during heavy precipitation events and may have some warning time. Sunny Day Failure happens with no warning at all and 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 Water Rights information. Carbon County GIS Department preparation/dissemination of inundation maps and Division of Emergency Management preparation of Hazard Risk Analysis for Critical Facilities in Carbon County.		

Description of Location and Extent

There are numerous dams throughout the County, the Utah Division of Water Rights identifies 11 dams that are federally inspected by the Bureau of Reclamation or inspected for general, flood control and industrial purposes. Table 9 lists 11 dams with the hazard rating (High,

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Moderate, and Low). There are two dams that are given a ‘High’ hazard rating. High hazard is defined as a possibility of life being lost due to dam failure. Three dams are listed, as having a moderate hazard rating, meaning there is a significant likelihood of downstream property loss if the dam were to fail. The remaining six dams have a low hazard rating; meaning if they were to fail there would be insignificant property loss.

Table 9 Dam Hazard Rating for Carbon County

	Dam Name	Hazard Rating
1	Scofield Reservoir	High
2	Grassy Trail Reservoir	High
3	Sunnyside Co-Generation Reservoir	Moderate
4	Price Storm Water DB (Cove Basin Park)	Moderate
5	Wellington City Debris Basin	Moderate
6	Anderson East	Low
7	US Steel Corp Tailing Upper	Low
8	US Steel Corp Storage (Clear Water)	Low
9	US Steel Corp Tailings (Lower)	Low
10	Mud Springs Reservoir	Low
11	Miller Creek	Low

(Utah Division of Water Rights)

All dams, regardless of rating should be monitored. It should be noted; dam safety hazard classifications are in the event of dam failure and are based upon the consequences of dam failure. Therefore, the classification of a high hazard dam does not mean that the dam has a high probability of failure.

In the following narratives, downstream towns have been identified; these could be potentially affected if any of the identified reservoirs were to breach.

East Carbon/ Sunnyside City

The Grassy Trails Reservoir was built in 1952 and is jointly owned by East Carbon and Sunnyside Cities. The two cities have consolidated into one city East Carbon/Sunnyside. A possible dam breach of the dam would affect East Carbon/ Sunnyside City, which is 7 miles from the reservoir. This reservoir is considered to have a high hazard threat and the need for mitigation is imminent. The reservoir storage at the spillway crest is 916 acre-feet and the storage at the dam crest is 1,156 acre-feet. Maximum dam breach flow would be 16,000 cubic feet per second.

The Sunnyside Co-Generation Reservoir Dam has a moderate hazard rating. It was built in 1992 and is owned by Sunnyside Cogeneration Associates. The reservoir storage at the open channel spillway is 123 acre-feet. The first downstream town is East Carbon/Sunnyside City, which is only 0.5 miles away.

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Helper City, Spring Glen, Carbonville, Price City, and Wellington City

The Scofield Dam is 10 miles northeast of the town of Scofield. It was constructed in 1943-1946 and has a 73,600 acre-feet capacity at spillway crest. If it were to fail, it would exhibit a natural breach failure. The drainage basin area is 139.6 square miles with an outlet diameter of 60 inches and length of 300 feet. A maximum dam breach flow of 441,000 cubic feet per second. The dam has a high hazard rating with Federal inspections. The first downstream town of 23 miles is Castle Gate; however, being that town was dismantled in 1974.

(Utah Division of Water Rights)

Scofield Dam has had modification for the dam's spillway during the period of 2007-2009. The work included the replacement of the spillway chute, the gate house on the dam crest and replacement of the highway bridge over the dam. The projected cost was figured for the Safety of Dams (SOD) costs \$5.8 million dollars and is divided 85 percent Reclamation and 15 percent Carbon Water Conservancy District. The non-SOD portion of the work is being paid for by Utah Department of Transportation (UDOT) and the CWCD, with the latter paying \$350,000 for control house and the former paying \$670,000 for the highway work. The total cost of the modifications to Scofield Dam is approximately \$7 million dollars. Works began in early July 2007. The work was completed during the last quarter of 2016 and the first quarter of 2017.

Price City

The Price City storm water detention dam, owned by Price Municipal Corporation, is located at 3rd East and 1100 North. This dam was constructed in 1996. The dam is adjacent to existing residential subdivisions and undeveloped land. A second detention dam is in the planning stage at Meads Wash at approximately 1100 north. Price has completed an intercity storm water master plan that is being implemented and developed into a storm water utility. Flood threats have occurred along the surrounding foothills, Meads Wash, Cardinal Wash, the Price-Wellington Canal and the Price River. Canals are impacted by storm water that flows into them throughout the county. The reservoir storage at spillway crest is 12-acre feet. The first downstream town is Price located just 0.1 miles away. The dam hazard rating is moderate, with outlet diameter of 15 inches and length at 137 feet. (Utah Division of Water Rights)

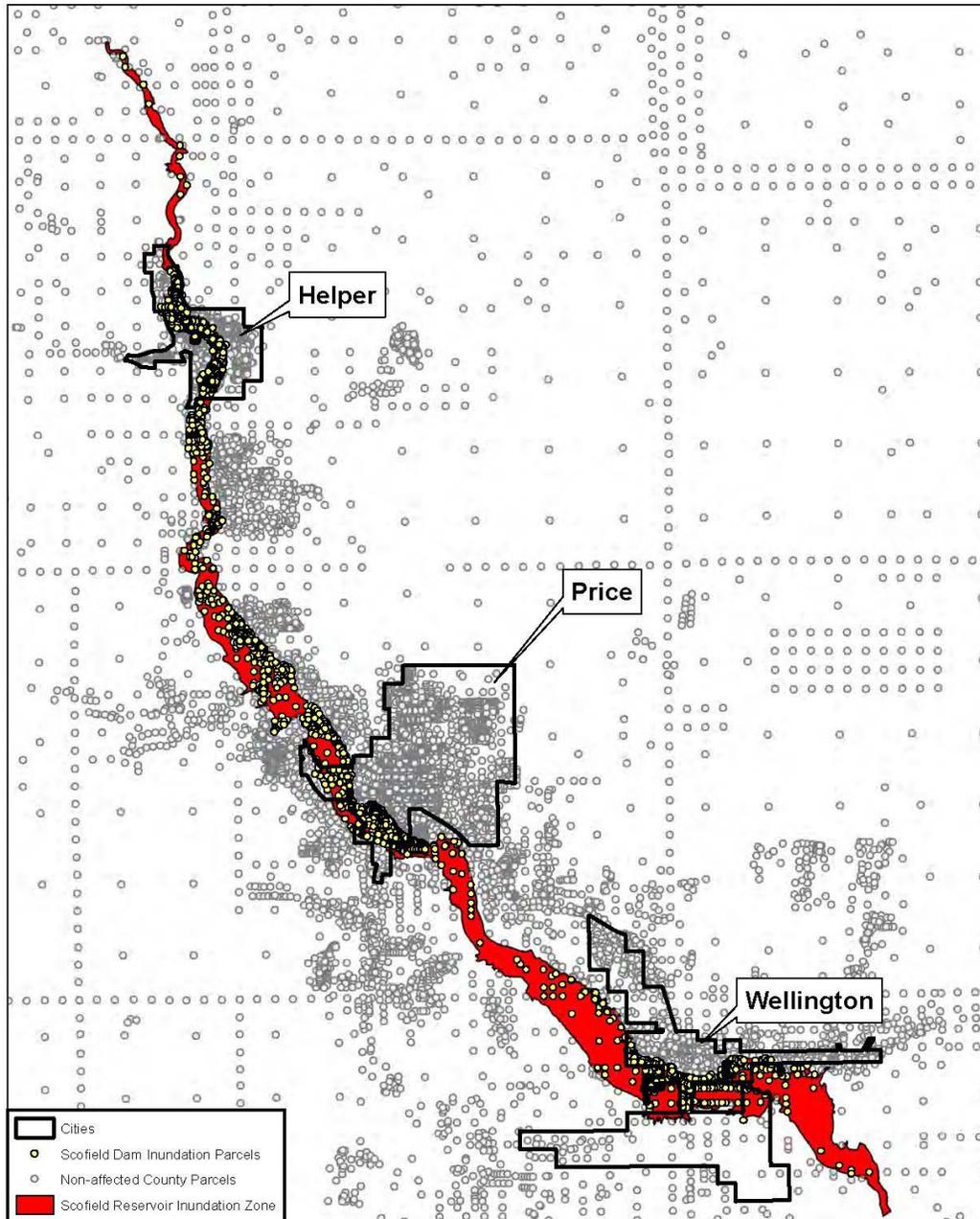
Vulnerability Assessment

Scofield Dam Inundation 2018 Map (Source: Carbon County GIS Office) There are 2401 parcels that intersect the inundation zone.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

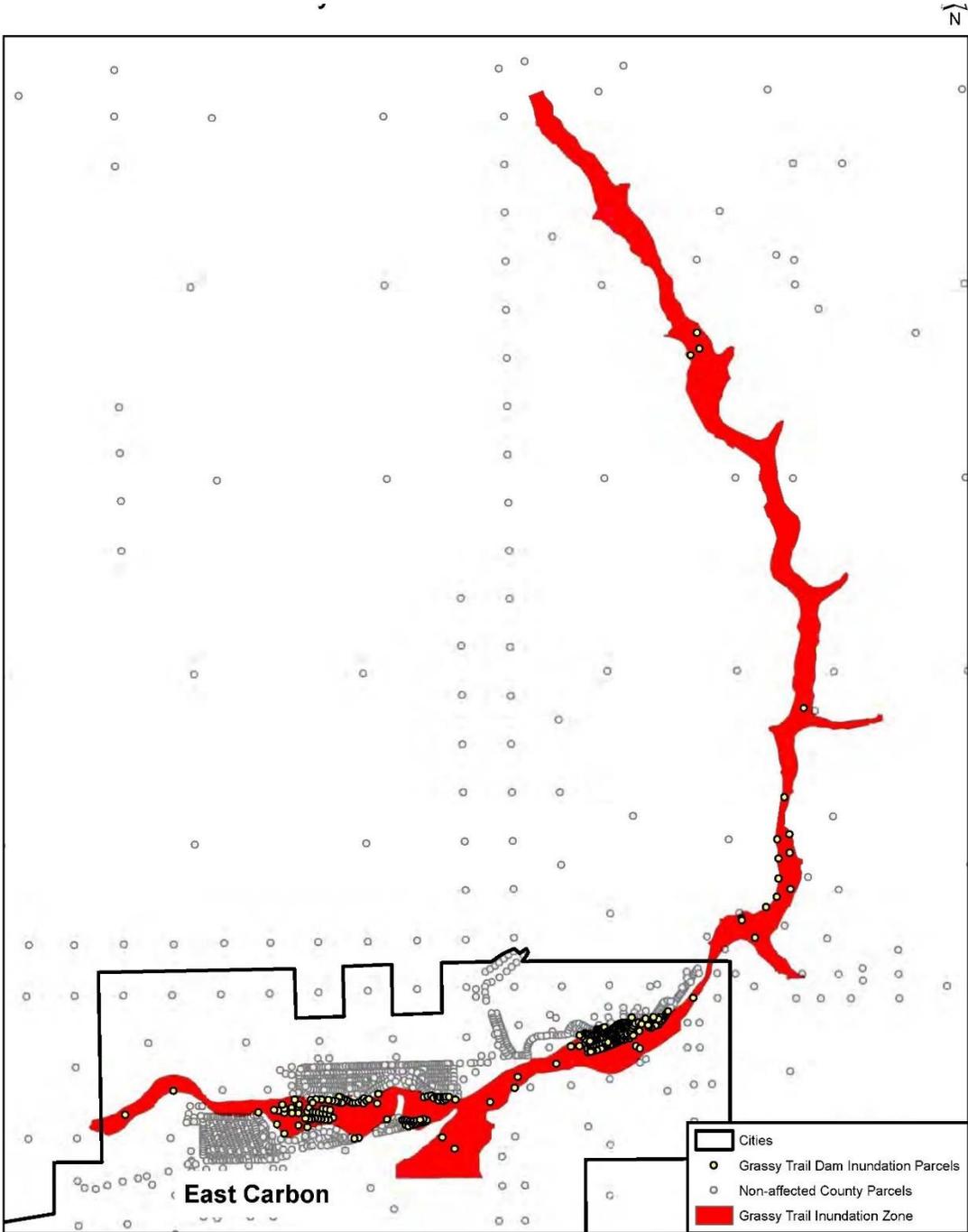
Scofield Dam Inundation 2018



Carbon County Pre-Disaster Hazard Mitigation Plan

2018

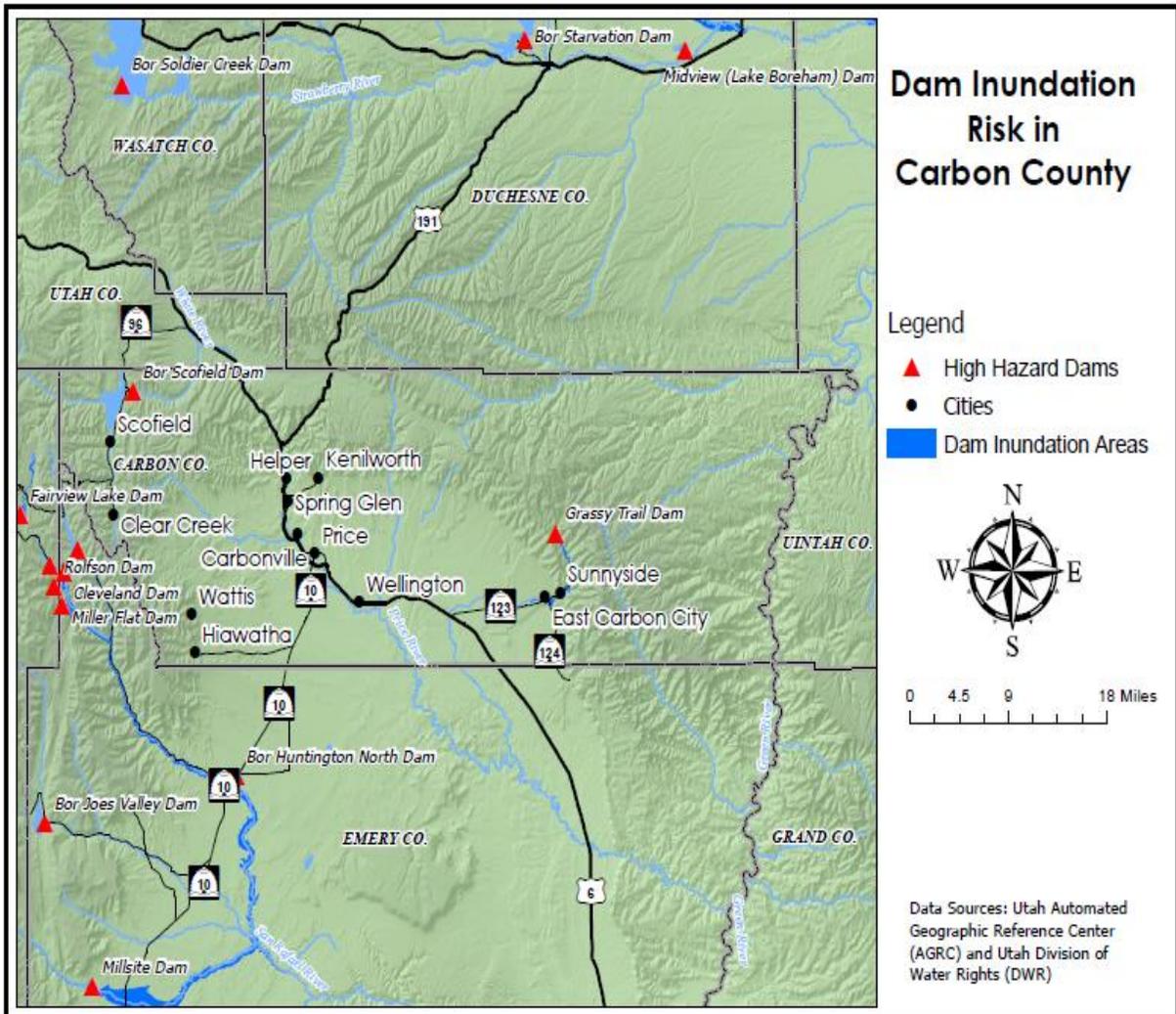
Grassy Trail Dam Inundation 2018 (Source: Carbon County GIS Department) There are 252 parcels that intersect the inundation zone.



Carbon County Pre-Disaster Hazard Mitigation Plan

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Carbon County Dam Inundation Risk



Flood Hazard Profile

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	Primarily along the area of the Price River Drainage.		
Seasonal Pattern or Conditions	Spring, Summer, Thunderstorms, Cloudburst Storms and Heavy Snowfall Runoff.		
Duration	Flooding Can Last Anywhere from Hours to Days and Even Months.		
Analysis Used	Review of Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), the Army Corp of Engineers Flood Study, Hazard Analysis Plans, and Geographic Information System (GIS) data.		

Description of Location and Extent

The entire county can experience flooding near the low-lying areas. The Price River and its tributaries; Cardinal Wash, Meads Wash, Spring Glen Wash, Spring Canyon Wash, Soldier Creek, Coal Creek, Hayes Wash, Deadman Creek, Drunkard Wash, Pinnacle Canyon Wash, Gordon Creek, Garley Canyon Wash, Consumers Wash, and Willow Creek all have the possibility to overflow. The Price River above the confluences of the Cardinal, Meads, Spring Glen, and Spring Canyon Washes, as well as Gordon Creek all tend to flood. The Price River is the main drainage system that flows southwest through Carbon County. Overflow can occur during spring snow melt but generally occurs during summer and fall cloudburst storms. The Flood Insurance Study # 49007CV000A for Carbon County, Utah and incorporated areas was effective May 2, 2012 which is available from the Carbon County Building and Planning Department.

The following canals also pose a threat to Carbon County: Carbon, Price-Wellington, and North Carbon Group. The Carbon Canal is an earthen canal and could threaten the south half of Price including hospital access on Westwood Boulevard and US6; however, frequent floods could potentially affect the west side of Price, including Westwood, and Robertson subdivisions. The Price-Wellington earthen canal could threaten the south half of Price and Wellington. The piped North Carbon Group Canal could pose a threat to Spring Glen, Helper City and North Carbonville areas.

The Price River floodplain between Price City and Helper City has the highest degree of development. The recurrence interval is a long-term average period between floods of a specific magnitude. However, rare floods could occur at short interval recurrence periods. Price

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Canyon is the primary route for culinary water transmission pipeline operated by Price City, Price River Water Improvement District (PRWID), and Helper City. Price and PRWID have water treatment plants in the mouth of Price Canyon at the Castlegate Narrows. Transportation cross roads occur at US6/SR191 at the confluence of Price River and Willow Creek. The UDOT weigh station is just downstream (less than 1 mile) from this conjecture.

Carbon County National Flood Insurance Policy Information

Table 10

Carbon County	Unincorporated	19 Policies	11/15/79 Entry into NFIP	5/2/12 Date of current Flood Plain Map, Level D
	Helper City	12 Policies	3/1/79 Entry into NFIP	5/2/12 Date of current Flood Plain Map, regulations require validating
	Price City	10 Policies	3/1/79 Entry into NFIP	5/2/12 Date of current Flood Plain Map, Level D, question about ordinances
	Scofield Town		Non-Participant	
	Wellington City	1 Policy	2/2/84 Entry into NFIP	5/2/12 Date of current Flood Plain Map, All Zone C
	East Carbon City/Sunnyside City	0 Policies	5/1/86 Entry into NFIP: NOT ACTIVE Sunnyside 9/29/78 entry into NFIP	5/1/86 Date of current Flood Plain Map 5/2/12 Date of current Flood Plain Map, Level D

(Utah Division of Emergency Management NFIP Program July 2017)

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Carbon County, HelperCity, Price City, Wellington City, and East Carbon City have no repetitive loss properties.

The Carbon County Zoning Administrator is the Flood Plain Administrator established by Carbon County Ordinance 10.1.1. The Carbon County Flood Plain Administrator enforces the Carbon County Flood Plain Overlay Zone Ordinance 4.2.22.

The City of Helper Flood Plain Administrator is a City Council Member and enforces the City of Helper Flood Plain Overlay Ordinance 11.5.10.

The City of Price Flood Plain Administrator is the City Engineer and enforces the Flood Plain Ordinance 12.21.11 revised and adopted 1/25/2012.

The City of Wellington Flood Plain Administrator is the City Recorder and enforces the Land Use Codes

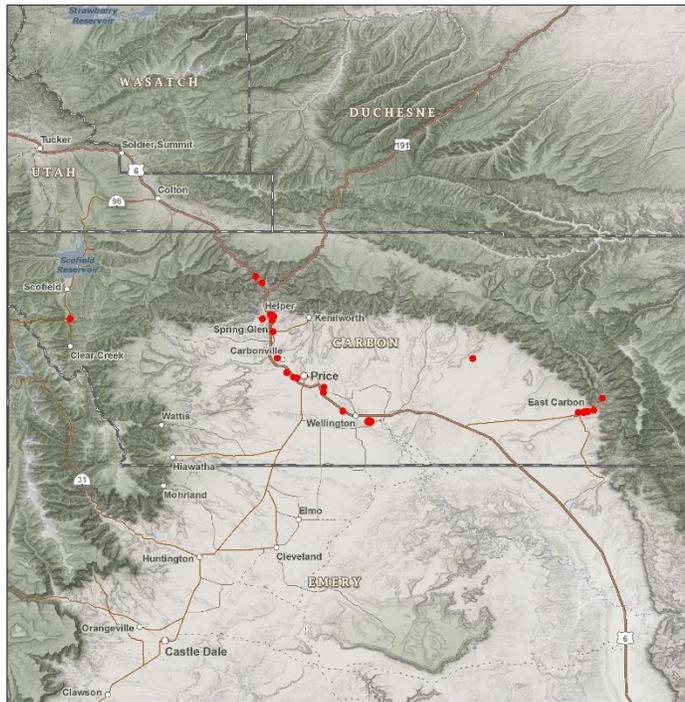
The City of East Carbon Flood Plain Administrator is the Mayor.

Vulnerability Analysis

The impact of a 100-Year flooding event on Carbon County would likely see at least moderate damage to 63 buildings with 9 destroyed. 40 additional buildings would suffer minimal damage. Financial estimates for building-related losses are 60.15 million dollars, there would be approximately 275 displaced households and 370 persons will be seeking public sheltering. (*Hazus-MH: Flood Global Risk Report, April 2018*)

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Direct Building Economic Loss

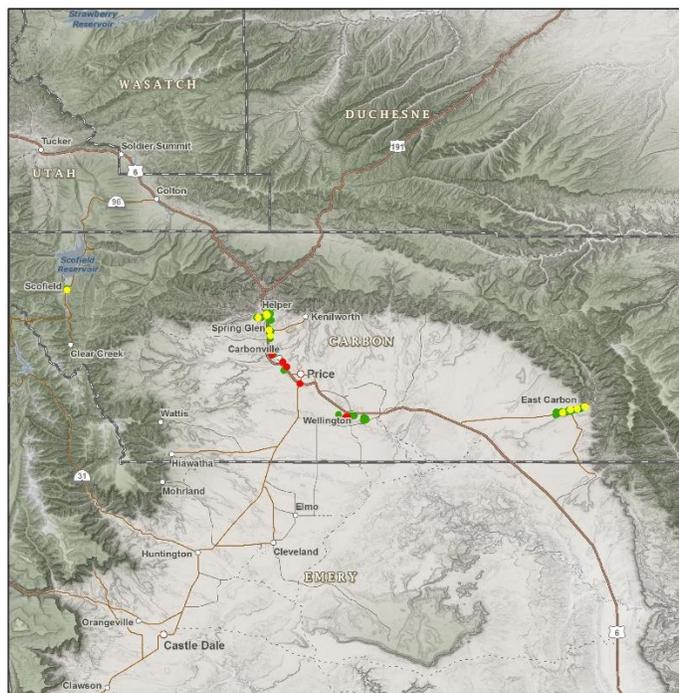
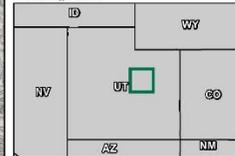
Carbon County 100 Year Flood

1 Dot = \$1,000,000 (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: Carbon 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



Building Inspection Needs

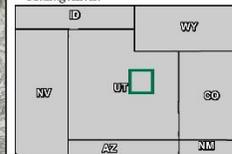
Carbon County 100 Year Flood

1 Dot = 1 Building (by Census Block)

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

Loss Estimation Data: HAZUS-MH 3.2
Level 2 Building and Parcel Data
Imported into the HAZUS General Building Stock from: Carbon 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

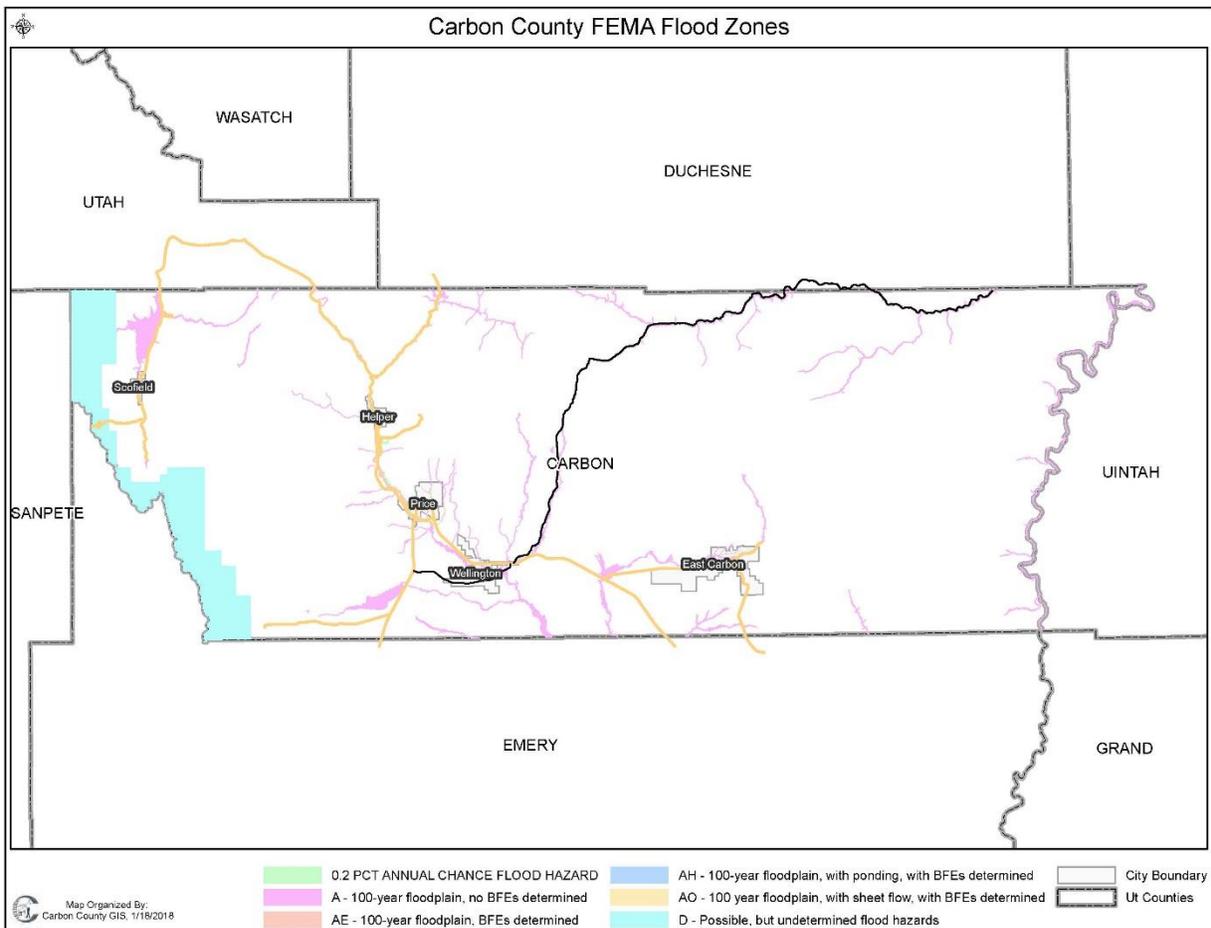


HAZUS Analyst Office of Division of Emergency Management, April 2018

Carbon County Pre-Disaster Hazard Mitigation Plan

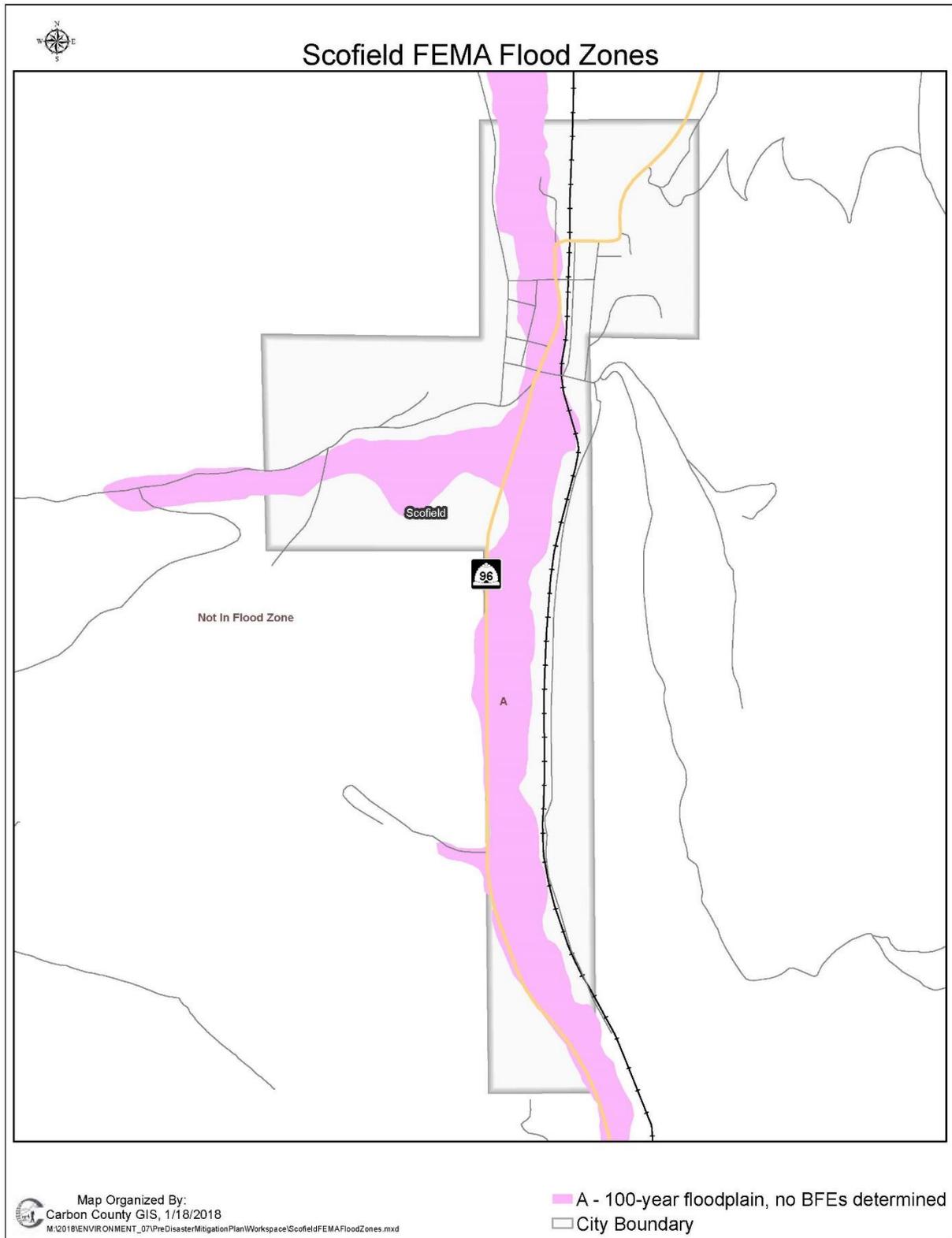
2018

The current digitized floodplain maps below are from the Carbon County's GIS office dtd 2018



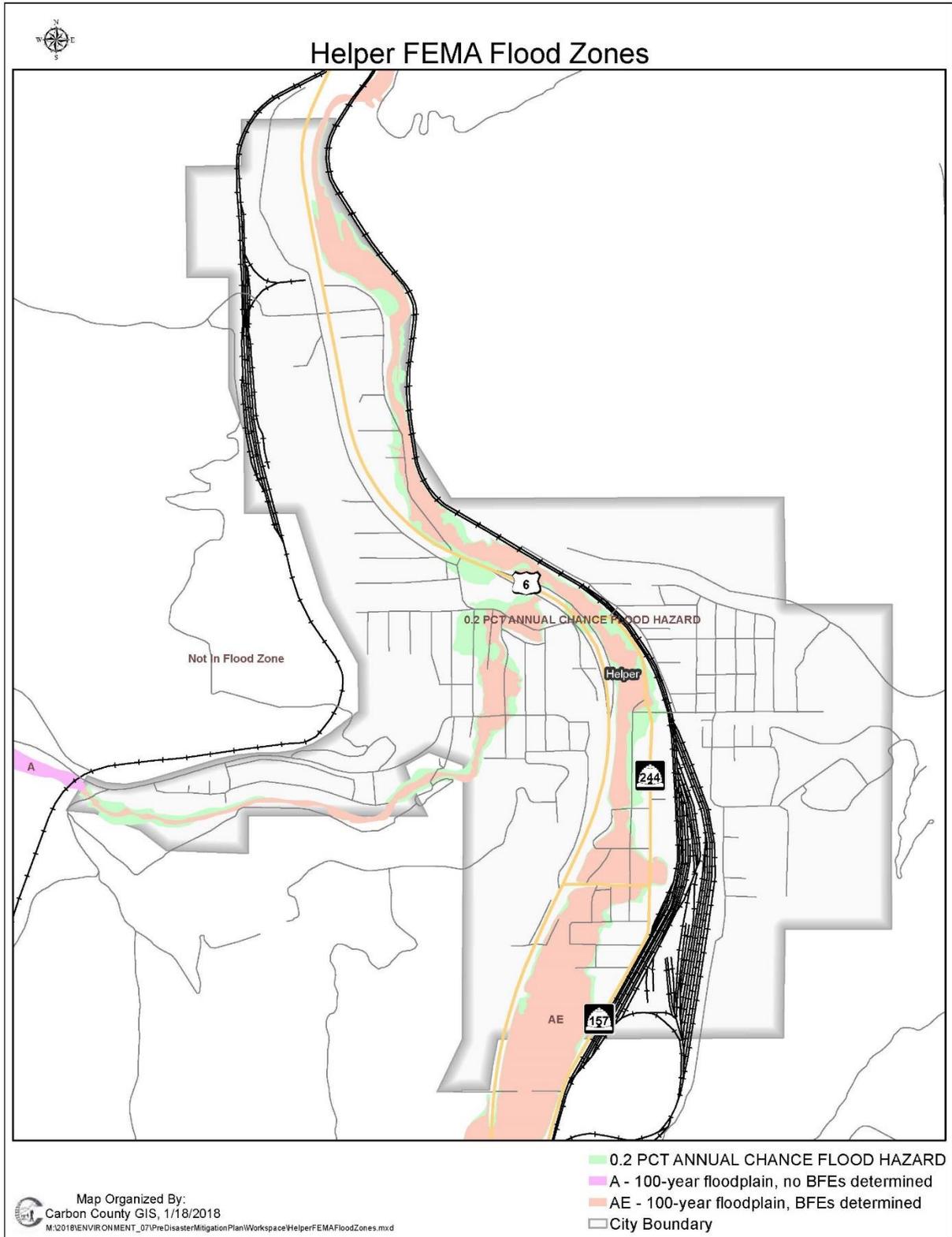
Carbon County Pre-Disaster Hazard Mitigation Plan

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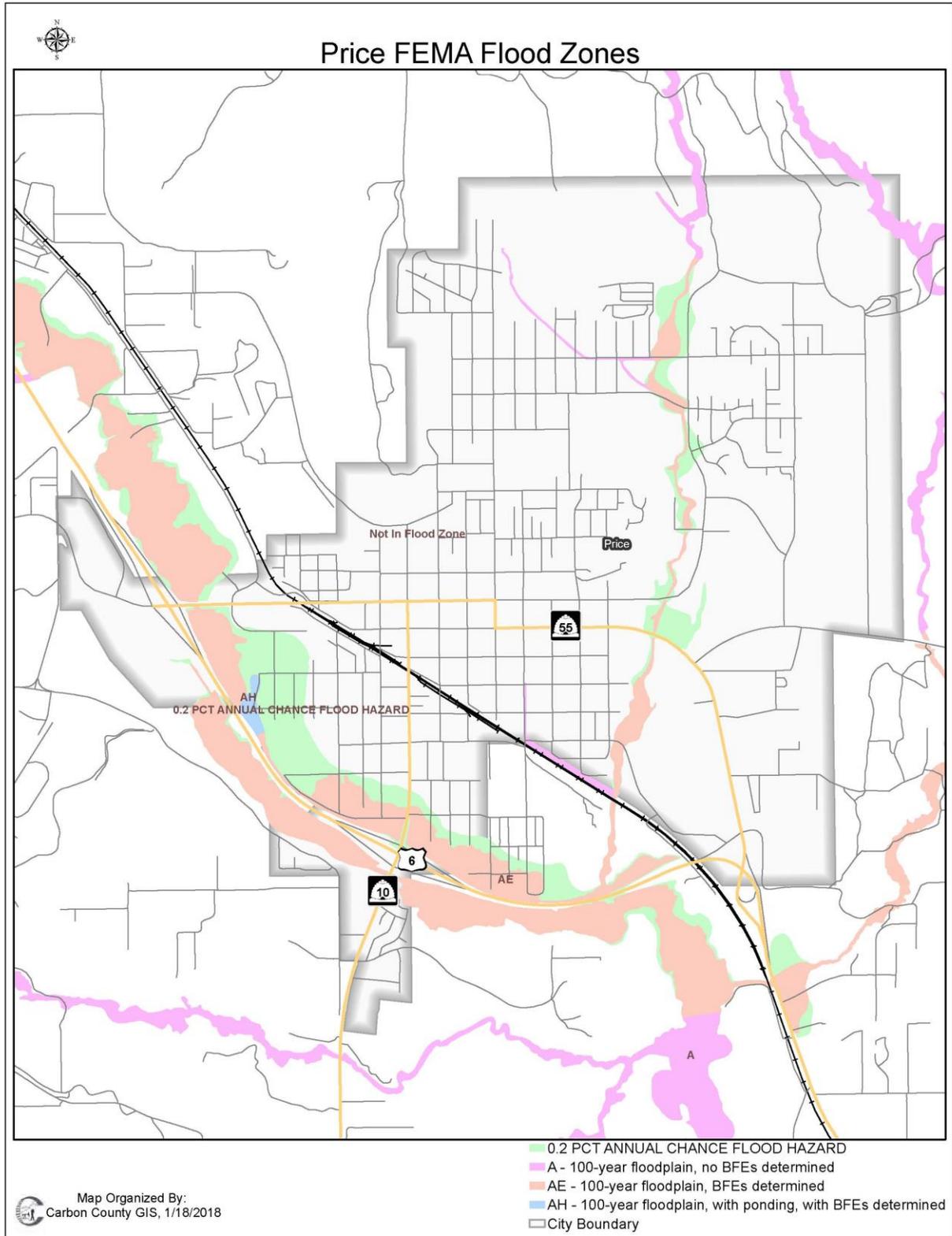
Carbon County Pre-Disaster Hazard Mitigation Plan

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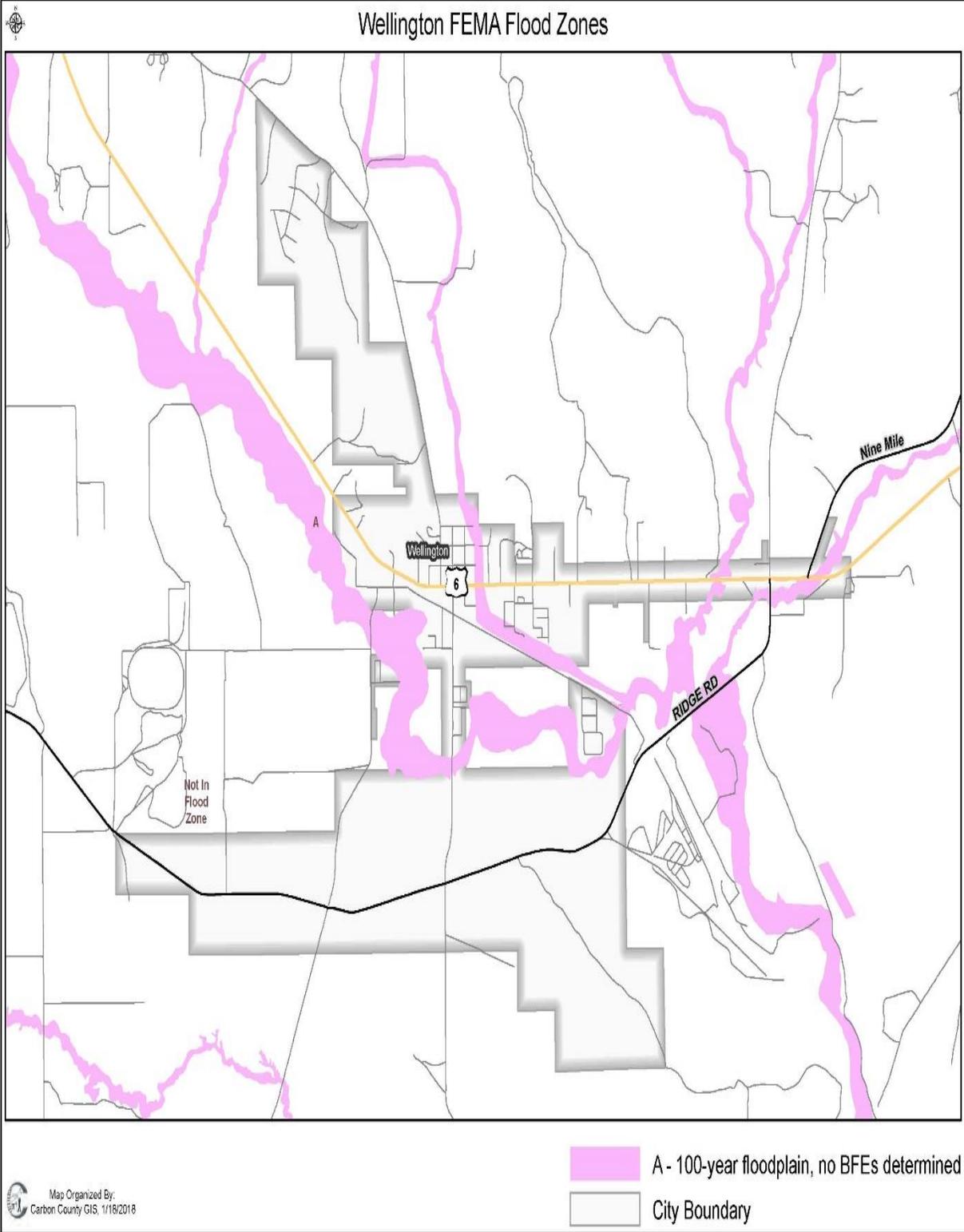
Carbon County Pre-Disaster Hazard Mitigation Plan

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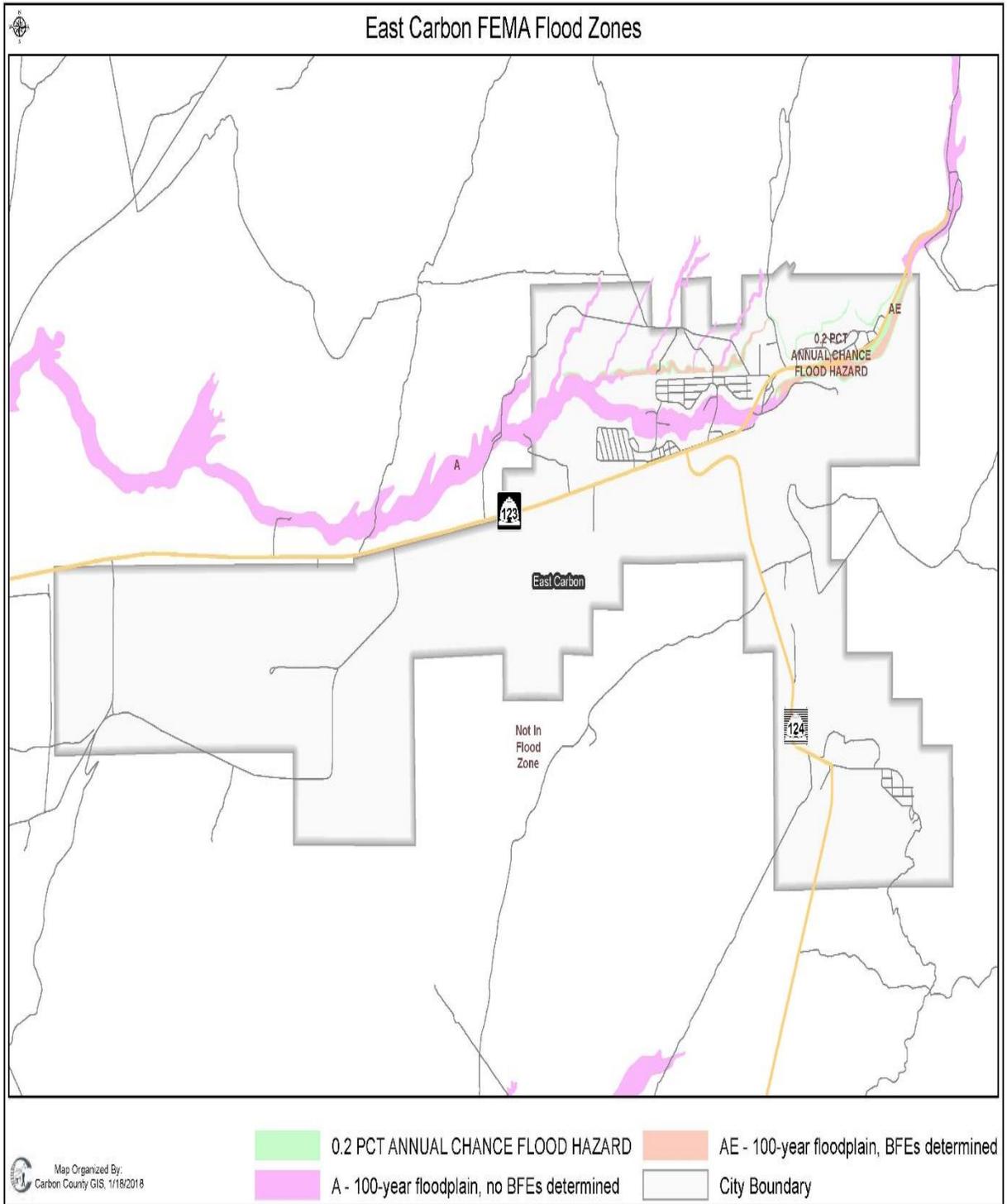
Carbon County Pre-Disaster Hazard Mitigation Plan

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Carbon County Pre-Disaster Hazard Mitigation Plan

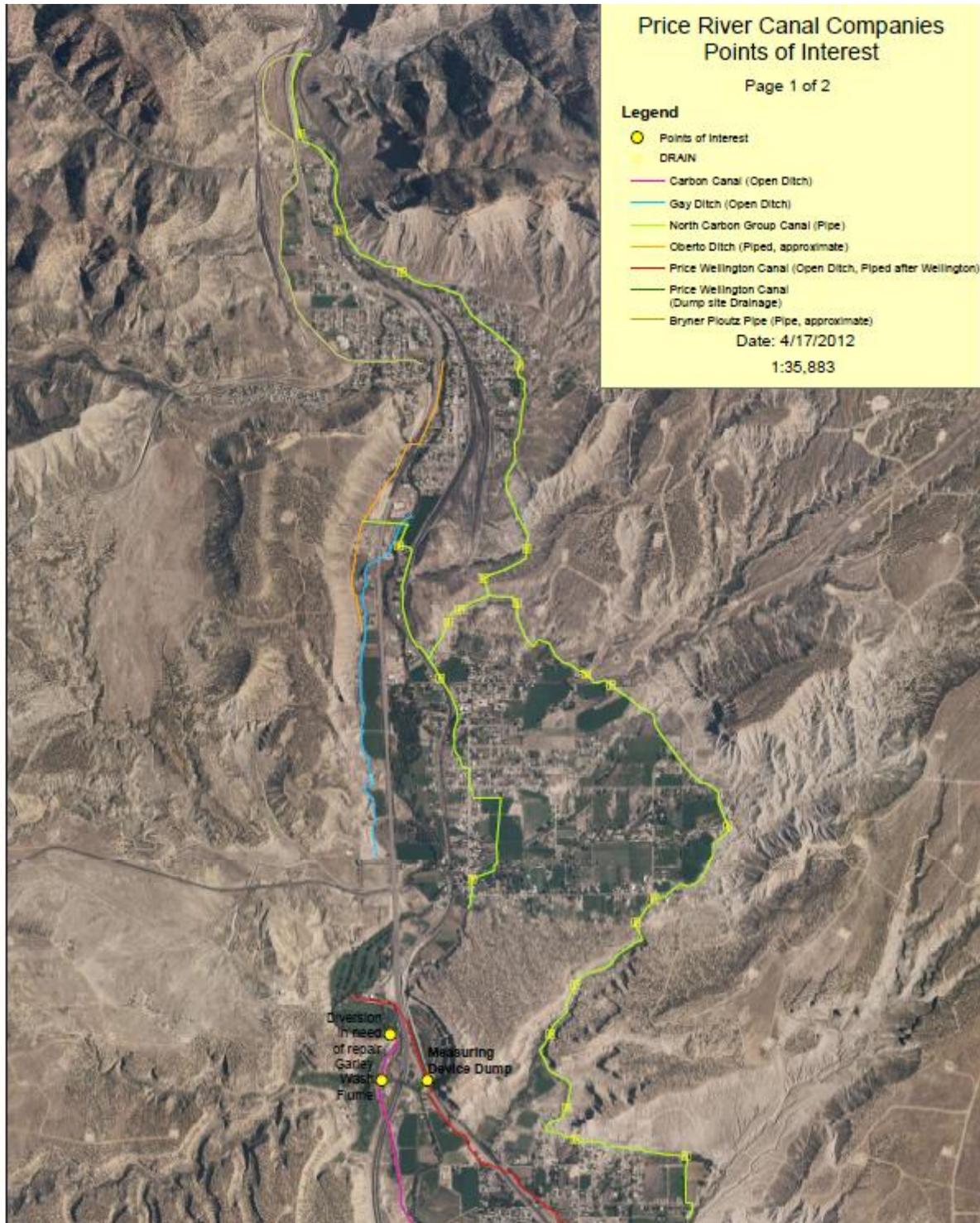
2018



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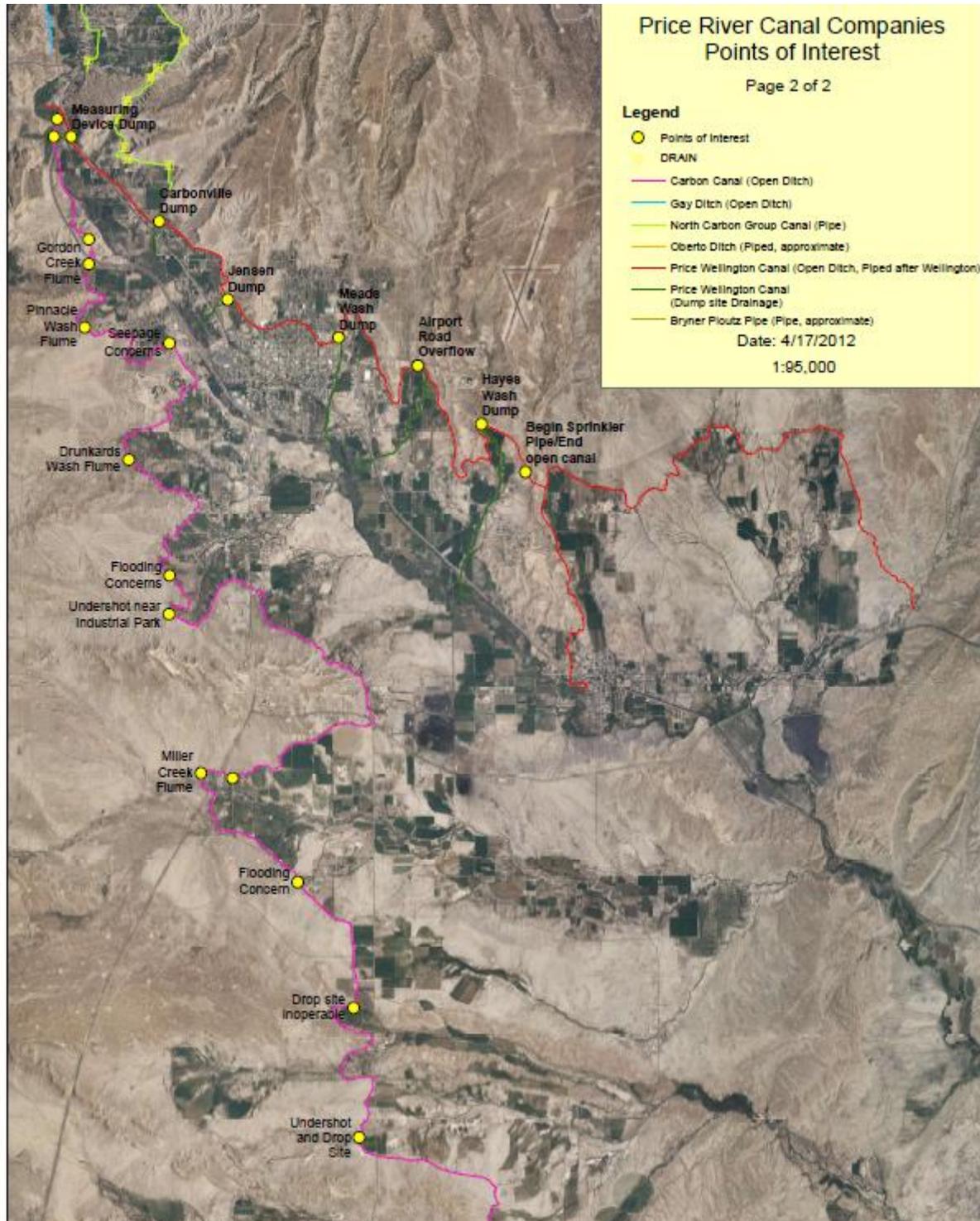
Carbon County Canals



Carbon County Pre-Disaster Hazard Mitigation Plan

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Carbon County Canals (2)



Carbon County Pre-Disaster Hazard Mitigation Plan

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Wildland Fire

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	In zones near the foothills and in forested areas.		
Seasonal Pattern or Conditions	Summer months. Areas affected by drought and/or heavily overgrown and dry brush and debris, lightning and human triggers.		
Duration	Wildfires typically last days but can last months, depending on climate and fuel load as well as resources (financial, manpower) to extinguish the fire. dry brush and debris.		
Analysis Used	Review of plans and data provided by US Forest Service, National Climate Center, FEMA, County Hazard Analysis Plans, SFF&SL and DEM.		

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 Carbon 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.

Carbon County Pre-Disaster Hazard Mitigation Plan

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Vulnerability Analysis

Loss estimates were made by identifying the wildland fire areas of extreme, high, and moderate within the county and then overlaying the infrastructure and the housing databases to identify vulnerable areas. The following table includes the population, number of commercial, and number of residential structures inside extreme, high, and moderate wildfire risk areas within the county are shown in Table 10.

Table 10 Structures and Population in Wildfire Area

Use Type	Extreme Risk	High Risk	Moderate Risk
Commercial Units/Annual Sales	16/\$10.9 million	77/\$102 million	60/\$150 million
Residential Units/*Est. Replacement Costs	638/\$50,170,406	954/\$75,019,698	592/\$46,553,104
Population	1,347	2,048	1,491

*Replacement cost does not include contents, which would increase the values list by approximately 50%.

Wildfire Risk with Municipal Boundaries

Table 11 Wildfire Risk Area contains the number of acres for each wildfire risk area that is within the municipal boundaries of the following cities in Carbon County. Table 12 shows the infrastructures that may be affected while Table 13 lists the Wildland Fires Hazard History for Carbon County over the past 16 years.

Table 11 Wildfire Risk Area

City Name	Acres of Extreme	Acres of High	Acres of Moderate
Helper	305	188	12
Price	56	637	286
East Carbon/Sunnyside	843	2210	1171
Wellington	0	0	0

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Catastrophic Wildfires Cascading Effects

The occurrence of a Catastrophic Wildfire in Carbon 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 13 Wildfire Hazard History (1996-2018)

Start Date	Fire Name	Size (Acres)	Total Fire Cost (est.)
7/25/1996	East Carbon	1200	N/A
5/14/2002	Coal Creek	29	\$25,239.48
6/1/2002	Pasture	8	\$21,286.50
6/2/2002	Mathis	12.1	\$1,050.00
6/11/2002	Mathis	4	\$3,649.50
7/5/2002	Range	3	\$1,601.50
7/23/2002	Bear	5	\$1,222.50
9/6/2002	Deep	42.5	\$29,852.00
9/6/2002	Jump Creek	1	\$1,524.00
6/13/2003	Consumers	5	\$5,808.40
6/28/2003	Fin Canyon	100	\$327,836.73
7/27/2003	Springs	3	\$7,890.38
7/30/2003	Bartles	6	\$20,138.86
8/1/2003	Mathis	5	\$33,098.75
8/29/2003	South Ridge	213	\$91,800.42
8/30/2003	Sawbelly	0.1	\$1,270.00
7/22/2004	Spring	2.5	\$35,820.88
7/25/2004	Columbia	0.5	\$1,160.00
7/26/2004	Cordingly Canyon	0.1	\$1,733.15
8/1/2004	Water Tank	1.3	\$5,796.68
7/8/2005	Flat Canyon	4	\$1,125.00
8/18/2005	Burnt Cabin	2.5	\$1,690.00
6/30/2006	Port	12.2	\$5,255.75
7/12/2006	Spring Canyon Flat	27	\$1,354.25
7/14/2006	Clearwater	2	\$3,529.00
7/19/2006	Rains	0.1	\$2,070.40
6/13/2007	Buckskin	41	\$3,510.00
7/20/2007	Jump Creek	0.1	\$3,952.50

Carbon County Pre-Disaster Hazard Mitigation Plan

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7/27/2007	Soldier Creek	1.5	\$1,240.00
8/26/2007	North Springs	0.1	\$1,040.00
8/26/2007	Cedar	0.1	\$2,348.00
8/26/2007	Pinnacle Gas Well	0.1	\$1,152.00
8/28/2007	Royal Rut	0.1	\$1,114.00
8/28/2007	Crandall	1	\$1,112.00
6/29/2008	Royal Rut	17	\$93,331.07
7/20/2008	Harmon	0.3	\$8,582.30
7/28/2008	Dugout	2.5	\$2,925.00
9/4/2008	Ridge	0.1	\$2,934.00
10/26/2008	Jacob	0.2	\$2,520.00
8/10/2009	John Day Fire	0.25	\$1,459.00
8/27/2009	Bruin Point	2.6	\$4,000.00
9/3/2009	Willow Creek	0.5	\$3,599.00
9/23/2009	Hunt Oil	1.75	\$5,096.00
6/16/2010	Van Duesen	0.1	\$1,784.00
7/7/2010	Load Out	0.1	\$1,061.00
7/17/2010	Whitmore	0.1	\$1,764.00
7/21/2010	Spring Canyon	0.1	\$6,061.50
8/1/2010	Star Point	0.1	\$1,712.00
8/4/2010	Slash	0.1	\$2,108.00
8/13/2010	Jensen Cabin	10.1	11,845.72
6/17/2011	Steer Ridge	0.1	\$1,000.00
7/27/2011	Double Down	0.1	\$2,465.50
3/25/2012	Kenilworth Trail	.10	\$384.18
3/25/2012	State Farm	10.70	\$138.68
3/27/2012	Circle K	50.50	\$2,220.04
3/29/2012	Trailer Park	.10	\$881.30
4/09/2012	Scotfield	35.00	\$1,760.00
4/30/2012	Prickley Pear	.25	\$8,094.00
5/11/2012	Harmon	.25	\$4,365.00
6/01/2012	Helper	1.90	\$1,380.50
6/02/2012	Pumper	.10	\$960.00
6/17/2012	Dead Man	.10	\$155.00
6/28/2012	Coal Creek	.10	\$7,980.00
6/28/2012	Coop	.30	\$4,321.00
6/30/2012	Kenilworth	.10	\$132.00
7/07/2014	Airport Road	.10	\$132.00
7/10/2012	Harmon Canyon	.10	\$954.16
7/10/2012	Harmon Canyon #2	.10	\$352.00
7/11/2012	Stone Cabin	.10	\$1,524.00

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

7/13/2012	Eagle	.10	\$220.00
7/14/2012	Alrad Canyon	.10	\$1,016.00
7/20/2012	Power Plant	.10	\$1,320.00
7/31/2012	Fasselin	.10	\$2,620.00
8/01/2012	Staker	.10	\$683.00
8/07/2012	Grass	.10	\$360.00
8/10/2012	Half Dome	.10	\$3,680.00
8/10/2012	North Springs	.10	\$875.00
8/26/2012	Crandall Canyon	5.00	\$4,368.00
9/24/2012	Miller Creek	.10	\$400.00
11/20/2012	Dry Canyon	7.00	\$10,032.50
4/27/2013	Carbonville	5.00	\$950.00
5/15/2013	Wellington Road	.10	\$1,046.00
5/18/2013	False Alarm Range Valley Ranch	.00	\$1,180.00
6/02/2013	Westwood	4.87	\$2,400.00
6/13/2013	Creek	.10	\$1,020.00
6/16/2013	Meads Wash	.10	\$1,188.00
6/28/2013	Long Canyon	.10	\$852.00
6/28/2013	Sheep	.10	\$1,000.00
6/28/2013	Straw Canyon	1.00	\$1,932.00
6/28/2013	Range Creek	.50	\$16,000.00
7/17/2013	Ponderosa Ridge	1.00	\$36,898.00
7/30/2013	Bennion	.10	\$2,461.00
8/01/2013	Mason	.10	\$1,282.00
8/01/2013	Wildcat	.10	\$773.00
8/01/2013	Abies	.10	\$3,200.00
8/02/2013	N.O. Watis	.00	\$900.00
8/09/2013	False Alarm SR 124 MM1	.00	\$1,856.00
8/10/2013	Pole Canyon	.10	\$1,778.00
8/10/2013	Leaning Tree	.10	\$1,078.00
8/12/2013	N.O. Clear Creek	.10	\$2,388.00
8/18/2013	Green Canyon	.10	\$125.00
8/18/2013	Rock Creek Ranch	.10	\$1,410.00
8/20/2013	Dog Spine	.10	\$459.00
8/21/2013	Alrad Canyon	.10	\$90.00
8/21/2013	Hobe	.10	\$1,200.00
9/07/2013	Woodhill	.10	\$824.00
1/06/2014	Four Mile	.10	\$596.00
2/16/2014	Clay Banks	.10	\$596.00

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

4/24/2014	Railroad Ave.	.10	\$296.70
5/28/2014	Stake Farm	2.00	\$1,000.00
6/07/2014	Gyro	.10	\$300.00
6/11/2014	9 Mile	.10	\$1,625.00
6/18/2014	Black Hawk	.10	\$625.00
6/20/2014	Hiawatha Junction	.10	\$610.00
6/28/2014	Hardscrabble Canyon	.10	\$674.50
7/06/2014	Helper	.50	\$538.00
7/12/2014	N.O. Kenilworth	.10	\$200.00
7/13/2014	False Alarm Coal Creek	.00	\$100.00
7/14/2014	Little Horse	.10	\$4,496.00
7/21/2014	Bear Creek	8.00	\$55,676.00
7/21/2014	Cottonwood Ridge	15.20	\$375.00
7/22/2014	Sunnyside	450.00	\$8,425.00
7/23/2014	False Alarm Cedar	.00	\$200.00
8/10/2014	Geezer Backbone	.10	\$240.00
8/10/2014	Pinnacle Peak	.10	\$615.00
8/16/2014	Price Canyon	2.50	\$852.00
8/17/2014	Tank	.10	\$150.00
8/23/2014	Dry Creek	.10	\$410.00
8/25/2014	Gun Club	.10	\$1,895.00
8/26/2014	Trough	.10	\$1,452.50
11/07/2014	False Alarm First Water Canyon	.00	\$340.00
11/28/2014	Thanksgiving	.00	\$400.00
4/05/2015	Wellington	3.40	\$2,637.00
5/03/2015	Gun Club	.10	\$44.00
5/23/2015	Koal	.10	\$300.00
6/11/2015	C Canyon	.10	\$150.00
6/11/2015	Dugout Ridge	.10	\$150.00
6/13/2015	Train 1,2,3,5, & 6	2.05	\$886.00
6/14/2015	Haley	.10	\$484.00
6/21/2015	1000 South	.50	\$302.50
6/26/2015	Indian Hills	.10	\$394.00
6/29/2015	East Carbon	2.00	\$157.50
7/13/2015	Mounds	.10	\$596.00
7/15/2015	False Alarm Hiawatha	.00	\$555.00
7/18/2015	Dugout Creek	.10	\$1,191.00
7/22/2015	Clark Valley	.10	\$549.00
8/23/2015	Scofield	.25	\$1,439.50

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

8/30/2015	Black Hawk	.10	\$433.50
9/05/2015	Hardscrabble	2.57	\$1,189.00
9/24/2015	Gordon Creek	2.00	\$2,080.00
5/21/2016	Valley View	2.00	\$630.00
6/02/2016	Lukes Trail	.10	\$760.00
6/07/2016	Warehouse Canyon	.10	\$519.00
6/20/2016	Drunkards	1.00	\$3,376.00
6/23/2016	Pinnacle Bench	.10	\$152.00
6/23/2016	Third Point	.10	\$1,245.00
6/23/2016	Carbonville	.10	\$2,257.00
6/25/2016	Gardner	.30	\$1,866.00
7/03/2016	Pine Springs	.10	\$1,591.00
7/04/2016	Spring	.10	\$430.00
7/04/2016	Pinion Ridge	.10	\$477.00
7/05/2016	Old Airport	.10	\$1,259.50
7/14/2016	False Alarm Fairgrounds	.00	\$152.00
7/15/2016	Carbon Canal	.50	\$3,881.00
7/18/2016	Big Springs	.10	\$760.00
7/18/2016	False Alarm Castle Valley Ridge	.00	\$760.50
7/19/2016	False Alarm W Scofield	.00	\$506.00
7/22/2016	False Alarm Horse Bench	.00	\$708.00
8/07/2016	False Alarm Tower	.00	\$822.50
8/09/2016	Cottonwood	.10	\$3,244.50
9/11/2016	Range Creek	32.00	\$1,281.00
9/14/2016	Wattis	.10	\$292.00
10/06/2016	Hiawatha	.10	\$532.00
10/16/2016	False Alarm Cat Peak	.00	\$650.00
4/08/2017	Gordon Creek	.00	\$121.24
5/22/2017	Cutoff	.01	\$250.69
5/27/2017	The Box	.01	\$151.03
6/05/2017	Sheep Canyon	35.00	\$371,308.10
6/08/2017	Cat Canyon	.01	\$771.00
6/08/2017	HWY. 123 MM 3	.01	\$1,349.81
6/08/2017	Rio	.01	\$257.00
7/13/2017	False Alarm	.00	\$284.82
7/23/2017	Buckskin	.97	\$16,316.00
7/29/2017	North Hollow	7.5	\$2371.72
7/30/2017	Meads Draw	.01	\$438.00

Carbon County Pre-Disaster Hazard Mitigation Plan

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8/04/2017	Deadman Creek	.01	\$160.84
8/07/2017	HWY 6 MM 245	.01	\$100.48
8/14/2017	False Alarm	.00	\$123.67
8/15/2017	Soldier	.01	\$384.33
8/21/2017	Hardscrabble Canyon	3.0	\$4,420.74
9/03/2017	Stake Farm	0.1	\$37.50
9/03/2017	Scofield	0.1	\$461.19
9/08/2017	Marsing	0.1	\$396.66
9/08/2017	Carbonville	0.1	\$1,229.10
2018			

Landslide

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	See map Figure 1.6 Landslides generally occur in canyon mouths 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. The recent Seeley and Mathis fire burn scars have little to no vegetation to hold the soils.		
Duration	Landslides generally last hours or days, but some can last weeks, years and decades.		
Analysis Used	Information and maps provided by UGS, DEM, AGRC		

Description of Location and Extent

The map “Carbon County Landslide Hazard” shows the locations of potentially active landslides and identifies historical landslides and their locations. Landslides are generally located in well-defined, localized areas, but when they occur is usually unpredictable. The impact of a landslide can be countywide. The best way to identify future landslides is to identify historical landslides. Several areas in the county pose landslide risks. The largest landslide threat in the county is along the Book Cliff Mountain range where landslides have historically taken place. Specific areas include the Cave Hollow subdivision, which has development adjacent to steep slopes, and the areas of 100 East St. from 500 North to 800 North in Price. This area could be affected because the backyards of these homes are along the base of Wood Hill. Price Canyon has the water treatment facility that could be damaged in a landslide or slope failure event. The Wasatch Plateau has also experienced several landslides.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Price Canyon has unstable slopes that threaten US6, Price River, plus water and sewer pipelines. Past slide activity occurred at the top of Price Canyon just before Kyune. The area above US6 and below the Price Recreation Area has an unstable “creeping” landslide activity. Rock fall occurs up and down Price Canyon is a continual threat with many events causing rock fall onto the road endangering motorists. The weigh station continuously has problems with rock falling.

A major landslide event took place north and west of the Town of Thistle in Utah County, but its impact severely affected Carbon County’s economy. In 1983, the Thistle landslide destroyed the major highway and railroad connecting Price City with the Wasatch Front. Residents were unable to conduct business effectively in and out of Price City and freight costs increased dramatically.

Vulnerability Assessment

Tables 14 and 15 identify the infrastructure within landslide areas.

Table 14 Inventories of Properties in Landslide Risk Areas

Use Type	Number	Estimated Value
Commercial Units	Not Impacted	Not Impacted
Residential Units	97	\$7,627,789
Population	127	N/A
Total Estimated Loss \$7,627,789		

Carbon County Emergency Manager

Table 15 Infrastructure Affected by Landslide

Item	Length (Miles)	Replacement Cost (\$)
Local Roads	1.01	\$2,525,000
State Highways	Not impacted	Not impacted
US Highways	9	\$45,000,000
Price Waterline (Price Canyon)	13	\$15,000,000
Power Lines	1.46	*
Gas Lines	Not Impacted	Not Impacted

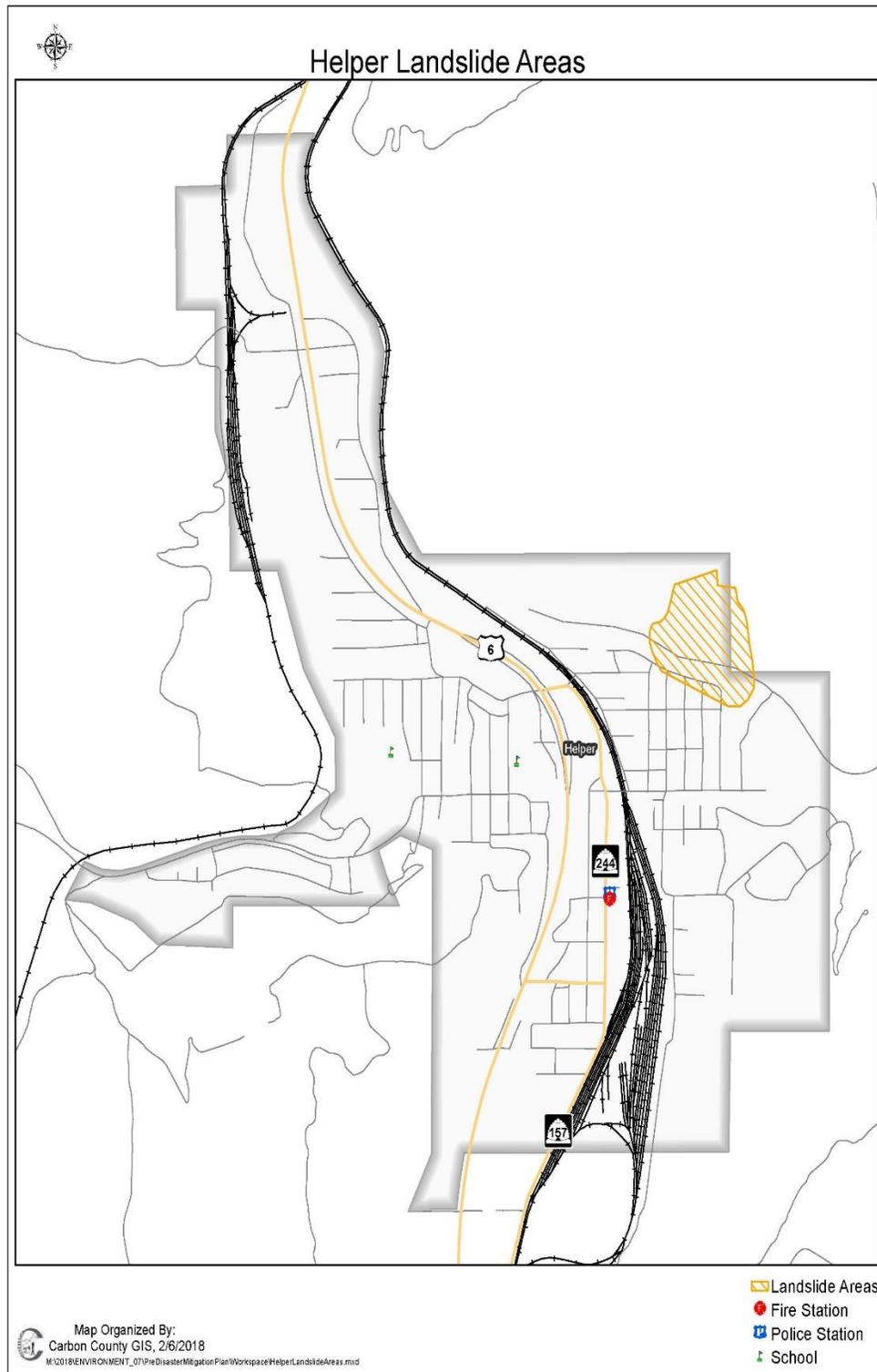
Carbon County Emergency Manager

*Power Grid Information is considered confidential and proprietary.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

City of Helper Landslide Risk



Carbon County GIS 2018

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Problem Soil

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
	X	Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	See map: Carbon County Problem Soils		
Seasonal Pattern or Conditions	Dependent on geology of county.		
Duration	Constant problem.		
Analysis Used	Reviewed information and maps provided by County soil classification books, UGS, Utah Division of Emergency Management (DEM), AGRC, and local input.		

Description of Location and Extent

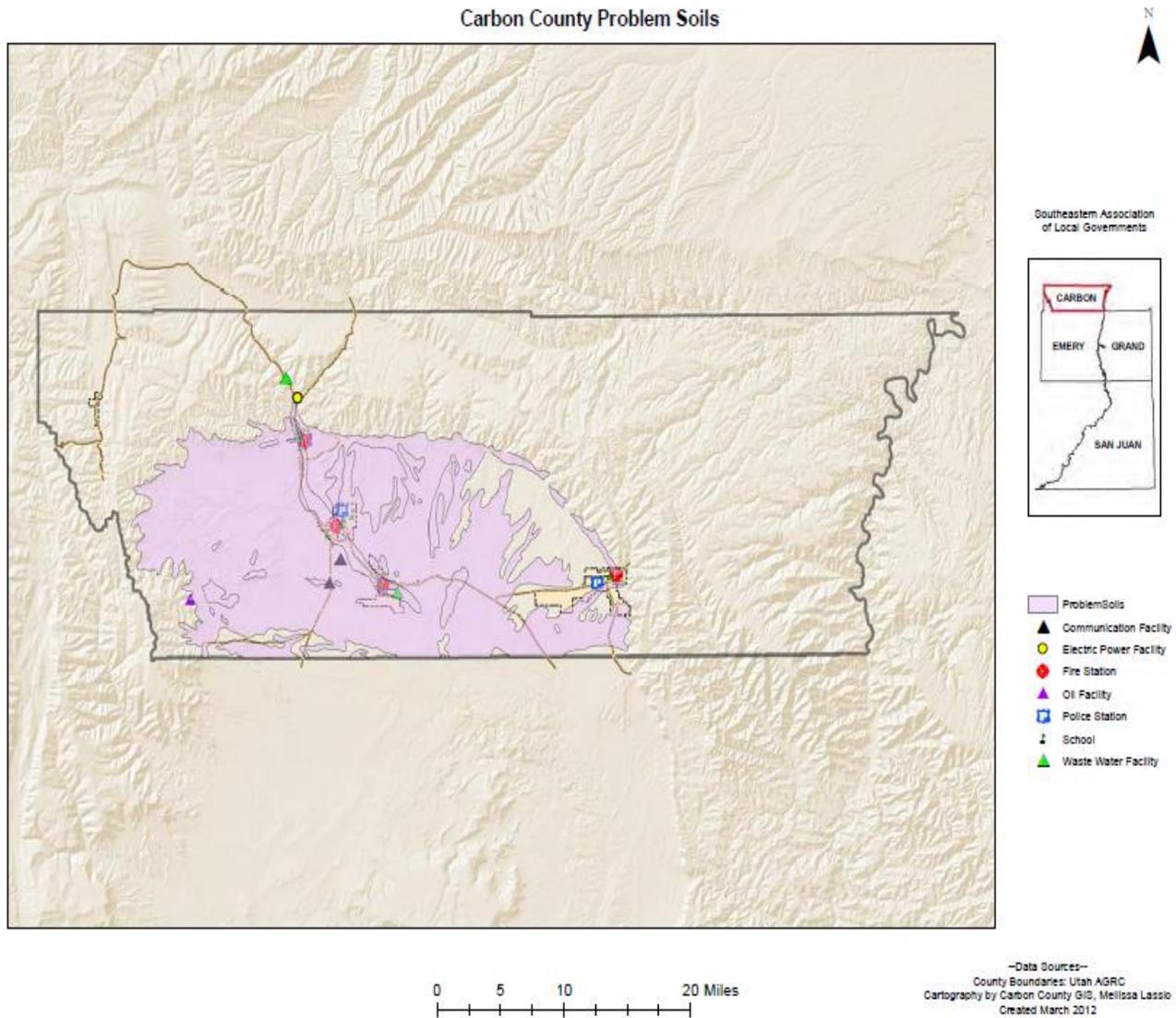
Problem soils pose challenges to construction, utility trenching, and agriculture. The county contains copious quantities of compacted Mancos shale, as well as soils with high alkali content; however, pH of the soil does not pose a major problem. The type of soils and soft rock that tend to swell or 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 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 Carbon County Building Codes. Refer to the "Carbon County Problem Soils" Map to identify the location and/or geographic extent.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Vulnerability Assessment

Carbon County Problem Soils



Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Infestation

Hazard Profile

Potential Magnitude	X	Negligible	Less than 10%
		Limited	10-15%
		Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	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, AGRC. Utah Forestry Fire and State Lands, Utah Forest Service, Utah State University Extension Service, and local input.		

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 and collaborate 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. 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 modern technology for management of forest insects and diseases

(Region 4), (Utah Weed Control Association)

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

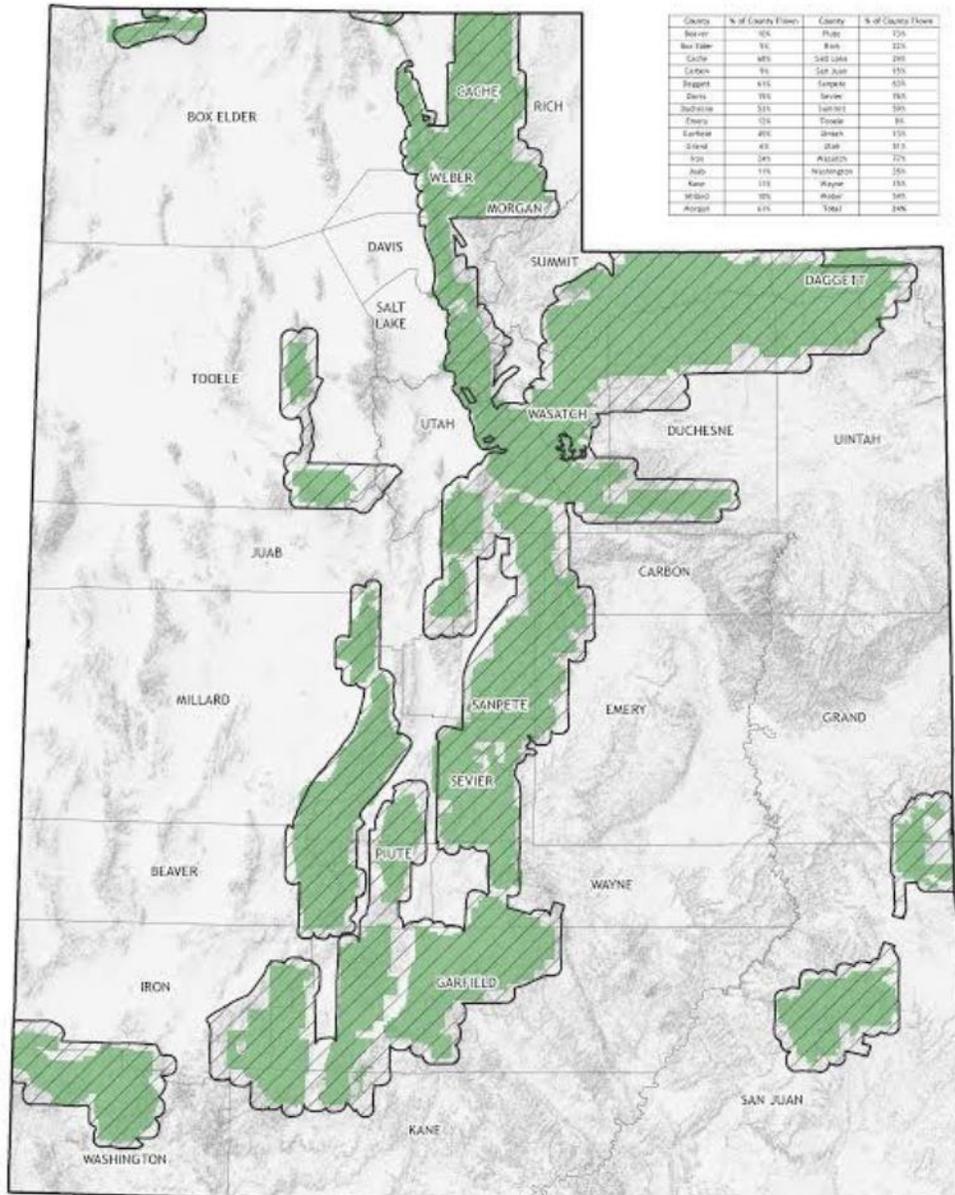
Vulnerability Assessment

Potential loss estimates are difficult 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 future calculations due to the unpredictability of such occurrences. Future analysis for this region may be based on historical events to grasp an understanding of this type of hazard.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Surveyed Areas for the 2015 Aerial Insect and Disease Detection Survey



 2015 Aerial Survey

Total area surveyed: 12,916,519 acres



Carbon County Pre-Disaster Hazard Mitigation Plan

2018

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

Tree Type	Number of Trees	Number of Acres
Mountain Pine Beetle	10 Trees	5 Acres
Douglas Fir Beetle	40Trees	20 Acres
Spruce Beetle	0 Trees	0 Acres
Pinon Engraver	0 Trees	0 Acres
Fir Engraver Beetle	0 Trees	0 Acres
Subalpine Fir	1,650 Trees	775 Acres

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

Cause	Number of Acres
Western Spruce Budworm	131 Acres
Unknown Aspen Defoliant	0 Acres
Aspen Decline	55 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%
		Limited	10-15%
	X	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		

Description of Location and Extent

The severe weather is generally a countywide event also affecting The City of Price, The City of Helper, The City of Wellington, The City of East Carbon/Sunnyside along with the unincorporated communities within the county.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Vulnerability Assessment

The historical record indicates Carbon County, experience 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 Carbon County. Also, the unimproved roads become impassable.

Earthquake

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	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 5)		

Description of Location and Extent

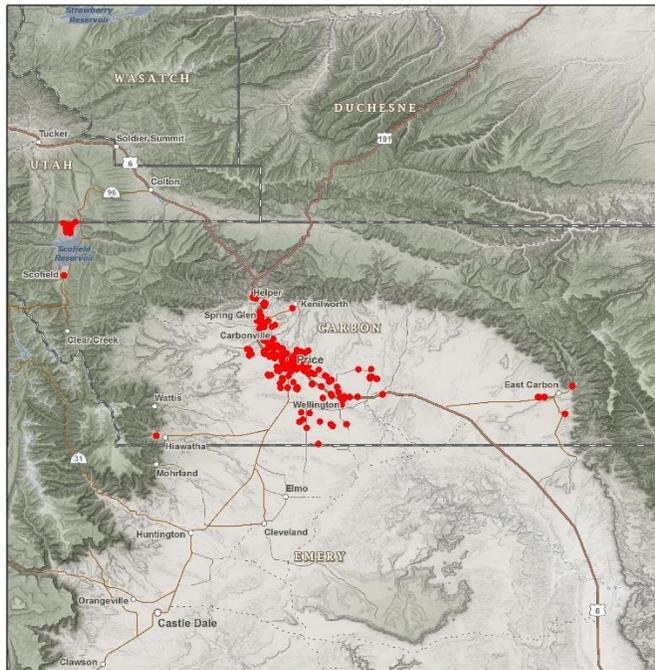
Carbon County has several earthquake fault lines identified in the sparsely populated western side of the county and the county has historically experienced minor earthquakes countywide.

Vulnerability Assessment

The Hazus Earthquake Global Risk Report, April 2018, based on a 6.5 MAG Earthquake indicates 1,759 buildings will be damaged, of those 133 buildings will be damaged beyond repair and 148 households will be displaced. 99 citizens will seek public shelter. The transportation systems will be at or near 100% functionality after day 1. The total economic loss is estimated at 271.70 million dollars.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018



Direct Building Economic Loss

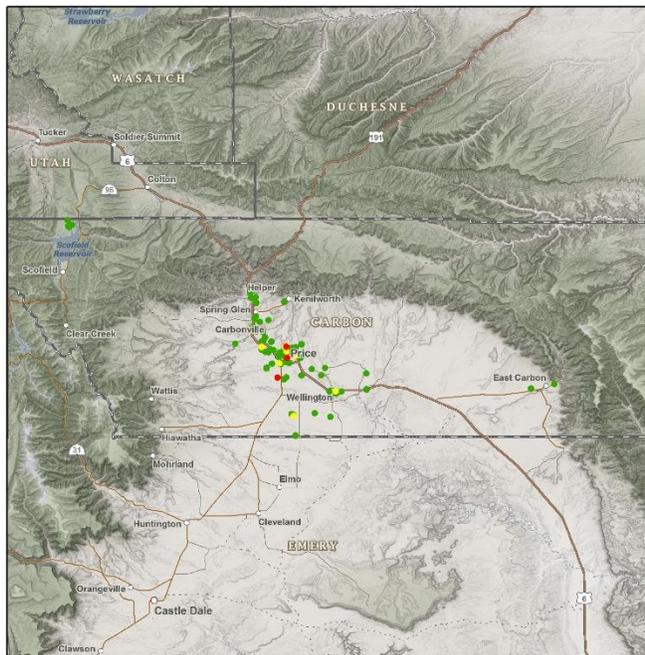
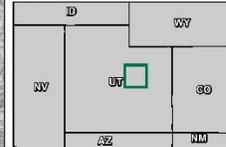
**Carbon County
2,500 Year Earthquake**

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: Carbon 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



Building Inspection Needs

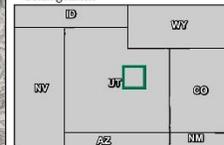
**Carbon County
2,500 Year Earthquake**

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: Carbon 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

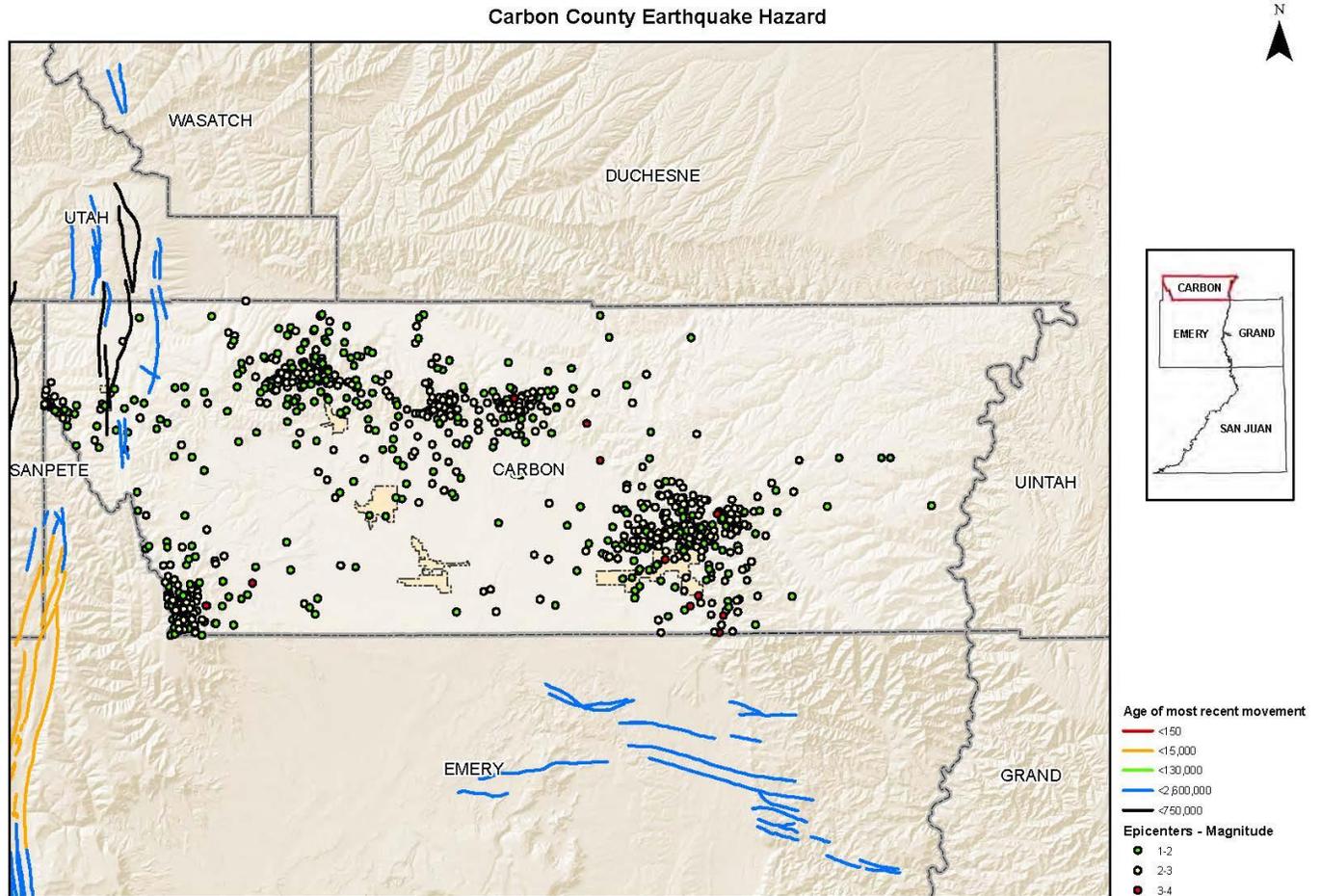


HAZUS Analyst Division of Emergency Management, April 2018

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Carbon County Earthquake Hazards



Map Organized By:
Carbon County GIS, 2/7/2018
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Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Drought

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-15%
	X	Critical	25-50%
		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, several months, to years		
Analysis Used	National Integrated Drought Information System, Utah State University Utah Climate Information		

Description of Location and Extent

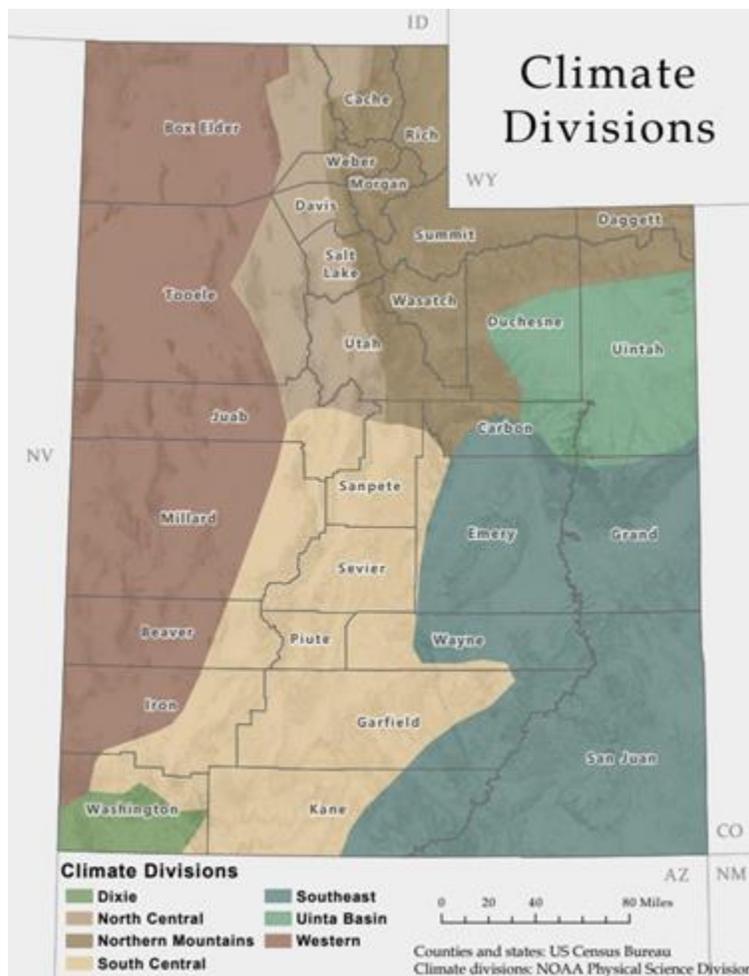
The drought events affect the County, incorporated cities, and the unincorporated communities. The culinary water supply, irrigation water supply, and the stock ponds are depleted during a drought event. Carbon County has signed a Drought Disaster document in April 2018. The cumulative effect of the prolonged drought has affected the economic, social, and environmental fabric of the county.

Vulnerability Assessment

Carbon County is subject to drought events due to its location on the high desert in Eastern Utah. There are three different climate divisions impacting Carbon County; the Northern Mountains, the Southeast, and the Uinta. This is reflected in the climatic divisions map of the State of Utah.

Carbon County Pre-Disaster Hazard Mitigation Plan

2018



The following Bar Graph displays the 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:

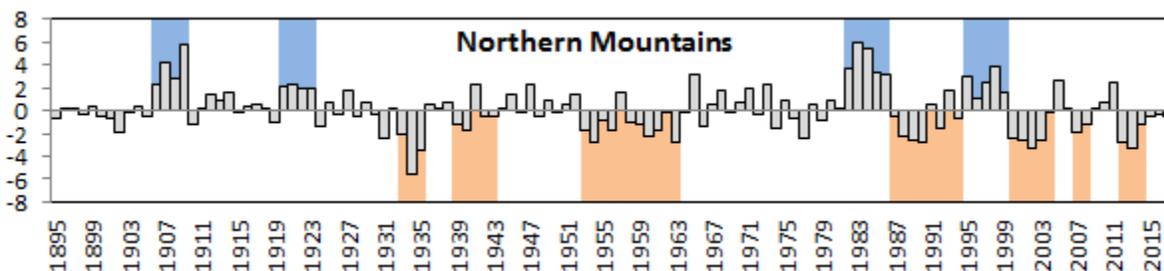
1. A drought was considered to have started with two consecutive years of annual average PDSI values less than or equal to -1.0.
2. A drought was terminated with two consecutive years of near of above normal conditions (annual average PDSI greater than -0.5).

Carbon County Pre-Disaster Hazard Mitigation Plan

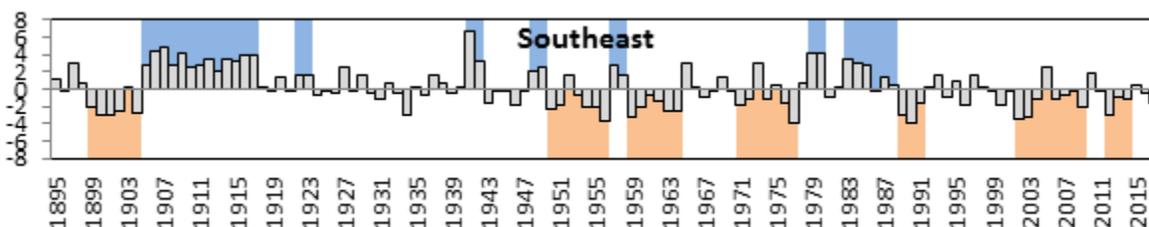
2018

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.



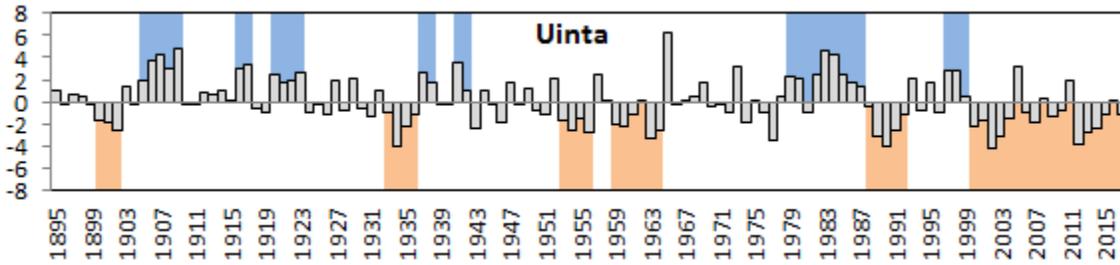
Northern Mountains Climate Division from 1895-2017 - 7 major drought events. The average PDSI value for the total 123-year record is 0.12.



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.

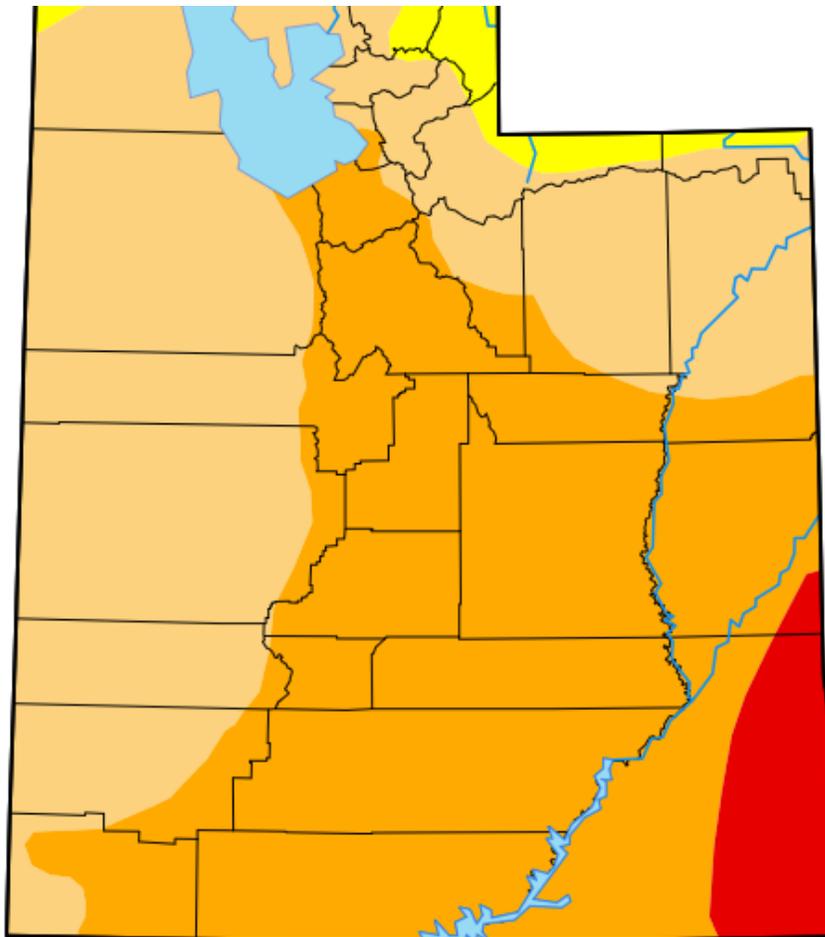
Carbon County Pre-Disaster Hazard Mitigation Plan

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Uinta Basin Climate Division from 1895 - 2017 - 6 major drought events. This region has been in a major drought since 2000. The average PDSI value for the total 123-year record is 0.08.

Drought U.S Drought Monitor- Utah 2018



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Drought Intensities

	None	No Drought
	D0	Abnormally Drought
	D1	Moderate Drought
	D2	Severe Drought
	D3	Extreme Drought
	D4	Exceptional Drought

Hazard History

Identifying past hazard events can help in predicting where future events are likely to occur. The following available relevant information such as date, location, and area impacted, and damage costs are identified in the table below in Table 18. Due to the frequency and geographic extent of problem soil and some severe weather events may not have been recorded and are therefore not identified in the table below.

Table 18: Hazard History (see fire hazard data is in Table 13, some may reflect in both tables)

Hazard	Date	Location/Area Impacted	Comments
Flash Flood	August 6, 1901	West of Scofield: Winter Quarters	2 deaths and property damage.
Flood	Fall of 1911	Countywide: Structural damage	
Flood	September 18, 1919	Helper City (Lost Creek): Price River flooded the city of Price to the canyon mouth above the city of Helper.	Cloudburst storm. Greatest recorded flood in county history with a discharge greater than 12,000 cfs. 200-year event
Flash Flood	August 16, 1928	Nine Mile Canyon: West of Price City	1 death, property damage
Flash Flood	July 29, 1937	Price City	1 death, 3 injuries, property damage
Drought	1930-1936	County wide: municipal and agricultural water supplies	Resulted in the construction of reservoirs, development of groundwater resources, and improved land management
Flood	September 12, 1939	Wellington City	Infrastructure damage

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Hazard	Date	Location/Area Impacted	Comments
Flood	September 13, 1940	Price/Helper	Homes, farmlands and streams flooded. Roads blocked. Soldier Canyon closed due to sliding. Helper accumulated \$10,000 in damage due to Heavy cloudburst.
Flood	August 5, 1942	Helper City, Price River	Damage to homes, roads, rail-lines, mines and bridges, \$75,000 damage.
Flood/Debris Flow	August 5, 1947	Sunnyside City	1 death, property damages.
Flood	July 17, 1953	Price City, Willow Creek Canyon	Property and road damage
Drought	1953-1965	County wide: Agricultural	10-25-year recurrence interval period
Flood	July 5, 1961	Price City	Property and road damage
Earthquake	August 2, 1968	Hiawatha	Richter magnitude 3.5
Flood	July 28, 1968	Spring Glen/Kenilworth	Property and road damage; Spring Glen water line and main street damage
Flood	September 13, 1970	Price/Helper, Price River and Willow Creek	Property damage, agricultural losses, railroad lines blocked, \$10,000 in damage in Helper City
Earthquake	June 11, 1971	Near Scofield	Richter magnitude 3.2
Earthquake	April 14, 1972	South of Sunnyside City	Richter magnitude 3.6
Earthquake	August 10, 1973	West of Sunnyside City	Richter magnitude 3.0
Drought	1974-1978	Countywide: Agriculture	10-25-year recurrence interval period
Flood	Summer of 1983	Countywide-Presidential Declaration	Thistle landslide created severe economic loss of \$7 million. Road, property, water, culvert, and sewer line damage.
Flood/Mud and Debris Flow	May 13, 1984	Clear Creek	1 death, property damage
Earthquake	1985-1986	Countywide	minor structural damage, no deaths
Earthquake	August 14, 1988	Epicenter at San Rafael Swell, Emery County	Richter magnitude 5.3; Impacted almost all of Carbon County
Drought	1988- 1993	Statewide, Carbon County	Agriculture and Industry, with residential water restrictions.
Flood	Summer of 1996	Wellington City	Cloudburst storm. Flooded sewer mains and basements. \$100,000+
Tornado	July 25, 2001	Carbon County: 10 miles SW of Price	1330 MST, 39 36'N, 110 48'W F0 tornado. http://www.wrh.noaa.gov/slc/climae/tornado.php

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Hazard	Date	Location/Area Impacted	Comments
Flood	Summer of 2002	Wellington City. Main Street and 800 East to 1500 East	Cloudburst storm
Severe Weather Wildfire	Summer of 2002	Price Canyon: 3 miles north of Price Canyon	
Wildland Fire	Summer of 2003	Horse Canyon Fire: Burned 15 miles southeast of East Carbon,	The Flames threatened two homes with rain and had diminished the fire, 195 acres.
Wildland Fire	Summer of 2003	Finn canyon Fire: Seven miles south of Scofield Town,	No threat of structures caused minor damage, two helicopters assisted with water buckets, 100 acres.
Infestation	May, 2003	Countywide: 1,000+ acres	Grasshoppers. Related to drought.
Flash Flood	July 30, 2006	Consumers Canyon	20 feet deep wall of water, two dead, rescue teams and volunteers search for months. severe thunderstorm along the eastern edge of Wasatch Plateau sending runoff water in to Consumers Canyon inundating sports utility vehicles and off roaders. Family of five washed down stream with loss of a 1-year old (who was not found) and a 3-year old that died of shortly after of complications. Search continued into October for the body.
Hazmat	October 3, 2006	Price City	Incident of severed transmission line after motorist ran it over on 300 East Main; 40 gallons of vehicle fueled spilled
Wildland Fire	July 6, 2007	Mathis Fire: 13 miles from Kenilworth	\$22613.50. Fire was in close proximity to Aberdeen Mine with a mile radius of a methane ventilation shaft it was contained; 886 acres with 200-foot flames, ranked top priority, Cordingly Canyon.
Hazmat	February 19, 2008	SR 191 Indian Canyon near Helper; Soil and Price River tributary	Tanker truck rollover; spilling 55,000 pounds of ammonium nitrate prill; diesel fuel spillage from truck; threatened nearby water source.

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Hazard	Date	Location/Area Impacted	Comments
Hazmat	July of 2008	Indian Canyon and Price water tributary	Tanker tip over at Mile marker 228 near Emma Park Road; approximately 25,000 gallons of drilling fluid that includes diesel fuel, oil, and mud; Health and EPA continue soil sampling and removed approximately enough soiled to fill a 25' x 75' x 10' hole; cost is over \$138,000 and soil will be monitored over the next five years.
Landslide	August 7, 2008	region wide--US6	Massive mudslide demolished a construction site, closure from Billy's Mountain to Mile marker 191. Traffic was routed over Indian Canyon. Flash flood warning in effect throughout Carbon county area and travel if not advised.
Wild Fire	June of 2009	Scotfield West Subdivision in danger.	Managed fire started in June became large problem, summer residents and full-time residents were evacuated, two wildfire engines and a helicopter battled the blaze with more fire engines, hand crews and type two helicopter carried fire retardant and water over the blaze.
Severe Weather--Lightening	August 24, 2009	Westwood Residential area--Tree damage	A lightning strike destroyed a tree in front of a Westwood area home near Ranch Road, sending large pieces of wooden debris more than 100 feet away from the blast. Surprisingly the incident, which apparently spooked a number of neighbors, seems to have left the home unscathed.
Tornado	July 26,2010	Wellington	Trailer rolled over, trees uprooted no injuries reported (NOAA)
Thunderstorm Lightening	July 13, 2011	Scotfield	Two Struck, One Fatality (NOAA)

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Hazard	Date	Location/Area Impacted	Comments
Hazmat	September 15, 2011	Indian Canyon: Willow Creek-- joins Price River	Truck hauling two trailers of crude oil traveling on SR191 near Helper. Driver pronounced dead at scene, estimated 6000 gallons of waxy paraffin crude oil released into river. Enviro Care, EM Sheriff's Department, and Federal EPA officials assess scene and cleanup efforts.
Severe Weather	December 20, 2010	U.S 6 --Price Canyon	Snow and Ice forced closure and restrictions; Four-wheel drive or chains were mandatory after a one-hour closure of the highway.
Severe Weather-Wind	December 6, 2011	Region wide: 60 miles per hour winds	Toppling trees, damaging homes and casing spotty power outages during early morning hours. Price City reported badly cracked power pole where Rocky Mountain Power replaced within a few days. Local business owner's shops windows were ruined with a cost of \$1000. Wind caused snow drifts to form causing local travel on Highway 10
Wildland Fire	March 29, 2012	3 Miles South of Price, 50 acres	Controlled weed burn jumped the canal banks placing Circle K subdivision in damage. Approximately \$9000 to battle fire.
Drought	June 14, 2012	region wide	Fire restrictions from Utah Division of Forestry, Fire and State Lands, Bureau of Land management, Forest Service, National Park Service, Bureau of Indian Affairs and the U.S. Fish and Wildlife Service announced orders in prohibiting commonality.

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Hazard	Date	Location/Area Impacted	Comments
Wildland Fire	June 26, 2012	Price through Ferron: 15 miles NW of Huntington, Utah,	48,050 acres, Suppression Cost est. \$8,500,000. Utilization of Carbon County Emergency Management, Sheriffs personnel, road department, officials, and volunteers. Lightening caused, July 18 became 100% contained, continued hotspots as of August 1, leaving landscape with flash floods, debris flows, road damage, fish kills, hazard trees, damage to recreation sites, rolling logs and boulders, stump holes and unstable soils. Emergency Stabilization Treatment cost est. \$1,857,000.
Earthquake	July 3, 2012	Sunnyside area	Micro earthquake at 1:07 AM (MDT) Magnitude 1.1. Four miles ESE of local.
Earthquake	July 3, 2012	Sunnyside area	Micro earthquake at 11:47AM (MDT) Magnitude 1.5. Six miles N of Sunnyside.
Flash Flood	September 9, 2013	Wellington	24 Homes flooded (NOAA)
Earthquake	September 21, 2013	2 miles from Clear Creek	2.1 no damage or injuries reported
Earthquake (2)	April 16, 2014	14 miles from Clear Creek	2.1 & 2.2 no damages or injuries
Earthquake	April 24, 2014	14 miles from Clear Creek	2.3 no damage or injuries reported
Flash Flood	August 5, 2014	Helper	100 Homes flooded, \$500,000 damage to public infrastructure (NOAA)
Flash Flood	September 27, 2014	Price	24 Homes flooded in Pilling's Trailer Court (NOAA)
Earthquake	June 2, 2015	8 miles from Helper	2.3 no damage or injuries reported
Flash Flood	September 22, 2016	Price, Wellington, Sunnyside	80 Homes evacuated from Pilling's Trailer Court; \$1.6 Million damage to public infrastructure (NOAA)
Drought	February 2018	County Wide	Severe Drought, Drought Declaration

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Mitigation Goals, Objectives, and Actions

Note: Countywide in this document refers to a mitigation strategy benefiting the cities, towns and communities of: Scofield, Spring Glen, Kenilworth, Carbonville, Wattis, Hiawatha, Helper, Price, Wellington, East Carbon/Sunnyside, and Clear Creek.

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 Carbon County Working Group, Subject Matter Experts (SMEs), and the Carbon 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 Carbon County, Helper City, Price City, Wellington City, and East Carbon City Codes and Ordinances were reviewed for updates and applicability to the mitigation strategies and action plans.

Carbon County:

Carbon County General Plan: Oct.1, 1997 Amended Jan.1, 2010

Carbon County Natural Resource Management Plan: Adopted Aug.2, 2017

Carbon County Zoning Ordinance: Chapter 10; 10.1.1 and Chapter 4; 4.4.22

Carbon County Emergency Operations Plan 2017

Helper City:

General Plan Adopted May 3, 2012

Zoning Ordinance: Chapter 11; 11.5.10

Price City:

General Plan Adopted Feb. 17, 2013

Price City Land Use Development and Management Code

Wellington City:

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Wellington City Land Use Code updated August 2008

East Carbon City:

General Plan Adopted: No Information Available

DAM FAILURE (DF)

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

Goal Priority:	High
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Objective 1: DF1-DF5.	Lives and property from dam failure inundation are at risk. Prevent or mitigate damage to property of public and private infrastructure and loss of life from Scofield Dam failure.	
Action project: DF1.	Install Early Remote Warning System	
	Time Frame:	In Progress
	Funding:	State and Federal Grants
	Estimated Cost:	\$50-\$100 for each remote system however, private consultants estimate \$5,000 and up for each bid site.
	Staff:	Local Bureau of Reclamation (BOR) and County
	Background	Scofield Dam is a Federal Dam; see detailed information on the web site: http://www.usbr.gov/uc/provo/rm/scofield/index.html Flood damage can affect the infrastructure of municipalities such as electric, water, sewer, rail, road and communication.
Action project: DF2	Work with Utah County in maintaining roads around the westside of Scofield Lake and Clear Creek route areas within Carbon County.	
	Time Frame:	Ongoing
	Funding:	B & C Road funds
	Estimated Cost:	\$10,000 Annually
	Staff:	County and State Agencies

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	Background	During severe weather and winter weather the roads deteriorate impacting alternate egress routes.
Objective 2: DF3.	Protect lives and property from Grassy Trail Dam failure in East Carbon City.	
Action project: DF3.	Install sensors at dam site and monitor devices at East Carbon City Offices For early warning of a dam failure or water overtopping the dam.	
	Time Frame:	6 months In Progress (6/12/2015)
	Funding:	Federal Grant
	Estimated Cost:	\$250,000
	Staff:	Private engineering firm will work with East Carbon/Sunnyside administrations.
	Background	Address Public Safety concerns
Objective 3: DF 4.	Minimize safety risk and property damage to East Carbon City from dam failure.	
Action project: DF4.	Construct riprap dike on the east side of Highway 123 from northern East Carbon City boundary to Sunnyside Park.	
	Time Frame:	2018-2021
	Funding:	Federal Grant
	Estimated Cost:	\$800,000
	Staff:	Private construction firm to work with City
	Background	Protect Highway 123 from flooding from a dam failure

FLOODING (F)

Countywide Problem Identification 1: Flooding continues to be of concern in the County and Cities and Towns within the County. The County can experience flooding year-round.

Goal 1:	Priority High	
Objective 1: F1-F6.	Minimize safety risk and property damage to Carbon County resident's due to flooding by establishing, upgrading and maintain structural control measures.	
Action project: F1.	Build catch pond on Meads Wash in Price City.	
	Time Frame:	3-5 Years
	Funding:	City and federal
	Estimated Cost:	\$300,000-\$350,000
	Staff:	City Staff and Federal

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	Background	
Action project: F2.	Build catch pond on Cardinal Wash.	
	Time Frame:	3-5 Years
	Funding:	State, County, and City
	Estimated Cost:	\$75,000
	Staff:	County
	Background	
Action Project F3	Build dissipation basin to protect Westwood Subdivision in Carbon County.	
	Time Frame	2018-2020
	Funding	NRCS
	Estimated Costs	\$1,740,000
	Staff	County
	Background	Storm water overflow threatens the Westwood Subdivision in Carbon County.
Action project: F4.	Excavate Spring Glen, Bull Wash, and Kenilworth Wash	
	Time Frame:	In Progress (6/12/2015)
	Funding:	NRCS
	Estimated Cost:	\$292,000
	Staff:	County, City
	Background	
Action project: F5.	Enlarge culvert and Pine Street and Edge Hill Drive in East Carbon City.	
	Time Frame:	2018-2020
	Funding:	Federal Grant
	Estimated Cost:	\$450,000
	Staff:	Private construction firm to work with City
	Background	Current culvert is not large enough to handle storm water flows
Action project: F6	Install multiple automatic flood water discharge points on Carbon Canal in Drunkards Wash (Carbon County).	
	Time Frame:	2018-2023
	Funding:	NRCS, Local
	Estimated Cost:	\$308,000
	Staff:	Contract
	Background	Flood waters from Carbon Canal overflow endangers the Robertson's Subdivision.

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Problem Identification 2: Work to reduce economic and property loss due to flooding by providing the public education on buying flood insurance.

Goal 2:	Priority High
Objective 1:	Support flood insurance programs.
Action project: F7	Promotion of flood insurance and periodic reviewing of flood studies.
	Time Frame: Ongoing
	Funding: Minimal
	Estimated Cost: \$5,000 Annually
	Staff: County and City Floodplain Administrators, Federal Emergency Management, Agency (FEMA)
	Background: The public is usually not aware they can purchase flood insurance. When residential and business property is purchased through mortgage or loan officers, by law they advise the purchaser if the property is within flood zones. Purchasers must buy appropriate food insurance to secure the property purchase. However, existing business and residential owners may not be aware they are within a flood zone due to the fact flood zone information may not have been available nor city/county codes may not have been established at the time of the purchase.

Countywide Problem Identification 3: Thunderstorms produce torrential rains that cause the canal system to overflow

Goal 3	Priority: Medium
Objective 1	Prevent flooding in Price City from canal over topping due to storm water.
Action project: F8	Install automatic flood discharge points in canal upstream from Price City and at Meads Wash.
	Time Frame: 2018-2023 years
	Funding: NRCS, Price City Funds
	Estimated Cost: \$708,000

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	Staff:	Price City Staff, Consultant
	Background	During storm events, storm water runoff is discharged into the Price/Wellington Canal. The canal does not have the capacity to carry this additional water which could overtop the canal and flood areas in Price City.
Goal 4		Priority: High
Objective12		Reduce flooding at the confluence of Coal Creek, Woods Wash and the Price River by cleaning out and restoring the flow capacity through both feeder streams.
Action project: F9		Clean Out the confluence of Coal Creek and Woods Wash.
	Location:	Wellington City
	Time Frame:	2018-2022
	Funding:	NRCS, County, City
	Estimated Cost:	\$500,000
	Staff:	City, County, Federal
	Background	Historically flooding has occurred at this location.

WILDLAND FIRES (WF)

Countywide Problem Identification 1: Wildfire can significantly impact identified areas of Carbon County.

Goal Priority 1:	High
Objective 1: WF1-WF3	Decrease fuel potential in areas of Carbon County, Helper City, Price City, Wellington City, and East Carbon City by maintaining adequate fire breaks between wildfire zones and residences.
Action project: WF1.	Remove dead and diseased trees in Wildland Urban Interface (WUI) areas within the County and the Cities.
	Time Frame: Ongoing
	Funding: Private, State and Federal Grants.
	Estimated Cost: \$90,000 Annually in Wildfire reduction activities
	Staff: Private, Bureau of Land Management (BLM), and/or Forestry Fire and State Lands (FFSL)division of Department of Natural Resources (DNR) plus County and Cities Fire Departments.

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	Background	Residents are encouraged to eliminate potential fire sources surrounding their property. The Forestry Fire and State Lands (FFSL) a division of Utah Department of Natural Resources (DNR) has programs such as Wildland Urban Interface (WUI) that encourages residents how to alleviate their risks of fire hazard. The FFSL also identifies “Hazard Fuel Removal” by implementing prescribed burns, mechanical treatment and hand treatment methods. The Bureau of Land Management (BLM), FFSL and Forest Service have annual appropriations or grant funds to continue running programs that help reduce fuel potential throughout the county for Federal and State Lands. Fund using matching funds from County and City.
Action project: WF2.	Secure up-to-date property mapping.	
	Time Frame:	Maintain- On Going
	Funding:	Local, State
	Estimated Cost:	\$100,000
	Staff:	City staff to include County assessor, Recorder, and GIS Specialists.
	Background	<p>Maps may be accessed through the online website: http://ims.carbon.utah.gov/IMS.default.aspx</p> <p>A WUI map: development of it came about slopes being a factor and how near they were to population centers. Map of aspen forest (which do not burn well). No need to create special maps.</p> <p>Historical data on fires is updated through the state.</p>
Action project: WF3.	Build roads between fire interface zone and residential areas within the County, Helper City, Price City, Wellington City, and East Carbon City.	
	Time Frame:	Ongoing
	Funding:	Federal Grant(s) and County
	Estimated Cost:	\$750,000 per mile unimproved road
	Staff:	County staff, GIS, and Public Safety City staff and public works staff.
	Background	<p>New IMS data will be available this summer</p> <p>Permit wells if it falls on private land, not on BLM or SITLA, most of the wells that are drilled the county does not approve. County (GIS) has had to follow the road ways for</p>

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		<p>emergency access and purposes. County has been asking the Gas and Oil Companies for Shape files but there has been no response.</p> <p>Public Lands Director: most of the roads are built on old road layers, however there are requests for center lines and information where pipe lines are established so we can identify if there is a hazard risk.</p> <p>County GIS suggests that the gas/drilling companies request a road permit therefore, the county is aware of where gas line roads are established throughout the county and region. This may help in an event of an emergency and response.</p> <p>Comment by Price City Mayor: New Action or possibilities: For a natural hazard to interfere with lines of communication, sewer, water, and electrical. Fire may take out lines and power line structures, floods taking out sewer or water lines.</p>
Action project: WF4.	Fuel reduction in Spring Canyon and Lower Fish Creek below Scofield Reservoir on the west side for Watershed Protection, Critical Infrastructure Protection, and the protection of an Endanger Fish Species.	
	Time Frame:	2018-2019
	Funding:	Federal Grant(s) and County
	Estimated Cost:	\$1,500,000
	Staff:	County staff, BLM, and Forest Service
	Background	The CAT Fire Group has established a Priority for fuel reduction along the Price River below the Scofield Dam to protect the watershed area, and wells servicing the cities and towns below the dam.

Countywide Problem Identification 2: Urban contiguous fire impact lives and property in the county.

Goal Priority 2:	Medium	
Objective 1: WF5.	Mitigate the effect of fire hazards within the city limits of Helper City, Price City, Wellington City, and East Carbon City.	
Action project: WF5.	Review the building codes and adoption on the 3 year cycle established by the State for each city by the CountyEmergency Manager.	
	Time Frame:	Ongoing
	Funding:	Local

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	Estimated Cost:	\$12,000-- \$3,000 per city to update their building code every three years.
	Staff:	Local
	Background	Utah State Legislature receives recommendations from Uniform Mechanical Code. There are locally owned municipalities power line structures. There is a three-year cycle on adoption of building codes ran by a state board.

LANDSLIDE (L)

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

Goal Priority 1:	High
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Objective 1:	Mitigate the effects of rockslides along the highway in Price Canyon.	
Action project: L1.	Dislodge large rocks along the highway in Price Canyon prior to a rockfall endangering lives and property.	
	Time Frame	On-Going
	Funding	Federal, State, and Local
	Estimated Costs	\$100,000
	Staff	UDOT and County
	Background	The freeze, thaw cycle cause rockfalls each spring

PROBLEM SOILS (PS)

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

Goal Priority 1:	Low
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Objective 1: PS1-PS3.	Protect roadways from the effects of Problem Soils.	
Action project: PS1.	Increase width of slope adjacent to roadways.	
	Time Frame:	On Going
	Funding:	Federal, State, and Local
	Estimated Cost:	\$1,500,000
	Staff:	State, County, and City

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	Background	
Action project: PS2.	Provide new homeowners with a facts sheet describing the problem soil risks found in Carbon County.	
	Time Frame:	2018-2023
	Funding:	Local
	Estimated Cost:	\$3,000
	Staff:	Local Building Department
	Background	Reference types of soils found in Carbon County
Action project: PS3.	Monitor and control water on alkali soils. Desalinate Project through NRCS.	
	Time Frame:	Ongoing
	Funding:	Federal
	Estimated Cost:	\$30,000
	Staff:	Local
	Background	Changes flood irrigation to sprinkler systems.

INFESTATION (I)

Countywide Problem Identification: Infestation of noxious weed and trees, insects and bird species can impact the health, safety and welfare of county and its residents.

Goal Priority 1:	Medium
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Objective 1: I1	Control insects and birds.
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Action project: I1.	Insecticide spray Countywide	
	Time Frame:	Ongoing
	Funding:	Local
	Estimated Cost:	\$100,000
	Staff:	Local
	Background	Carbon County participates in a yearly Countywide Spraying program to control insects.

DROUGHT (D)

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Countywide Problem Identification: Cyclical periods of drought place a strain on community culinary water resources.

Goal Priority 1:	High	
Objective 1: D1.	Minimize damage to property and disruption in commerce and economical proceeds that are caused by drought conditions can be helped through the practice of proactive water conservation measures.	
Action project: D1.	Promote water recycling of secondary water sources.	
	Time Frame:	On Going
	Funding:	State, federal, and Local
	Estimated Cost:	\$25,000
	Staff:	City(s), County
	Background	

Goal Priority 2:	Medium	
Objective 2: D2-D6.	Secure adequate water for culinary and agricultural needs of East Carbon/ Sunnyside through structural measures.	
Action project: D2.	Design and build silt control coffer at water inlets at Grassy Trail Reservoir to prevent buildup.	
	Time Frame:	2018-2023
	Funding:	Federal Grant
	Estimated Cost:	\$20,000,000
	Staff:	Contractor, private engineering firms to work with cities.
	Background	Due to recent studies to build a new Grassy Trails; this project is still a possibility and will need to be addressed again upon review of the plan.
Action project: D3.	Build the Garley Wash Dam.	
	Time Frame:	2018-2030
	Funding:	Multiple Sources
	Estimated Cost:	\$10,000,000
	Staff:	City, County, State, Federal
	Background	The construction of an additional reservoir for water storage is necessary for Carbon County to meet current and future water requirements.

SEVERE WEATHER (SW)

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Countywide Problem Identification: Snowstorms, summer thunderstorms, hail, and high winds over eastern Utah have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists.

Goal Priority 1:	Medium	
Objective 1: SW1-SW3	Protect County from adverse effects of severe weather.	
Action project: SW1.	County participates in the StormReady program.	
	Time Frame:	2018-2023
	Funding:	State and Federal
	Estimated Cost:	\$10,000
	Staff:	City and County Emergency Management
	Background	Set up within the county emergency management and encourage all cities to participate, all requirements of the National Weather Service StormReady program. The county holds bi-annual Storm Ready/Spotter trainings in Price at the Local Emergency Planning Committees (LEPCs) meetings.
Action project: SW2.	Encourage avalanche preparedness for county backcountry users.	
	Time Frame:	Yearly/On-Going
	Funding:	Minimal
	Estimated Cost:	Minimal
	Staff:	Carbon County Recreation
	Jurisdictions:	Countywide
	Background:	Sponsors: County Emergency Management State Hazard Mitigation Team members, Utah Avalanche Forecast Center and Carbon County Recreation. 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 on US Forest Service land the search and rescue for the lost individual is often coordinated by emergency managers with search parties comprised of count and city staff. Introductory avalanche awareness training could lessen the costs to Carbon County and cities within the county. Most avalanche victims die in avalanches started by

Carbon County Pre-Disaster Hazard Mitigation Plan

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		<p>themselves or someone in their party. Thus, education can limit the number of avalanche related searches each year.</p> <p>The Carbon County Recreation provides an instructor for this training.</p>
Action project: SW3.	Install Doppler Radar on Bruin Point.	
	Time Frame:	2018-2023
	Funding:	State and Federal
	Estimated Cost:	1.5 Million
	Staff:	County, National Weather Service
	Background	The availability of current, real time weather information is lacking in Carbon County. The County is in a black hole between the Salt Lake Weather Radar and the Grand Junction Weather Radar.

Action project: SW4	Install 2 new generators and relocate two generators to service Carbon County and Price City critical facilities to maintain services during severe weather events.	
	Location:	Carbon County and Price City
	Time Frame:	2019-2020
	Funding:	Local, PDM Grant
	Estimated Cost:	\$112,000
	Staff:	City, County Emergency Management
	Background	The Carbon County Emergency Management Department, in a collaborative effort between the Carbon County Ambulance/ Carbon County Emergency Operations Center (EOC), Carbon County Sheriff's Search and Rescue Department, and the Incorporated City of Price have a design and will implement a severe storm mitigation project which will include the purchase, installation and relocation of four total, generators servicing Carbon County Critical Emergency Response Infrastructures. These facilities include the Carbon County Ambulance, Carbon County Sheriff's Intake Building, Carbon County Search and Rescue, and Price City Fire Department. Two new generators will be purchased and installed; one at the Carbon County Ambulance Department, the other at Price City Fire Department. Existing generators at these facilities are

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		inadequate to operate at capacity and will be relocated to the Carbon County Sheriff's Intake and Search and Rescue Facilities. These facilities operate a much smaller load in comparison. The generators will be able to accommodate the full burden with ease.
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Severe Weather Mitigation Programs

StormReady

The National Weather Service, in partnership with emergency management officials, businesses, volunteer organizations, academia, and the media is focused on fostering a Weather-Ready Nation, where society is prepared for and responds appropriately to weather-dependent events. A key component of this is ensuring that community leaders make informed decisions, and that is where the StormReady program comes into play.

StormReady encourages communities to take a proactive approach to improving local hazardous weather operations and public awareness. Of course, the end result being the protection of lives and livelihoods.

To be recognized as StormReady, a community must 1) establish an effective communications system, complete with a 24-hour warning point and emergency operations center; 2) have multiple ways to receive severe weather forecasts and warnings; 3) create a network for monitoring local weather and water events; 4) have multiple ways to dissemination weather and weather-related information; 5) engage in community preparedness efforts, including the promotion of public readiness and response through community seminars; and 6) develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

To get started, visit the NWS StormReady[®] Program page at <https://www.weather.gov/stormready> or contact the NWS Weather Forecast Office serving your area.

Weather-Ready Nation Ambassador

NOAA's Weather-Ready Nation (WRN) initiative is about helping our nation become more resilient to increasing extreme weather, water, and climate events. NOAA is working to keep these threats from becoming disasters with greater accuracy in forecasts and warnings, evolving services to community decision makers, and better ways to communicate risk to stakeholders and the public. As part of the WRN initiative, NOAA partners with emergency management officials, businesses, volunteer organizations, academia, and the media to motivate individuals and communities to prepare for

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potential weather disasters. And these actions can save lives – at home, in schools, and in the workplace.

Building a WRN requires the participation and commitment of a vast nationwide network of “Ambassadors” – organizations contributing in the best ways they can:

- Broadcasters advocating preparedness on-air
- Schools/universities teaching about the risks associated with severe weather and resiliency best practices
- Companies within the weather enterprise building the technological infrastructure for weather information and alerts
- Insurance companies providing discount incentives to policyholders who meet certain mitigation criteria

WRN Ambassadors partner with the National Weather Service to improve readiness, responsiveness, and overall resilience against extreme weather, water, and climate events in their communities. WRN Ambassadors agree to promote WRN messages, collaborate on outreach and education efforts, share success stories, and serve as an example.

To learn more about the WRN initiative or becoming a WRN Ambassador, visit the Weather-Ready Nation page at <http://www.weather.gov/wrn> or e-mail NOAA’s Weather-Ready Nation team at wrn.feedback@noaa.gov.

To register, visit the Welcome to the WRN Ambassador Submission Process page at <https://www.weather.gov/wrn/amb-tou>.

NWS National Seasonal Safety Campaign: Preparing the public for hazardous weather year-round

NOAA’s National Weather Service (NWS) wants you to be prepared for hazardous weather year-round. The aim of the National Seasonal Safety Campaign is to build a Weather-Ready Nation, one that is prepared for extreme weather, water, and climate events.

Each campaign includes seasonal resources that provide information that is vital to keeping you and your loved ones safe. These materials include websites, articles, social media, infographics, videos and other content around the weather hazards most common during the current season.

Visit the NWS National Seasonal Safety Campaign: Preparing the public for hazardous weather year-round page at <http://www.weather.gov/safetycampaign>, then click on one of the seasonal buttons for material relevant to that season.

EARTHQUAKE (E)

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Countywide Problem Identification: Earthquakes may strike at any time in this region or regions that are geographically close to the county; therefore, it is vital to educate the public on how to prepare for such an event.

Goal Priority 1:	Medium	
Objective 1: E1	Attend planning and zoning meetings on a continual basis.	
Action project: E1.	Work with County Building Inspectors to ensure that new construction continues to meet current building code standards.	
	Time Frame:	Ongoing
	Funding:	County Tax Funds
	Estimated Cost:	\$5,000
	Staff:	County Emergency Management, County Planning and Zoning
	Jurisdictions:	County wide
	Background:	
Objective 2: E2	Educate the public through the Be Ready Utah Campaign.	
Action project: E2.	Continue to attend fairs, public events, trainings, and handout educational material to the public on earthquake preparedness, encourage participation in the “Great Shakeout”.	
	Time Frame:	Ongoing
	Funding:	County Tax Funds
	Estimated Cost:	\$5,000
	Staff:	Countywide departments
	Jurisdictions:	County wide
	Background:	Earthquakes are infrequent and of a low magnitude leading to complacency.

Appendix 1

Plan Maintenance, Evaluation, and Implementation

Carbon County Pre-Disaster Hazard Mitigation Plan

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Monitoring, Evaluating, and Updating the Plan

Periodic monitoring and updates to this Plan are required to ensure the goals and objectives for the Carbon 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 Carbon 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 Carbon County Pre-Disaster Mitigation Plan 2018 up-to date the LEPC will conduct a semiannual review to discuss the incorporation of new hazards, mitigations, or other data into the Plan.

Annual Review Procedures

Or as situations dictates, such as following a disaster declaration. The process will include Carbon 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 Carbon 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.

The Carbon 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

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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 Carbon 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

Upon receiving the recommendation from the Utah Division of Emergency Management, a public hearing will be held by the Carbon 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

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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 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

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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.

Appendix 2

Carbon County Pre-Disaster Natural Hazard Mitigation Plan Process

**Integrating the 2018 Carbon County Pre-Disaster Natural Hazards Mitigation
Plan into other County, City, and Town Plans**

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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 great opportunity for communities to review their sections of the Carbon 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 offer assistance to 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 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.

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Perhaps the most direct way communities in Carbon 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 Carbon 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.

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

The Carbon 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 Carbon 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 Kick-Off Meeting was held on June 23, 2016 in Price, Utah chaired by the Carbon County Emergency Manager, Justin Needles, and attended by Whitney Waterford, Carbon County Emergency Management, Angelia Crowther, Utah Division of Emergency Management, Scott Mabe, Lead Contractor and Ron Mosher, Contractor. The purpose of the meeting was to brainstorm the composite of the 2018 PDM Working Group and establish a tentative meeting schedule. The roles and responsibilities of the contractor and the county were discussed and agreed upon.

As a result of this Kick-Off Meeting the Carbon County 2018 Pre-Disaster Natural Hazard Mitigation Plan Working Group and the Core Planning Team were identified, and invitations were sent out for the first Working Group Meeting scheduled for August 4, 2016.

Carbon County 2018 Pre-Disaster Natural Hazard Mitigation Working Group

Name	Representing	Email
Angelia Crowther	Utah Division of Emergency Management	acrowther@utah.gov
Amy Jones	Carbon County Emergency Management	amy.jones@carbon.utah.gov
Barry Horsley	Carbon County IT	barry.horsley@carbon.utah.gov
Benjamin Clement	Carbon County GIS	benjamin.clement@carbon.utah.gov
Bill Barnes	Price City Police Dept.	billb@priceutah.net

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Brandon Sicilia	Price City Police Dept.	brandons@priceutah.net
Casey Hopes	Carbon County Commission	casey.hopes@carbon.utah.gov
Cletis Steele	Carbon County Sheriff's Office	cletis.steele@carbon.utah.gov
Curtis Pace	Carbon County	curtis.pace@carbon.utah.gov
Daniel Campbell	Carbon County Road Dept.	daniel.campbell@carbon.utah.gov
Don Marrelli	Carbon County Ambulance	don.marrelli@carbon.utah.gov
Doug Parsons	East Carbon City	douglasparsons53@yahoo.com
Ed Chavez	Helper City, Mayor	mayor@helpercity.net
Eric Martineau	Utah Division of Emergency Management	emartineau@utah.gov
Jake Mellor	Carbon County Commission	jake.mellor@carbon.utah.gov
Jeff Richens	PRWID	jeffpwrld@emerytelcom.net
Jeff Weddle	Castle View Hospital	jeff.weddle@lpnt.net
Jenifer Stansfield	Carbon Canal/Conservancy District	jenifer@etv.net
Jennifer Hansen	Utah Forestry, Fire, State Lands	jenniferhansen@utah.gov
Jeremy Jorgensen	Utah Forestry, Fire, State Lands	Jeremyjorgensen.utah.gov
Joan Powell	Wellington City, Mayor	mayor@wellingtonutah.us
Jordan Behunin	Carbon County GIS	jordan.behunin@carbon.utah.gov
Julie Medley	Carbon County Assessor	julie.medley@carbon.utah.gov
Justin Needles	Carbon County Emergency Manager	justin.needles@carbon.utah.gov
Kerry Jensen	Carbon County School District	jensenk@carbonschools.org
Kevin Drolc	Price City Police Dept.	kevind@priceutah.net
Kyle Ekker	Emery County Emergency Manager	Kyle.ekker@ecso.utah.gov
Matt Bunnell	Utah Highway Patrol	mbunnell@utah.gov
Mellissa Lasslo	Carbon County GIS	mellissa.lasslo@carbon.utah.gov
Mechelle Miller	Utah Division of Emergency Management	mmiller@utah.gov
Paul Bedont	Price City Fire Dept.	fire@priceutah.net
Richard Colombo	Helper City	rcolombo@helpercity.net
Rex Sacco	Carbon County Public Lands/Roads Access	rex.sacco@carbon.utah.gov
Rick Bailey	Grand County Emergency Manager	rbailey@grandcountysheriff.org

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Robert Donaldson	South Eastern District Health Dept.	rdonaldson@utah.gov
Ron Mosher	Ron Mosher Consulting	brmosher@infowest.com
Scott Mabe	S. Mabe Consulting LLC	smabecllc@gmail.com
Sulika Merrell	Carbon County Assessor Office	Sulika.merrell@carbon.utah.gov
Todd Thorne	Carbon County	todd.thorne@carbon.utah.gov
Whitney Waterfall	Carbon County Emergency Management	whitney.waterfall@carbon.utah.gov
Carbon County Core Planning Group		
Justin Needles	Carbon County Emergency Manager	
Whitney Waterfall	Carbon County Emergency Management Office	
Amy Jones	Carbon County Emergency Management Office	
Paul Bedont	Price City Fire Chief	
Kevin Drolc	Price City Police Chief	
Richard Colombo	Helper City	
Joan Powell	Wellington City	
Curtis Page	Carbon County	
Mellissa Lasslo	Carbon County	
Scott Mabe	Lead Contractor	
Ron Mosher	Contractor	

The 2018 Carbon County Pre-Disaster Natural Hazard Mitigation Plan Working Group list of those invited to participate represents a diverse group representing communities within Carbon County, local EMS, fire, and police agencies, surrounding jurisdictions, regional agencies and state agencies. All the invitees were given the opportunity to participate.

The first Carbon County 2018 PDM Working Group Meeting was held on August 4, 2016 at the Carbon County Fairgrounds Complex and was facilitated by the contractor. The key stakeholders were present for the planning meeting. A tentative time line was presented setting expectations for accomplishing goals to complete the plan. The 2013 Carbon County Pre-Disaster Natural Hazard Mitigation Plan's list of natural hazards was reviewed, and the Working Group concurred the list was still valid but as the planning process proceeds the priority of the listing may be subject to change. The data collection for updating the 2013 Plan was discussed and an outcome was the contractor will update the basic Carbon County demographical information, the State Forestry, Fire, and State Lands representative will contact

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the Salt Lake City office and obtain the last five years of fire data for Carbon County, and the Carbon County Emergency Manager will begin updating the critical facilities list. It was emphasized by the contractor that the development of their Carbon County 2018 Pre-Disaster Natural Hazard Mitigation Plan is dependent on the cooperation, collaboration, and communication with and between members of the Carbon County 2018 PDM Working Group.

The second Carbon County 2018 PDM Working Group Meeting was held on June 1, 2017 and was facilitated by the contractor. The basic plan information that had been gathered by the contractors was reviewed and comments made by the participants were incorporated into the plan. The critical facilities that had been identified were modified to reflect recent changes. The risk assessment process was discussed and the list of the nine natural hazards was examined and the rankings for Carbon County agreed upon. The status of current mitigation projects in the 2013 PDM was discussed with the subject matter experts. Some of the mitigation projects had been completed and it was determined some were on going and a small percentage were not started. The potential for carrying forward current projects and the development of future mitigation projects was discussed, and points of contact established for the mitigation projects. A presentation was made 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 Carbon County. The consensus of the Working Group was to add the Community Wildfire Preparedness Plan (CWPP) as an appendix to the 2018 Pre-Disaster Natural Hazard Mitigation Plan when the CWPP is completed.

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

The third Carbon County 2018 PDM Working Group Meeting was held on April 3, 2018 and the contractors presented a Draft 2018 Carbon 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. As a result of this discussion the Working Group participants did recommend some modifications to the draft plan that were incorporated into the document. Next steps were discussed as the draft will become a "Final" document to send to the State of Utah Division of Emergency Management for their review.

The Carbon County Emergency Manager did place the 2018 Carbon County Pre-Disaster Natural Hazard Mitigation Plan on the Carbon County website on June 20, 2018 for citizen review and comment. There have been no comments from the community made on the website. The Carbon County Emergency Manager did schedule and conduct a Public Hearing on July 18, 2018

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at 4:30 PM at the Carbon County Commission Chambers. There were no comments from those in attendance during the Public Hearing. Attending the Public Hearing:

Casey Hopes	Carbon County Commissioner
Jake Mellor	Carbon County Commissioner
Jae Potter	Carbon County Commissioner
Jeff Wood	Carbon County Sheriff
Justin Needles	Carbon County Emergency Manager
Angelia Crowther	DEM Southeastern Utah Lisision
Christian Bryner	Citizen
Seth Overson	Citizen
Rita Vigor	Citizen
Rose Barnes	Citizen
Todd Thorne	Citizen
Barry Horsley	Carbon County Communications
Sulieka Merrell	Carbon County Assessor Office
Tony Martinez	Citizen
Lori Perez	Citizen
Lenise Peterman	Citizen
Kathy Hanna-Smith	Citizen
Dave Smith	Citizen
Matt Ward	Citizen
Jared Hansen	Citizen

The Notice of Public Hearing was published in the Sun Advocate Newspaper, Price, Utah on June 20, 2018.

****Public Notice**

Carbon County Emergency Management Office in accordance with state and federal guidelines has updated the Pre-Disaster Mitigation (PDM) Plan for Carbon County, Utah. The updated plan is available to view on the Carbon County Website <https://www.carbon.utah.gov/notices>. An open hearing for public comment will be at the regular scheduled commission meeting July 18, 2017 at 4:30pm Carbon County Administration Office 751 East 100 North.

Plan Description: Pre-Disaster Mitigation Plan prioritizes the hazard risks within the county and details the mitigation efforts that are taking place to minimize the effects of those hazards.



Carbon County Office of Emergency Management

Phone: (435) 636-3740

Address: 751 East 100 North

Price UT. 84501

Carbon County Pre-Disaster Hazard Mitigation Plan

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PUBLIC NOTICE

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Plan Description: Pre Disaster Mitigation Plan prioritizes the hazard risks within the county and details the mitigation efforts that are taking place to minimize the effects of those hazards.



Carbon County Office of Emergency Management

Phone: (435) 636-3740

Address: 751 East 100 North

Price UT. 84501

Email: HLS@Carbon.Utah.Gov

NOTICE OF PRIMARY ELECTION AUDIT AND CANVASS OF ELECTION

Notice is hereby given that an audit of the voting equipment used in the Primary Election will take place on July 3, 2018 at 11:00 a.m. in the Swell Room of the Emery County Courthouse. A special meeting of the Emery County Commissioners will be held on Tuesday, July 3, 2018 at 12:00 p.m. for the purpose of canvassing the election returns from the June 26, 2018 Primary Election. The meeting will be held in the Emery County Courthouse, Swell Room.

*/s/Brenda D. Tuttle
Emery County Clerk/Auditor*

Published in the ETV 10 Newspaper June 27, 2018.

The deadline for notice submissions is Tuesday at 9 a.m. Notices can be emailed to Scottie

Carbon County Pre-Disaster Hazard Mitigation Plan

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

Pre-Disaster Mitigation

Planning Committee Meeting

Carbon County

4-Aug-16

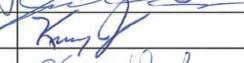
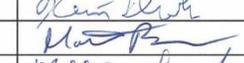
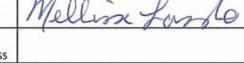
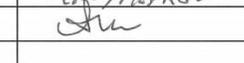
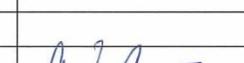
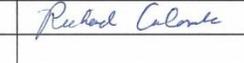
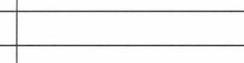
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Carbon County Pre-Disaster Hazard Mitigation Plan

2018

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Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Carbon County Pre-Disaster Mitigation Planning Meeting

8/4/16

J. Needles

Welcomed and thanked everyone for coming to the PDM Planning Committee meeting.

Introduced Scott Mabe and Ron Mosher

Introductions: **Please see the sign in sheet**

R. Mosher

The Timeline and Target dates

Encouraging data collection. Aug 4 Kickoff meeting

Sept. 16 Begin the process to revise and update

March 14 Mitigation STRATEGY

Sept. 6 Review and Revise and update the CCPDM

Nov 27.17 Submit proposed 2018 PDM

Dec 21, 2017 Collaborate with the working group to make the revisions suggested by the state

E. Martino

The mitigation strategies are the state is the middle man between CC and FEMA- the state will proff it and then send it back to CC if revisions need to be made. Once they have been made then they will send it to FEMA. Do not adopt the plan until FEMA has approved it.

R. Mosher

January 20, 2018 Submit to FEMA Region 8 for FEMA Review

March 1, 2018 Collaborate with working group

March 31, 2018 Submit to FEMA

- How is the five year outlook for the county? Community involvement is key.
- Social media, newspaper, get the word out that the plan was community involved. We have to document that these measures were taken. FEMA is big on community involvement. The opportunity needs to be given. A community spokesperson is a necessity.
- Each community has a unique set of capabilities, including
- Capabilities on planning
- Ordinances
 - Building
 - Requirements
 - Laws and statues
 - Nuclear
- Impacts that can be foreseen
- National Flood insurance Program

Carbon County Pre-Disaster Hazard Mitigation Plan

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- How many people in the community have NFIP
- Important part of this Plan (documenting for FEMA)

Risk assessment

The planning team conducts a risk assessment and determines the potential impacts and hazards. If you do not have A PDM FEMA will not fund and the disaster and give any relief moneys.

The Plan has to be comprehensive to include all hazards that could occur.

RISK-Potential for damage and (see slide) natural hazards, potential hazards with man-made as well.

2013 PDM

These hazards may change priority

- Earthquake
 - STILL AN ISSUE
 - Review by county
- Landslides
 - Valid Consideration
 - Reviewed by Group
- Wild Fire
 - Valid Consideration
 - Reviewed by Group
- Flooding
 - Valid Consideration
 - Reviewed by group
- Problem Soils
 - Valid Consideration
 - Reviewed by group
 - Blue Clay
- Dam Failure
 - Valid Consideration
 - Reviewed by group
 - Most Dam Companies have an EOP
 - This plan
- Flash Flooding
 - Reviewed by group
 - Valid Consideration
 - Who is living in the flood plane
- Drought
 - Reviewed by group
 - Valid Consideration
- Infestation
 - Reviewed by group
 - Valid Consideration
 - Beetle infestation
 - Economic threat
 - Ranching
- Severe Weather
 - Reviewed by group

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

- Valid Consideration
 - Document everything
 - Snow
 - Lightning
 - Avalanche
 - If there is snow

Conclusion

This is the plan for the county so everyone needs to cooperate and collaborate. The community will need to be involved so that things that we don't think of can be added to the plan.

We would like to mitigate as many things as possible.

Utah has to meet the 3.9 Mill in disaster money to get a declaration. Justin will set the parameters

Scott and Ron will call individuals to gather the information when they need it.

Search and Rescue will need to be contacted.

The current Plan is too big and not usable.

FEMA only does the NATURAL HAZARDS

MAN MADE CAN BE INCLUDED BUT THEY ARE NOT LOOKED AT BY FEMA

These hazards may change priority

- Earthquake
 - STILL AN ISSUE
 - Review by county
 - Include inundation of people from disaster.
- Landslides
 - Valid Consideration
 - Reviewed by Group
- Wild Fire
 - Valid Consideration
 - Reviewed by Group
- Flooding
 - Valid Consideration
 - Reviewed by group
- Problem Soils
 - Valid Consideration
 - Reviewed by group
 - Blue Clay
- Dam Failure
 - Valid Consideration
 - Reviewed by group
 - Most Dam Companies have an EOP
 - This plan
- Flash Flooding
 - Reviewed by group
 - Valid Consideration
 - Who is living in the flood plane

Carbon County Pre-Disaster Hazard Mitigation Plan

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- Drought
 - Reviewed by group
 - Valid Consideration
- Infestation
 - Pandemics
 - Reviewed by group
 - Valid Consideration
 - Beetle infestation
 - Economic threat
 - Ranching
- Severe Weather
 - Reviewed by group
 - Valid Consideration
 - Document everything
 - Snow
 - Lightning
 - Avalanche
 - If there is snow

E. Martino

Reasons to participate in this plan

- Money
 - PDM
 - Annual
 - 4MILL
 - 75/25 MATCH
 - BASED ON A RECENT DISASTER
 - HMGP
 - Contingent on a disaster
- Knowledge

S. mabe

Thanks for coming

J. Needles

If you have another person or entity that may be a valuable asset to this group please let us know.

Adjorn

1251

Carbon County Pre-Disaster Hazard Mitigation Plan

2018

Agenda

Carbon County 2108 PDM

Working Group Meeting

June 1, 2017

11:00 AM – 1:00 PM

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

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Pre-Disaster Mitigation

Planning Committee Meeting

Carbon County

1-Jun-17

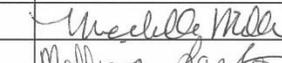
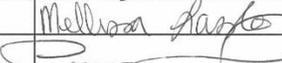
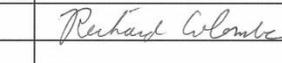
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2018

Carbon County Pre-Disaster Mitigation Planning Meeting

April 3, 2018

[Type the document subtitle]1400 Hrs.

Agenda

Open meeting at 11:43 am Justin welcomed everyone and turned time over to Ron Mosher with Mabe Consulting. Introductions.

Ron went over Agenda, status of plan proposed changes and the planning process

- Review the Plan
 - Carbon County 2018 Pre-Disaster Natural Hazard Mitigation Plan as of April 3, 2018
 - Plan is over 200 pages with other info lacking
 - The Appendix is still forthcoming.
 - Action Project some are completed, some are set to be completed and others are just ideas of what we'd like to do and possible funding avenues.
 - Objectives and Authorities and local ordinances only through 2016 if the 2017 ones are available soon they will be included in the plan.
 - The economy, demographics
 - Land Use 60/40 split 60% is governmental property and 40% is private property.
 - Building permits- 2016 was a very slow year for construction. Residential construction was pretty steady in 2017.
 - Helper and Price Cities are making strides.
 - Risk assessment
 - 2003 and 2011 plan and then 2017 first pre-disaster Mitigation Working Meeting
 - Wildland Fire
 - Severe Weather
 - County Drought
 - Flood
 - Earthquake
 - Landslides
 - Problem Soils
 - Infestations
 - Dam Failure
 - Impact-

Carbon County Pre-Disaster Hazard Mitigation Plan

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- Rate the Critical Infrastructure of likelihood
- NFIP
 - 19 Policies in the
 - No repetitive loss properties in Carbon County
 - None of the insured properties have had any loss
 - Flood Plain Manager
 - Price City,
 - Wellington City, Engineer
 - Carbon County- Todd Thorn, County Planning and Zoning Administrator
 - East Carbon/ Sunnyside
- CWPP
- Landslides in the County the map came from Carbon County GIS
- Problem Soils
- Infestation
 - Maintenance and Abatement Programs that work together between Carbon and Emery Counties.
 - 2015 information
- Earthquake
 - Waiting for the State Hazus and the infrastructure projection based on a 6.5 earthquake. Angelia said that John will have the Hazus by the April 20, 2018.
- Action Items
 - Dam
 - Early Remote Warning System
 - That was completed in a program about. The sights maybe in place already. The Division of Water Rights in Price is another Contact 613-3753.
 - ~~The~~ road on the West Side of the Scofield Lake
 - Maintaining rather than improvement, the County cannot commit to improving the road, but they can maintain it.
 - Grassy Trails Dam
 - East Carbon will need to be contacted.
 - East Carbon Mayor Avery- 435-888-3373 or (435)630-4144
 - Flooding
 - Beehive has been completed add to the top “Completed Projects”
 - Add to action Items “Construct Dissipation Basins to Westwood”.
 - Add Spring Glenn, Bull Wash and Kenilworth Wash estimated cost \$292,000 Funding provided by NRCS/ Carbon County to F4.
 - Add to Meads Wash F8 Cost \$708,000 Funds provided by NRCS/ Price City.
 - Landslides
 - Remove L1
 - Problem Soils
 - PS3 Add “NRCS” instead of NCRS
 - Add \$30,000 in NRCS Grant funds

Carbon County Pre-Disaster Hazard Mitigation Plan

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- PS4 Make sure that it is on the top and delete from PS4
 - Dam
 - Change D3 to 10million add NRCS and County Funding
 - Remove D6
 - Severe Weather
 - SW SFA (drought monitor station) Mistie Christian in Castle Dale (our rep) Maybe talk to the Media to see if they would help partner.
 - Earthquake
 - No Changes
 - Appendix 1
 - No Changes
- Proposed Changes
 - If there are no further changes?
 - Possible critical infrastructure exclusion based on addresses of infrastructure and keeping that out of public reach.
 - Update the Chart for the Critical Infrastructure.
 - Once we have the last changes we will present a clean copy of the plan to the county.
 - This copy will need to be posted on the county website for 30 days for public comment.
 - Public Hearing at the conclusion of the 30 days.
- Review Process
 - 30-day Public Review (Notice of plan review and public hearing in paper and the plan posted on the County website).
 - We will need a copy of the notice for the plan
 - Once this is completed we will adjust the plan as needed
 - We will return the plan to the county so that they can forward it to The State for their review. (30 days)
- Further Questions
 -
- Adjourn 143pm

Carbon County Pre-Disaster Hazard Mitigation Plan

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Carbon County Pre-Disaster Hazard Mitigation Plan

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Pre-Disaster Mitigation

Planning Committee Meeting

Carbon County

3-Apr-18

Hosted by: Carbon County Emergency Management

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Carbon County Pre-Disaster Hazard Mitigation Plan

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Place Holder

Carbon County Commission Resolution of Adaption

Helper City Resolution Adaption

Price City Resolution Adoption

Wellington City Resolution Adoption

East Carbon City Resolution Adoption

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Appendix 3

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

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

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- 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

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

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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 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

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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 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

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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
- 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

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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.

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.

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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
- 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

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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 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.

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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.

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

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- 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 downstream 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
- 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

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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

- 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

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- 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

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

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- 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
- 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

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- 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

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

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- 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

- 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

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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 4 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 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,

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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 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.

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“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 are spreading at a rate of more than 4,600 acres per day on federal lands in the United States.

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.

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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 aethiopsis
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.

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

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Yellow starthistle	<i>Centaurea solstitialis</i>
Yellow toadflax	<i>Linaria vulgaris</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Black henbane	<i>Hyoscyamus niger</i>
Dalmation toadflax	<i>Linaria dalmatica</i>

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

* 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 5 HAZUS



Hazus-MH: Flood Global Risk Report

Region Name:	CarbonCounty_L2_FL
Flood Scenario:	Carbon_County_100_Year_Flood
Print Date:	Thursday, April 26, 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 1,485 square miles and contains 2,065 census blocks. The region contains over 8 thousand households and has a total population of 21,403 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 10,463 buildings in the region with a total building replacement value (excluding contents) of 2,004 million dollars (2010 dollars). Approximately 87.51% of the buildings (and 53.46% of the building value) are associated with residential housing.



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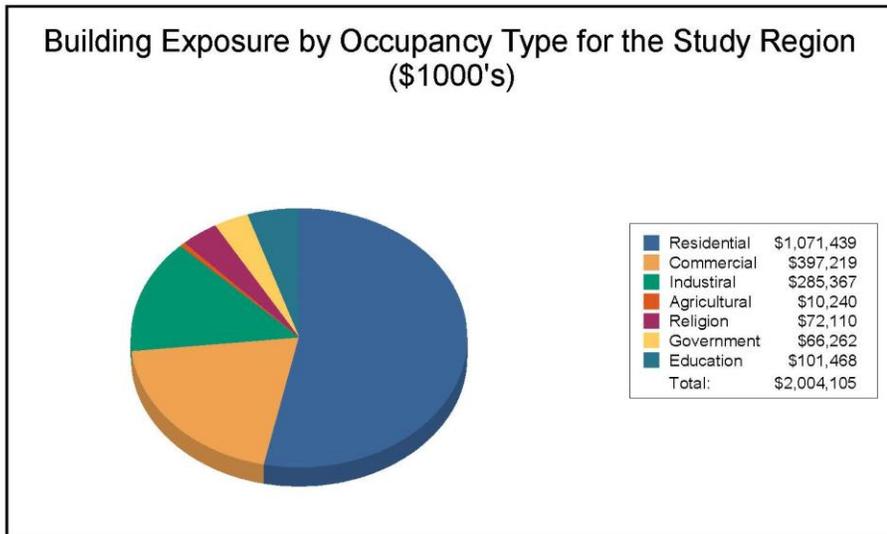
Building Inventory

General Building Stock

Hazus estimates that there are 10,463 buildings in the region which have an aggregate total replacement value of 2,004 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	1,071,439	53.5%
Commercial	397,219	19.8%
Industrial	285,367	14.2%
Agricultural	10,240	0.5%
Religion	72,110	3.6%
Government	66,262	3.3%
Education	101,468	5.1%
Total	2,004,105	100.0%



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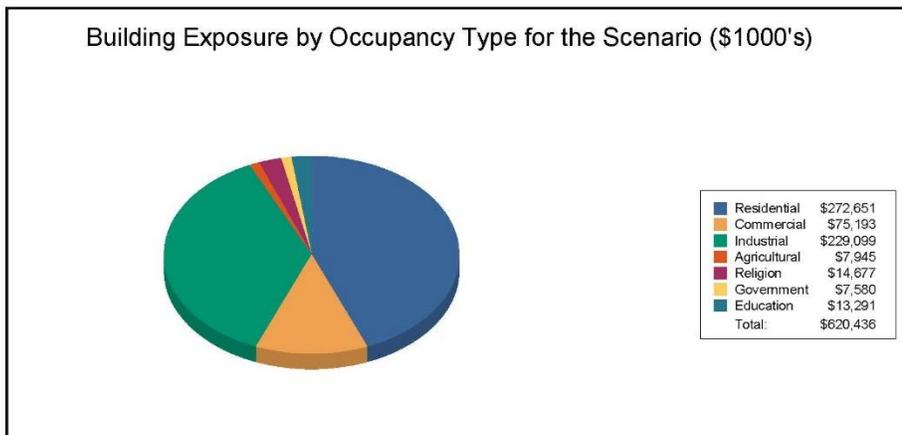
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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	272,651	43.9%
Commercial	75,193	12.1%
Industrial	229,099	36.9%
Agricultural	7,945	1.3%
Religion	14,677	2.4%
Government	7,580	1.2%
Education	13,291	2.1%
Total	620,436	100.0%



Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 84 beds. There are 12 schools, 7 fire stations, 8 police stations and 1 emergency operation center.



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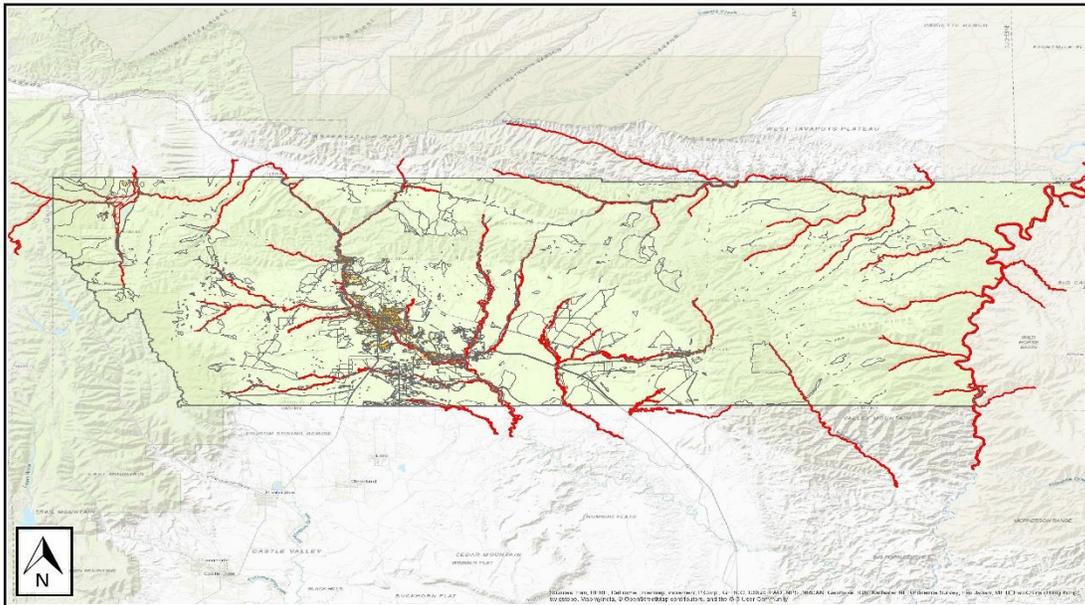
Flood Scenario Parameters

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

Study Region Name:	CarbonCounty_L2_FL
Scenario Name:	Carbon_County_100_Year_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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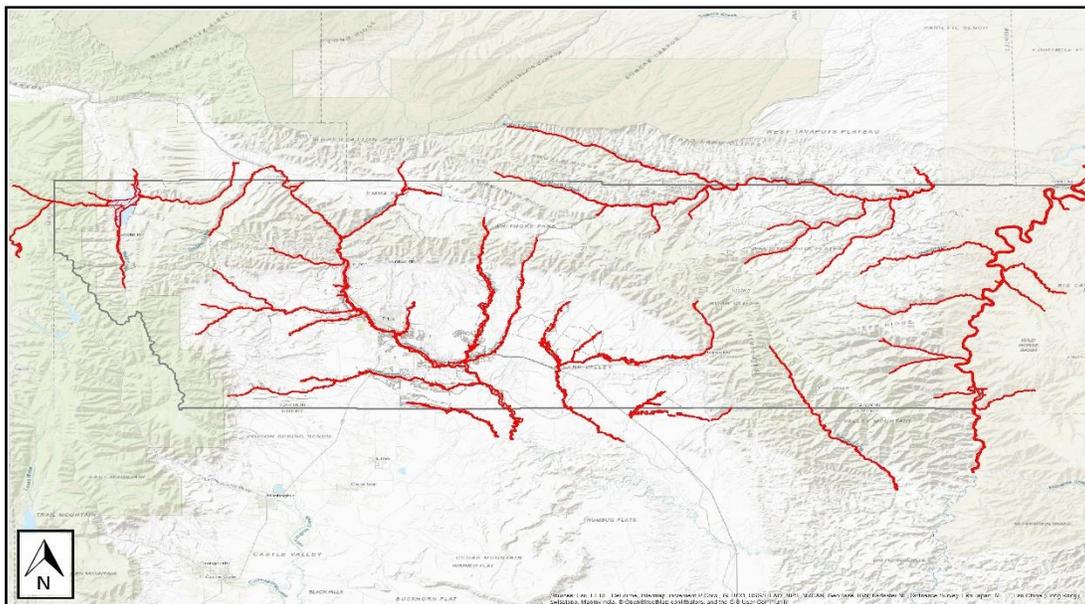


Building Damage

General Building Stock Damage

Hazus estimates that about 63 buildings will be at least moderately damaged. This is over 61% of the total number of buildings in the scenario. There are an estimated 9 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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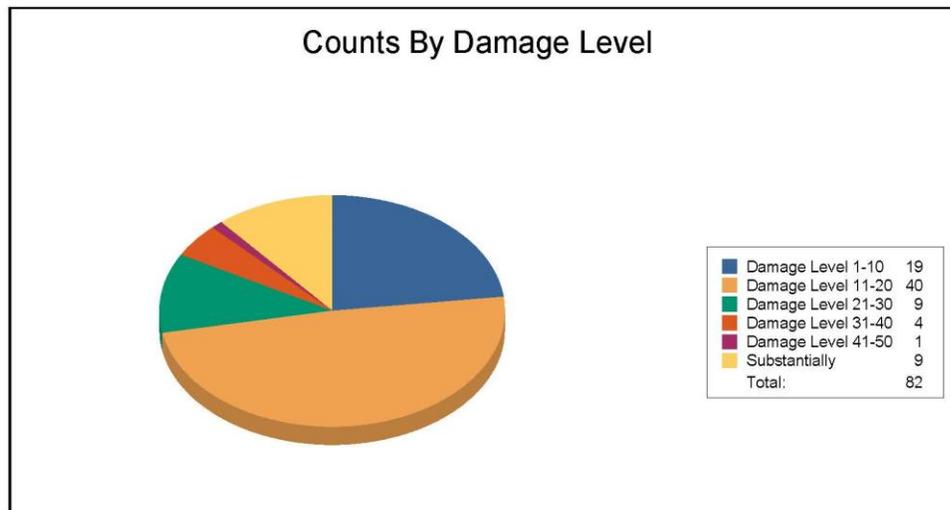
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Table 3: Expected Building Damage by Occupancy

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	0	0.00	2	100.00	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	3	25.00	8	66.67	1	8.33	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	16	23.53	30	44.12	8	11.76	4	5.88	1	1.47	9	13.24
Total	19		40		9		4		1		9	



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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	1	100	0	0	0	0	0	0	0	0
Manuf/Housing	1	10	0	0	0	0	0	0	0	0	9	90
Masonry	1	14	6	86	0	0	0	0	0	0	0	0
Steel	2	20	7	70	1	10	0	0	0	0	0	0
Wood	14	26	26	49	8	15	4	8	1	2	0	0



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 84 hospital beds available for use. On the day of the scenario flood event, the model estimates that 84 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	7	0	0	0
Hospitals	1	0	0	0
Police Stations	8	0	0	0
Schools	12	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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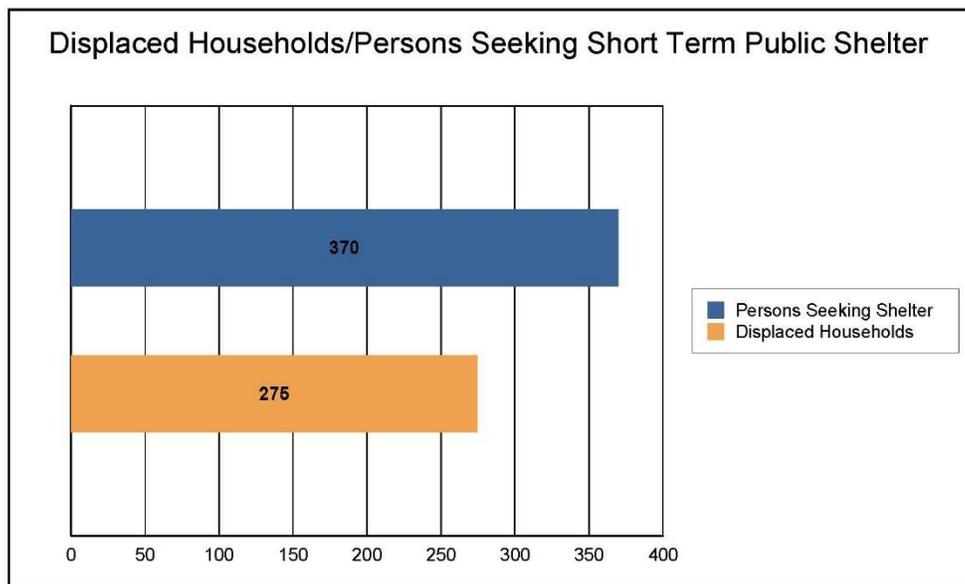
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Social Impact

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 275 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 370 people (out of a total population of 21,403) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 68.15 million dollars, which represents 10.98 % 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 67.97 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 17.65% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



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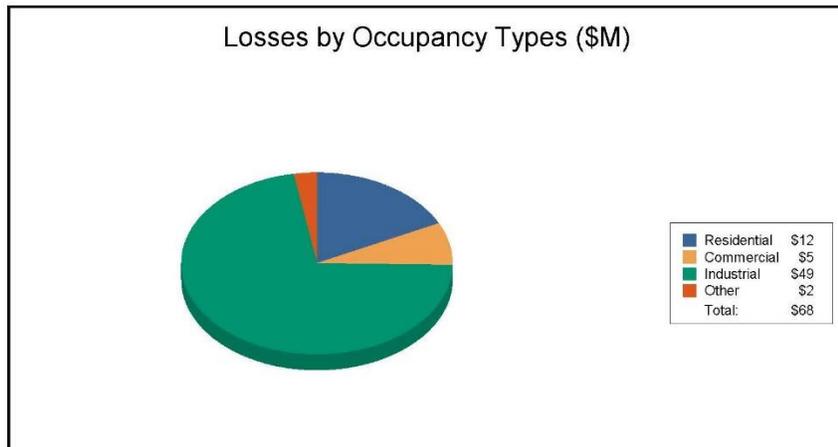
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	8.05	1.05	12.51	0.25	21.86
	Content	3.96	3.79	33.66	1.52	42.92
	Inventory	0.00	0.31	2.73	0.15	3.19
	Subtotal	12.00	5.16	48.89	1.92	67.97
Business Interruption						
	Income	0.00	0.03	0.02	0.00	0.05
	Relocation	0.01	0.01	0.02	0.00	0.03
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.01	0.04	0.01	0.03	0.09
	Subtotal	0.03	0.07	0.05	0.03	0.18
ALL	Total	12.03	5.23	48.95	1.95	68.15



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Appendix A: County Listing for the Region

Utah
- Carbon



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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Utah				
Carbon	21,403	1,071,439	932,666	2,004,105
Total	21,403	1,071,439	932,666	2,004,105
Total Study Region	21,403	1,071,439	932,666	2,004,105



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Hazus-MH: Earthquake Global Risk Report

Region Name: CarbonCounty_L2_EQ

Earthquake Scenario: Carbon_County_2500_Year_EQ

Print Date: April 27, 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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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 1,484.23 square miles and contains 5 census tracts. There are over 7 thousand households in the region which has a total population of 21,403 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 10 thousand buildings in the region with a total building replacement value (excluding contents) of 2,004 (millions of dollars). Approximately 88.00 % 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 783 and 281 (millions of dollars), respectively.

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Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 10 thousand buildings in the region which have an aggregate total replacement value of 2,004 (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 65% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

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

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 84 beds. There are 12 schools, 7 fire stations, 8 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 3 dams identified within the inventory. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 12 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 1,064.00 (millions of dollars). This inventory includes over 97 kilometers of highways, 71 bridges, 1,700 kilometers of pipes.

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Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	71	67.80
	Segments	18	401.50
	Tunnels	0	0.00
	Subtotal		469.40
Railways	Bridges	1	0.10
	Facilities	1	2.70
	Segments	165	186.50
	Tunnels	0	0.00
	Subtotal		189.30
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	783.20

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Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	17.00
	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		17.00
Waste Water	Distribution Lines	NA	10.20
	Facilities	1	65.30
	Pipelines	0	0.00
	Subtotal		75.50
Natural Gas	Distribution Lines	NA	6.80
	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		6.80
Oil Systems	Facilities	2	0.20
	Pipelines	0	0.00
	Subtotal		0.20
Electrical Power	Facilities	2	215.60
	Subtotal		215.60
Communication	Facilities	0	0.00
	Subtotal		0.00
		Total	315.10

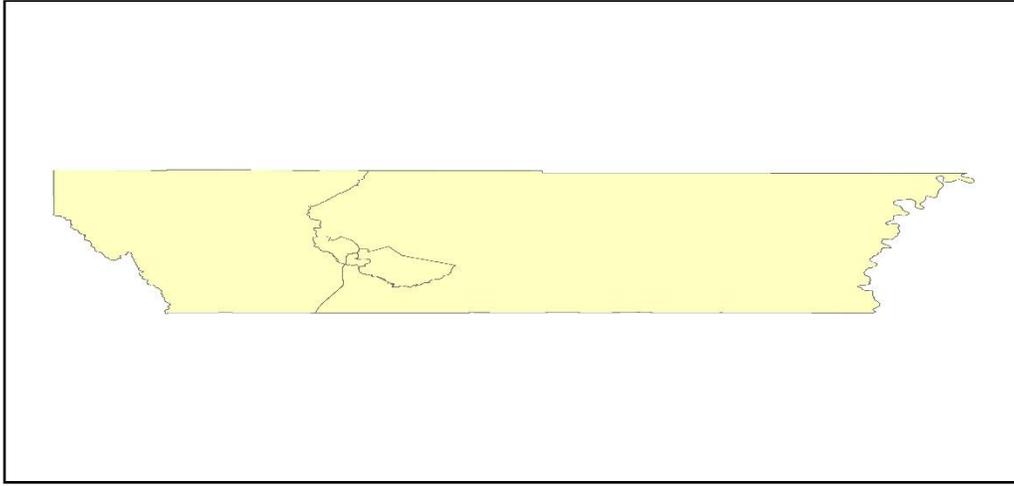
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Earthquake Scenario

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



Scenario Name	Carbon_County_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 1,759 buildings will be at least moderately damaged. This is over 17.00 % of the buildings in the region. There are an estimated 133 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

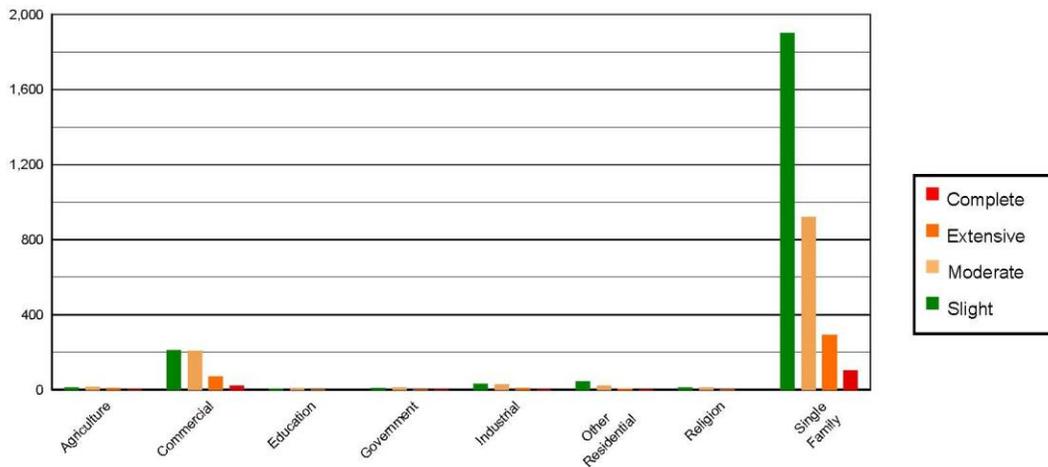


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	17	0.36	11	0.50	16	1.32	9	2.25	1	1.06
Commercial	470	9.83	212	9.53	208	16.88	71	17.85	21	16.04
Education	10	0.21	5	0.23	7	0.60	2	0.48	1	0.38
Government	20	0.42	9	0.41	12	0.95	3	0.77	1	0.59
Industrial	76	1.58	31	1.38	30	2.45	9	2.17	2	1.57
Other Residential	95	1.98	44	1.97	22	1.81	6	1.53	2	1.50
Religion	24	0.51	12	0.54	13	1.04	3	0.73	1	0.57
Single Family	4,074	85.11	1,901	85.44	923	74.96	293	74.23	105	78.30
Total	4,786		2,225		1,231		395		134	

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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	3,654	76.34	1532	68.86	454	36.87	42	10.51	4	2.78
Steel	314	6.56	144	6.49	183	14.83	54	13.72	12	9.16
Concrete	3	0.06	2	0.07	1	0.09	0	0.11	0	0.05
Precast	24	0.51	8	0.36	7	0.59	2	0.61	0	0.09
RM	121	2.53	29	1.31	22	1.75	5	1.21	0	0.12
URM	670	14.01	510	22.91	565	45.87	292	73.83	117	87.80
Total	4,786		2,225		1,231		395		134	

*Note:
 RM Reinforced Masonry
 URM Unreinforced Masonry
 MH Manufactured Housing

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Essential Facility Damage

Before the earthquake, the region had 84 hospital beds available for use. On the day of the earthquake, the model estimates that only 29 hospital beds (36.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 59.00% of the beds will be back in service. By 30 days, 90.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	0
Schools	12	0	0	12
EOCs	1	0	0	1
PoliceStations	8	0	0	8
FireStations	7	0	0	7

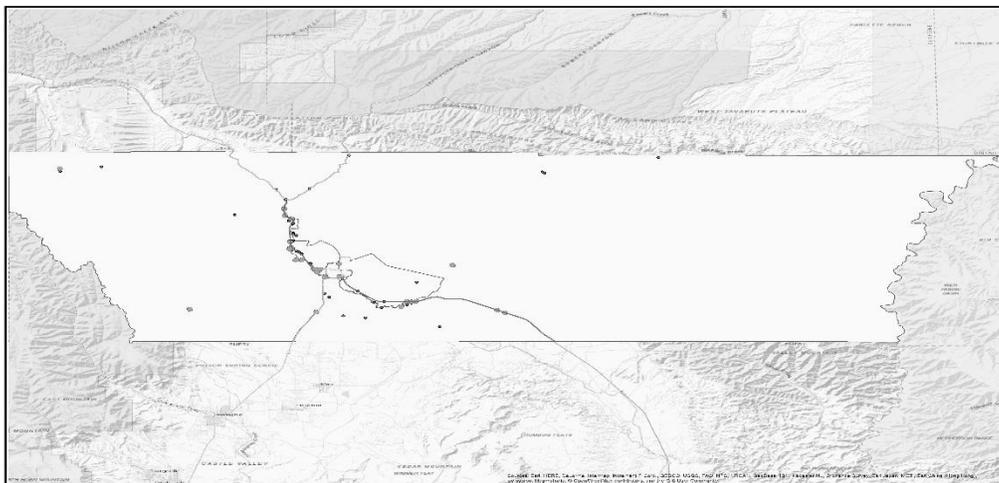
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Transportation Lifeline Damage



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Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	18	0	0	18	18
	Bridges	71	0	0	71	71
	Tunnels	0	0	0	0	0
Railways	Segments	165	0	0	165	165
	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	1	1	0	0	1
Natural Gas	0	0	0	0	0
Oil Systems	2	2	0	0	2
Electrical Power	2	1	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	850	57	14
Waste Water	510	41	10
Natural Gas	340	12	3
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	7,978	0	0	0	0	0
Electric Power		0	0	0	0	0

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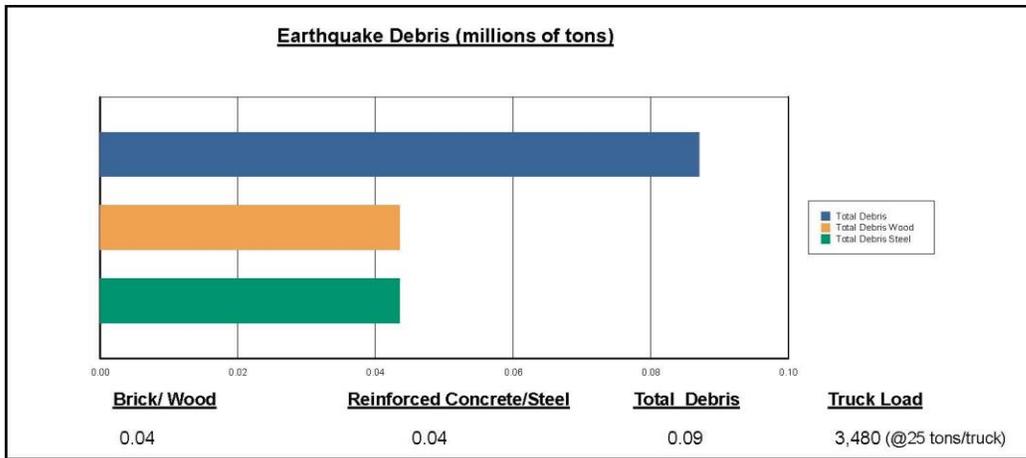


Induced Earthquake Damage

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 0.09 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 50.00% 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 3,480 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.



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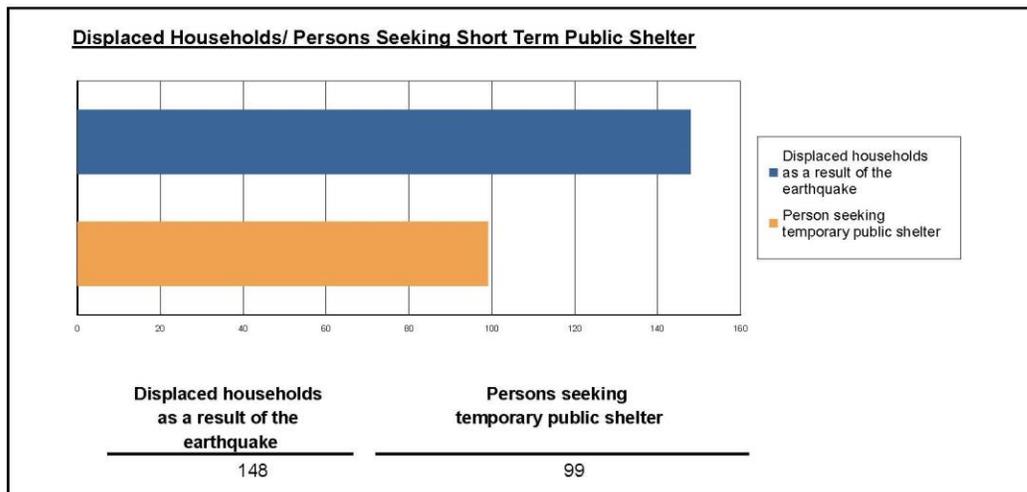
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Social Impact

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 148 households to be displaced due to the earthquake. Of these, 99 people (out of a total population of 21,403) 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	1	0	0	0
	Other-Residential	2	0	0	0
	Single Family	48	11	2	3
	Total	51	12	2	3
	2 PM	Commercial	27	6	1
Commuting		0	0	0	0
Educational		8	2	0	0
Hotels		0	0	0	0
Industrial		4	1	0	0
Other-Residential		0	0	0	0
Single Family		11	3	0	1
Total		51	12	2	3
5 PM		Commercial	19	4	1
	Commuting	1	1	2	0
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	2	1	0	0
	Other-Residential	1	0	0	0
	Single Family	19	5	1	1
	Total	44	11	3	3

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Economic Loss

The total economic loss estimated for the earthquake is 271.70 (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 214.00 (millions of dollars); 32 % 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 37 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

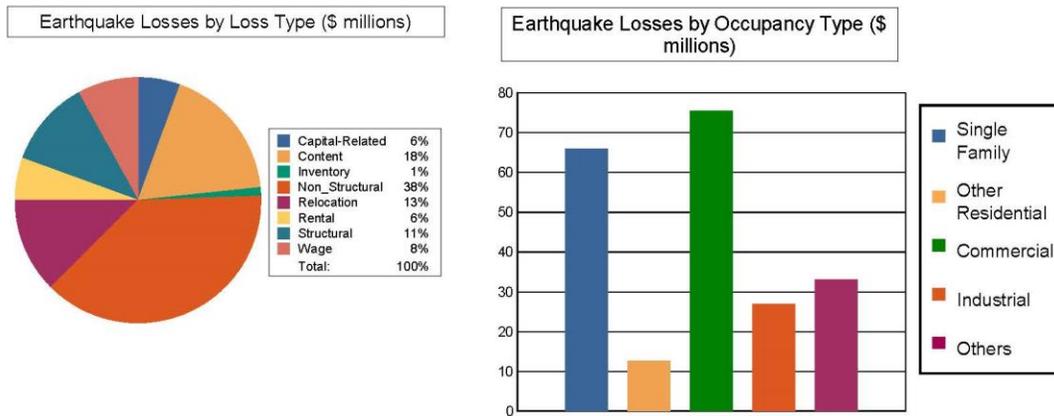


Table 11: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	2.30	12.27	0.37	2.13	17.08
	Capital-Related	0.00	0.98	10.35	0.27	0.33	11.93
	Rental	2.99	2.19	5.79	0.29	0.65	11.91
	Relocation	10.33	0.29	9.22	1.59	5.42	26.84
	Subtotal	13.32	5.77	37.63	2.52	8.53	67.76
Capital Stock Losses							
	Structural	9.91	0.73	6.99	2.63	4.13	24.39
	Non_Structural	32.23	4.82	19.11	11.66	13.66	81.48
	Content	10.53	1.32	10.50	8.87	6.61	37.84
	Inventory	0.00	0.00	1.19	1.18	0.15	2.52
	Subtotal	52.67	6.87	37.79	24.35	24.55	146.24
	Total	65.99	12.64	75.42	26.87	33.08	214.00

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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	401.55	\$0.00	0.00
	Bridges	67.81	\$2.84	4.19
	Tunnels	0.00	\$0.00	0.00
	Subtotal	469	2.80	
Railways	Segments	186.53	\$0.00	0.00
	Bridges	0.09	\$0.00	0.23
	Tunnels	0.00	\$0.00	0.00
	Facilities	2.66	\$0.62	23.18
	Subtotal	189	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	\$2.59	24.36
	Runways	113.89	\$0.00	0.00
	Subtotal	125	2.60	
Total		783.20	6.10	

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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	17.00	\$0.26	1.52
	Subtotal	17.00	\$0.26	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	65.30	\$10.66	16.34
	Distribution Lines	10.20	\$0.18	1.81
	Subtotal	75.47	\$10.85	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Lines	6.80	\$0.05	0.78
	Subtotal	6.80	\$0.05	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.20	\$0.03	17.14
	Subtotal	0.20	\$0.03	
Electrical Power	Facilities	215.60	\$40.46	18.76
	Subtotal	215.60	\$40.46	
Communication	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Total		315.07	\$51.65	

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FEMA

Appendix A: County Listing for the Region

Carbon, UT

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FEMA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Utah	Carbon	21,403	1,071	933	2,004
Total State		21,403	1,071	933	2,004
Total Region		21,403	1,071	933	2,004

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APPENDIX 6 Research Sources

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APPENDIX 7

Carbon County Community Wildfire Preparedness Plan