Part 9. Grand County

Grand County is made up of two jurisdictions: Castle Valley and Moab City. The county is located in the southeastern portion of the state on the Utah Colorado border.

A. Demographics and Population Growth

The following information involving Population Estimates, Average Annual Rate of Change, and Population and Development Trends is important in understanding the impacts that a natural hazard would have on a local community. Population numbers also identify the constancy of a community by determining the degree of change a community (Table 9-1).

Table 9-1 Grand County Population

	Grand County	Castle Valley	Moab City	Balance of Grand County	Southeast Region
1980 Census Population	8,241				54,124
1990 Census Population	6,620	211	3,971	2,438	49,801
2000 Census Population	8,485	349	4,779	3,357	54,180
2005 Population Projections	8,596				54,559
2010 Population Projections	8,969				57,699
2015 Population Projections	9,638				62,754
2020 Population Projections	10,102				66,489
2030 Population Projections	10,122				67,867
1990-2000 AARC	2.5	5.2	1.9	3.3	
2000-2030 AARC	0.59%				0.75%
1990-2000 Percent Change	28.2%				
Rank by 2000 Population	20				

Rank by Percent Change	12				
Rank by AARC	12				
Source: Bureau of the Census, 2002 Baseline Projections, and Utah Population Estimates Committee. Governor's Office of Planning and Budget. 1980 and 1990 populations are April 1 U.S. Census modified age, race and sex (MARS) populations; 2000 populations, household sizes and households are April 1 U.S. Census summary file 1 (SF1) populations; all others are July 1 populations. Note AARC is average annual rate of change.					

B. Economy

Presently, Grand County is working to diversify its economy by targeting light manufacturing, tourism and recreation, the fine arts, educational programs, television and motion picture production, agricultural, and through the development of natural resources. Grand County's economy is slowly expanding and moving forward. The unemployment rate for Grand County as of October 2002 was 6.4 percent, a 0.6-point drop from the 7 percent in October 2001. Non-farm jobs, construction, and manufacturing have all had a slight employment gain. The economy here is resilient and will continue to grow as the nation's economy improves (Grand County Trends). The 2000 estimated average house value is $123,751 (Annual Statistical).

C. Transportation and Commuting Patterns

The principle transportation routes through Grand County are Interstate 70 and U.S. Highway 191. The principle east-west corridor through Grand County is Interstate 70 (I-70). I-70 travels through the center of the county to the Colorado border. U.S. Highway 191 is the north-south corridor heading south from Crescent Junction off I-70, through the town of Moab, into San Juan County (Traffic Volume Map).

D. Land Use and Development Trends

Grand County uranium mining began in the early 1950's and as a result, the population jumped to nearly 10,000 in three years. Potash and salt mining, as well as milling operations were another source of economic prosperity in Grand County. Since the 1990's the local economy has been driven primarily by tourism. Over 1 million visitors enjoy mountain biking, river rafting, rock climbing, hiking, and four wheeling each year (Grand County History). Most land is owned and maintained by federal and state agencies, including the Bureau of Land Management (BLM), the Forest Service (FS), the National Park Service (NPS), and the Utah Divisions Of Forestry, Fire and State Lands (FFSL).

Moab City is the largest city within the county and offers a variety of residential and commercial real estate. There are an estimated 3,712 family housing units within Moab and Spanish Valley combined. These housing units include single family, mobile homes, and apartment homes. Because of the quiet streets and larger sized lots subdivisions and housing complexes in the area are very attractive for area newcomers. The median value of a home is $120,000.

E. Risk Assessment

The risk assessment process revealed the following risks: Drought, Flood, Wildfire, Severe Weather, Landslide, Earthquake, and Problem Soil. Risk assessment maps were completed for the mapped hazards and can be viewed at the end of this section. Refer to Part 6 for an explanation of the risk assessment process. According to GIS data there are a total of 17 identified critical facilities within Grand County (Appendix C).

Grand County and each jurisdiction contributed to the risk assessment analyses performed for the county when located within an identified hazard boundary (see Section E). Drought, Earthquake, and Severe Weather are regional hazards and have been profiled as such (Part 4 Regional Data).

1. Flood

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-25%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	See map in Section H, mainly near the major rivers of the Colorado and Green and their respective tributaries.		
Seasonal Pattern or Conditions	Spring, Cloudburst Storms and Heavy Snowfall Runoff.		
Duration	Flooding can last anywhere from hours to days and even months.		
Analysis Used	Review of FIS, FIRM, Army Corp of Engineers Flood Study, Hazard Analysis Plans, GIS data, Moab City Project Impact Application, Moab Hazard Mitigation Plan, and have worked with local residents of the community.		

Description of Location and Extent

The local planning team members including the county GIS department were unable to map flood prone areas within the county and complete a risk assessment due to the lack of digitized data. The Army Corps of Engineers compiled a rudimentary Flood Hazard Identification Study in 2003. This study can be found in Appendix E. The Army Corps' study identified the smaller unmapped tributaries of Castle Creek and its tributaries as threats in Castle Valley.

The City of Moab recorded 29 of 36 total flood events. Because of its location with streams and rivers, Moab has a very high flood threat. Moab City is the county seat and the largest community in the county and has been designated as a Project Impact Community. As a result, a Moab City Storm Water Management Plan was created and flood control issues were identified and put into place for Pack Creek, Mill Creek, and the Colorado River. Over half of the community is in a floodplain. Moab is subject to flash flooding mainly from the frequent thunderstorms and cloudbursts that occur in the steep slickrock canyons. Local roads, infrastructure, and residences are all subject to repeat flooding at Walker Canyon, Stewart Canyon, the Kelling Property, and Williams Way.

Vulnerability Assessment

Mill Creek floodplain flooding events were calculated for 13, 67, 125, and 370 -year events relaying the number of structures lost and approximate dollar losses for each flood event (Table 9-4).

Table 9-4 Mill Creek Floodplain Damage Estimates

Year	Approximate Dollar Loss	Number of Structures (residential and commercial)
370	71,709	848
125	68,577	772
67	50,218	486
13	22,396	86

Dam Failure Flooding

Ken's Lake is actually located in San Juan County, however the risk is region-wide. Ken's Lake Reservoir is considered to have a high hazard threat. The dam was built in 1981 and is owned by the Grand County Water Conservancy District. The reservoir storage at spillway crest is 2,820 acre-feet and the reservoir storage at dam crest is 3,360 acre-feet. The spillway type is open channel and the maximum dam breach flow is 64,000 cfs with a 3 square mile drainage basin area. The first downstream town is Moab, 6 miles away.

2. Wildland Fire

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-25%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
	X	Likely	
		Possible	
		Unlikely	
Location	URWIN zones near the foothills and in forested areas. See map in Section H		
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.		
Analysis Used	Review of plans and data provided by US Forest Service, National Climate Center, FEMA, AGRC, County Hazard Analysis Plans, and DESHS.		

Description of Location and Extent

The Division of Emergency Services assigned five hazard categories to the wildfire risk data provided in the statewide fire risk assessment-- Extreme, High, Medium, Low, and Very Low. These ratings cover all of Grand County and are based on the type and density of vegetation in each area. Factors influencing wildland fire behavior such as weather conditions, wind speed and direction are not considered in this risk assessment. Refer to Table 9-9 for the recorded history of wildfires in the county.

Vulnerability Assessment

Loss estimates were completed by identifying the wildland fire areas of extreme, high, and moderate within the county then overlaying the municipalities in a GIS database that identifies the vulnerable areas. The following table includes the population and number of commercial, and residential structures inside extreme, high and moderate wildfire risk areas within the county (Table 9-5).

Table 9-5 Structures and Population in Wildfire Area

Use Type	Extreme Risk	High Risk	Moderate Risk
Commercial Units	0	36	20
Residential Units	0	417	242
Population	0	828	368

Potential Wildfire Loss Estimates

Table 9-6 details the annual sales of the businesses inside each wildfire risk area, and the assessed value of residential property in each wildfire risk area. Residential loss estimates do not include contents; including the value of contents would increase the values listed by 50%. No businesses are located in Grand County in Extreme wildfire risk areas. All businesses located in High and Medium Wildfire Risk areas except one are in the City of Moab or Castle Valley. The Thompson's Springs Fire Department is the only Critical Facility in Grand County located in a wildfire risk area.

Table 9-6 Inventory of Properties Located in Wildfire Risk Areas in Grand County

Businesses Number/Annual Sales	**Residential Units** Number/Replacement Cost	**Population**
56 / $42,300,000	659 / $81,551,909	1,196

Wildfire Risk within Municipal Boundaries

Table 9-6 lists the number of acres in each wildfire risk area contained within the municipal boundaries of the following cities in Grand County. Table 9-8 identifies the infrastructure found within wildfire areas.

Table 9-7 Wildfire Risk Area

City Name	Acres of Extreme	Acres of High	Acres of Moderate
Moab	0	635	117
Castle Valley	0	1,253	2,888
Green River	0	0	0

Table 9-8 Infrastructure in Wildfire Area

Item	Length (Miles)	Replacement Cost
Local Roads	116.09	$232,176,800
State Highways	41.38	$99,877,629
US Highways	0.00	$0
US Interstates	29.41	$105,875,280
Power Lines	124.03	$5,988,168
Gas Lines	26.33	$6,355,799

Table 9-9 Wildfire History

Date	Fire Name	Cause	Size
6/19/84	Agate Oilfield	Lightning	300 - 999 Acres
6/9/85	East Cisco	Equipment	300 - 999 Acres
6/25/85	Cottonwood	Lightning	300 - 999 Acres
7/4/85	Sager 2	Equipment	300 - 999 Acres
7/7/85	Little Hole	Lightning	300 - 999 Acres
8/14/85	Border R733	Lightning	300 - 999 Acres
8/16/85	Mile Post 222	Lightning	300 - 999 Acres
8/31/85	Brewster 1	Incendiary	300 - 999 Acres
6/8/86	Westwater 2	Debris Burn	300 - 999 Acres
6/19/86	East	Railroad	300 - 999 Acres
7/6/86	Harley	Lightning	300 - 999 Acres
7/12/86	Westwater Comp	Lightning	1000 - 4999 Acres
8/5/86	Bitter Creek	Lightning	300 - 999 Acres
7/1/89	Diamond Peak	Lightning	> 5000 Acres
7/8/89	Ryan Creek	Lightning	1000 - 4999 Acres
7/10/93	Whipsaw Flat	Lightning	300 - 999 Acres
8/13/93	Westwater 2	Lightning	300 - 999 Acres
6/9/94	Thompson	Equipment	1000 - 4999 Acres
7/23/94	Mm 213	Miscellaneous	300 - 999 Acres
8/30/94	Westwater 3	Lightning	1000 - 4999 Acres
6/19/95	Valley City 2	Lightning	1000 - 4999 Acres
6/24/95	Valley City 3	Miscellaneous	300 - 999 Acres
8/16/96	One Eye	Lightning	300 - 999 Acres
7/1/99	Little Hole	Lightning	1000 - 4999 Acres
5/28/00	Fisher	Lightning	300 - 999 Acres

3. Landslide

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-25%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	Possible	
		Unlikely	
Location	See map in Section H. Generally occur in canyon mouths and foothill areas. Manti-La Sal National Forest, near foothills on steep slopes, cliff faces, canyon walls.		
Seasonal Pattern or Conditions	Spring and Summer usually caused by the stress release of over-weighted soils and or loosening of rock and debris.		
Duration	Landslides generally last hours or days, but some can last weeks.		
Analysis Used	Information and maps provided by UGS, DESHS, AGRC.		

Description of Location and Extent

The map "Grand County Landslide Hazard" shows the locations of high-risk landslide areas by identifying historical landslide locations. The main historical landslides in Grand County occurred in the Southeastern portion of the Manti-La Sal National Forest, just east of Green River. Generally, landslides are located in well-defined, localized areas. The identified historical areas will most likely be the location of future landslides.

Vulnerability Assessment

The hazard analysis indicates that there are no business or critical facilities in Grand County that are located within the high landslide risk area. There are residential units as well as general infrastructure within the risk area (Tables 9-10, 9-11).

Table 9-10 Inventory of Properties Located in Landslide Risk Areas in Grand County

Businesses	Residential Units	Population
Number\Annual Sales	Number\Replacement Cost	
0 /$0	97 \ $12,003,847	127

Table 9-11 Infrastructure in Landslide

Item	Length (Miles)	Replacement Cost
Local Roads	5.77	$11,540,000
State Highways	0.00	$0
US Highways	0.00	$0
US Interstates	0.00	$0
Power Lines	2.56	$123,597
Gas Lines	0.00	$0

4. Problem Soil

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-25%
	X	Critical	25-50%
		Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	See map in Section H. Central and southern portions of the county.		
Seasonal Pattern or Conditions	Spring and Summer		
Duration	Constant problem		
Analysis Used	Review of information and maps provided by County soil classification books, Soil Conservation Service, local input, UGS, DESHS, and AGRC.		

Description of Location and Extent

In 1991 the Soil Conservation Service (SCS) studied the Canyonlands area just south of the Grand County border. The soils within the study area range from well-drained silty soils to impervious rock. Based upon the soil makeup, permeability in the bluffs of the southeastern portion of the county is considered by the SCS to be generally moderate, meaning they have medium to rapid runoff conditions. The soils according to SCS in the Moab City developed region have moderate to rapid permeability which means they have slow to medium runoff. Expansive soil and rock affect the central and southern portions of the county and minor amounts of silica dune are found in the mid-southern portion.

Using the problem soils and major roadways map from DESHS developed for the State of Utah and Census 2000 block data, the two maps were overlaid to indicate where households and roadways exist in relation to problem soil areas. The results from the analysis are presented in Table 9-12 below (no households were identified in problem soil areas). Roadway replacement was calculated assuming a cost of $2 Million per mile. The map "Grand County Problem Soils" shows the areas of Problem Soils within Grand County.

Table 9-12 Roadways in Grand County located on Problem Soil Areas

Roadway	Miles	Estimated Replacement Cost
I-70	42.53	$148,858,010
West Main St.	0.41	$826,729
East Main St.	0.53	$1,065,863
Main St.	0.19	$380,063
South Main St.	0.51	$1,029,283
North Main St.	0.32	$634,556
State Route 10	40.91	$81,814,581
State Route 155	5.64	$11,278,533
State Route 24	4.78	$9,560,011
State Route 29	4.87	$9,737,116
State Route 31	4.50	$8,998,304
State Route 57	9.74	$19,474,253
U.S. Highway 6	35.69	$71,389,921

F. Hazard History

Identifying past hazard events is key in predicting where future events are likely to occur. The following available relevant information such as date, location, area impacted, and damage costs are identified in the table below (Table 9-14). Due to the frequency and geographic extent of problem soil, and some severe weather events past events have not been recorded and are therefore not identified in the table below.

Table 9-14 Hazard Histories

Hazard	Date	Location	Critical Facility/ Area Impacted	Comments
Cloudburst storm	August 28, 1939	Moab City	Mill Creek	$5,000 in damage to homes, businesses and streets, serious damage to the powerhouse
Flood	August 31, 1939	Town of Cisco	Diamond Creek	One death
Flash Flood	July 23, 1953	Moab City		Thousands of dollars of damage to a movie production set at Fisher Towers
Flash Flood	August 6, 1957	Moab City	Mill Creek	Several thousand dollars damage to property and crops, and culinary water lines across Mill Creek
Flash Flood	August 29-30, 1957	Moab City	Thompson	Heavy rains caused flooding along streets and highways, destroying several homes
Tornado	May 4,1961	Grand County		F1 tornado
Flash Flood	August 25-26, 1961			Thousands of dollars of damage was recorded to motels and homes. Highway 160 was blocked
Flood	June 29-30, 1962	Moab City	Walker Subdivision	Moab city park flooded
Flood	August 8, 1963	Moab City	Mill Creek and Pack Creek	Destroyed sewer mains. Streets and roads were damaged and several hundred acres of land were covered with silt
Flood	October 15, 1965	Moab City	Mill Creek and Pack Creek	$1,500 damage to culverts, roads, and bridges
Flood	June 5, 1967	Moab City	Northern Moab,	Worst flood in 20

			US 160, Main Street.	years. Destroyed homes, businesses, establishments, apartments, and streets. Thousands of dollars of damage.
Hail	August 14, 1968	Grand County		1.75 inches
Flood	August 17, 1968	Moab City		Destroyed homes, businesses, and roads; covered in mud and water. Damage totaled about $50,000
Thunderstorm/ High winds	April 06, 1969			
Tornado	June 10, 1970	Grand County		F2 Tornado
Avalanche	Winter 1970	Grand County	Miner's Basin	1 building destroyed
Avalanche	1970	Grand County		2 deaths
Thunderstorm/ High winds	August 30, 1971	Grand County		
Earthquake	March 14, 1974	Grand County	Cisco	3.2 Richter Magnitude
Hail	June 10, 1976	Grand County		1.75 inches
Hail	August 30, 1986	Grand County		1.00 inches
Avalanche	February 1991	Grand County	Talking Mountain	4 deaths 6 buried
Funnel Cloud	October 07, 1993	Moab City		
Lightning	August 16, 1995	Moab City		1 death, 1 injury
Lightning	September 29, 1995	Moab City		1 injury
Lightning	August 17, 1996	Moab City		1 death
Flash Flood	September 06, 1997	Moab City		$175,000 property damage
Hail	September 20, 1997	Crescent Junction		1.75 inches
Winter Storm	December 07, 1997	Grand County		1 death, 20 injuries, $200,000 property damage
Heavy Rain	September 12, 1998	Moab City		
Winter Storm	December 19, 1998	Grand County		10 injuries, $100,000 property damage
Extreme Cold	December 21, 1998	Grand County		$20,000 property damage
High Winds	April 09, 1999	Grand County		60 kts. $2,000 property damage
Lightning	May 29, 1999	Cisco		1 death
Wildfire	June 20-21, 1999	Westwater		
Flash Flood	July 08, 1999	Moab City		
Lightning	July 14, 1999	Crescent Junction		
Flash Flood	July 14, 1999	Moab City		$60,000 property damage
Heavy Rain	July 27, 1999	Moab City		$10,000 property

				damage
Flash Flood	July 30, 1999	Thompson		$2,000 property damage
Flash Flood	August 11, 1999	Moab City		
Thunderstorm/ High Winds	August 30, 1999	Canyonlands		50 kts.
Tornado	April 18, 2000	Grand County	Moab City	F0 Tornado, $1,000 property damage
High Winds	April 18, 2000	Grand County		60 kts. $20,000 property damage
Thunderstorm/ High Winds	May 24, 2000	Moab City		50 kts.
Thunderstorm/ High Winds	May 25, 2000	Canyonlands		50 kts.
Wildfire	July 04, 2000	Cisco		
Flood	July 09, 2000	Moab City		
Lightning	July 09, 2000	Moab City		$100,000 property damage
Wildfire	July 15, 2000	Cisco		
Lightning	July 22, 2000	Moab City		$2,000 property damage
Wildfire	July 24, 2000	Westwater		
Wildfire	August 15, 2000	Westwater		
Thunderstorm/ High Winds	August 20, 2000	Canyonlands		50 kts.
Tornado	September 08, 2000	Grand County		F0? Tornado
Hail	September 21, 2000	Cisco		1.00 inches, $10,000 property damage
Heavy Snow	December 24, 2000	Grand County		
High Winds	April 20, 2001	Grand County		50 kts. $10,000 property damage
Flood	July 08, 2001	Moab City		
Flood	July 09, 2001	Moab, Canyonlands		
Flash Flood	July 10, 2001	Moab City		
Flood	August 13, 2001	Moab City		
Winter Storm	January 28, 2002	Grand County		
Drought	May 01, 2002	Grand County		
Thunderstorm/ High Winds	May 15, 2002	Cisco		67 kts.
Drought	June 01, 2002	Grand County		
Wildfire	June 20, 2002	Thompson		
Wildfire	June 22, 2002	Thompson		
Wildfire	June 27, 2002	Thompson		

G. Mitigation Goals, Objectives, Actions

Mitigation Strategies Workbook
Grand County

Note: Countywide in this document refers to a mitigation strategy benefiting the cities, towns and communities of: Thompson Springs, Cisco, Castle Valley and Moab City.

Grand County and Moab City have certified Emergency Service Personnel including, City Police, Grand County Sheriffs, EMT, Building Inspectors, and the Moab Valley Fire Department.

The following documents are the documents used for mitigation and action plans.

- The Grand County Storm Drainage Master Plan as amended to date.
- The Grand County Land Use Code, specifically Articles 4, 5, & 6, as amended to date.
- Moab City Code Chapter 15.40, Flood Damage Reduction as amended to date.
- The FIRM Flood Map for Moab City Panel 2 of 2.
- Grand County Emergency Operations Plan, as amended to date
- Moab Valley Wildfire Mitigation Plan as amended to date.
- International Building Codes as adopted.

FLOODING

Countywide Problem Identification
The rapid development of the county has caused a need to re-evaluate the system and establish a plan and level of service to manage stormwater. Development also directly impacts the historical drainage ways with culverts roads and structures.

Goal 1 – Priority HIGH

Objective 1.1 – Continue to support and update Storm Water Management Plan.

Action: Review and revise Storm Water Management Plan as development warrants.
Time Frame: Ongoing
Funding: County and impact fees
Estimated Cost: Depends on extent of identified projects within Plan.
Staff: County, Private Contractors
Background: The Storm Water Management Plan as protected the County from flood losses. This Plan also contains identified storm water basins and other structural control projects.

Problem Identification: Flood occurs primarily from spring snowmelt in the higher elevations and summer flash flooding. Identifying and then controlling flooding will assist in responding to flood events. Protection of life and property before, during, and after a flooding event is essential.

Goal 1 – Priority High

Objective 1.1 Encourage 100% participation in the National Flood Insurance Program (NFIP).

Action: Assist Unincorporated Grand County in joining NFIP
Time Frame: 1 year
Funding: None required
Estimated Cost: None
Staff: County Emergency Management, County Engineer, And State Floodplain Manager

Background: Special Flood Hazard Areas have been identified by FEMA in the Unincorporated County. The County has chosen not to participate in the NFIP. Flood insurance is not available in the Unincorporated County.

Objective 1.2 Promote flood insurance throughout the County

Action: Create outreach document promoting flood insurance and include in local newspaper(s), libraries, and other public buildings.

Time Frame: 1 year
Funding: Minimal
Estimated Cost: Unknown
Staff: County Engineer, State Floodplain Manager, and DES
Background: General public is usual not aware they can purchase flood insurance.

Objective 1.2 Reduce threat of unstable canals throughout the County. Identify County-wide canal systems

Action: Map and assess for structural integrity canal systems in the County

Time Frame: 3-5 years
Funding: Federal grants
Estimated Cost: Unknown
Staff: County Engineer, County Public Works, County Information and Technology, County Emergency Management
Background: Private and Public canals are used for transportation and dispersion of water as well as flood control.

Objective 1.3 Ensure EOC(s) is equipped to respond to flooding.

Action: Obtain communication equipment that will allow for timely response to flooding.

Time Frame: 1 year
Funding: Federal Grants
Estimated Cost: $30,000
Staff: County Sheriff, County Emergency Management
Background: An alternate EOC(s) also need adequate communication capabilities are essential between all response agencies within the County.

Objective 1.4 Support updating of flood hazard data

Action: Support and encourage participation in the NFIP Flood Map Mod Program.

Time Frame: Ongoing
Funding: Federal
Estimated Cost: Unknown
Staff: County Engineer, State Floodplain Manager
Background: Accurate flood maps assist the County in the administration of the NFIP and better reflects flood risk within the County. County must join the NFIP to be able to participate in Map Mod.

SEVERE WEATHER

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

Goal 1 – Priority High

Objective 1.1 Protect County from adverse affects of severe weather

Action 1: County participates in the Storm Ready program.
Time Frame: 2 Year
Funding: State and Federal
Estimated Cost: Unknown
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 Storm Ready program.

Action 2: Encourage avalanche preparedness for county backcountry users in the northeastern portion of the County
Time Frame: 1 Year
Funding: Minimal
Estimated Cost: Minimal
Staff: County Emergency Management State Hazard Mitigation Team members, Utah Avalanche Forecast Center.
Background: Avalanches and avalanche preparedness is not often considered when discussing mitigation on the county or city level, yet several people die each year in Utah's backcountry. While the avalanche terrain is mainly on US Forest Service land the search and rescue for the lost individual in more often than not coordinated by emergency managers with search parties comprised of county and city staff. Introductory avalanche awareness training could lessen the costs to Grand County. Most avalanche victims die in avalanches started by themselves or someone in there party. Thus, education can limit the number of avalanche related searches each year.

Action 3: Assess EOC's to ensure they are grounded lightning, to include buildings with towers, etc.
Time Frame: 2-3 years
Funding: Federal Grants
Estimated Cost: Unknown
Staff: County Emergency Management
Background: EOC's and alternate EOC's**,** Sheriff's Dispatch, Command Vehicle(s)and associated equipment need to be protected from severe weather events including lightning.

SLOPE FAILURE (LANDSLIDE AND DEBRIS FLOW)

Countywide Problem Identification
There is a potential risk to structures located in areas identified by the SECAOG GIS as landslide risk areas.

Goal 1 – Priority Medium

Objective 1.1 Reduce potential landslide risk on commercial and residential structures in areas of known landslide potential.

Action: Assess the probability of landslides and identify specific structures at risk
Time Frame: Undetermined
Funding: Property owner
Estimated Cost: Unknown
Staff: Unknown
Background: Soil surveys and other engineering surveys are needed.

Problem Identification: Rockfall may impact structures within the County

Goal 1 – Priority Medium

Objective 1.1 Remove risk to homes by removing rocks.

Action 1: Remove large rocks overhanging existing developments.
Time Frame: Undetermined
Funding: Not applicable
Estimated Cost: Not applicable
Staff: City, County Planning
Background: Developments should include removal or remediation of large rock areas from being dislodged by earthquake or rains.

Action 2: Remove potential rock hazards prior to building homes.
Time Frame: 5 year
Funding: None
Estimated Cost: Unknown
Staff: Planning Departments
Background: Prior to building, require builder/owner to secure or remove possible rock hazard.

EARTHQUAKE

Countywide Problem Identification
Although there is a limited impact to earthquakes, there is an opportunity to evaluate transportation and utilities services could be impacted form secondary effects of earthquake.

Goal 1 – Priority Low

Objective 1.1 Provide for emergency response and relief

Action: Identify and maintain critical transportation and utility services
Time Frame: Ongoing
Funding: Local governments and possible grants
Estimated Cost: Unknown- Determined by the extent of damage anticipated.
Staff: County and City staff.
Background: Critical transportation, utility and communication systems need to be maintained.

DROUGHT

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

Goal 1 – Priority Medium

Objective 1.1 Conserve culinary water by educating the public

Action: Educate the public on the need to be water wise
Time Frame: Ongoing
Funding: City funds
Estimated Cost: minimal
Staff: Water purveyor and newsletter editor
Background: Use a newsletter to educate the public

Objective 1.2 Conserve culinary water by conservation

Action: Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: County funds
Estimated Cost: minimal
Staff: Water purveyor and newsletter editor
Background: County should evaluate a tiered water system.

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

Goal 1 – Priority Medium

Objective 1.1 Meet current and future water needs of community

Action: Develop additional source and storage as well as implement conservation plans implemented.
Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: County Staff, Professional Services, and Contractors
Background: To meet the needs of a community's residential and businesses water users, vigilance in locating new and additional sources as well as increasing storage capacity to meet current needs as well as future need is a must.

H. Maps

All of the following maps have been created for the Pre-Disaster Mitigation Plan using the best available data at the time of the creation of this plan. Because data was obtained from federal and other external sources, Grand County, Moab City, SEUALG and WFRC and its staff members cannot accept responsibility for any errors, omissions, or positional accuracy; therefore there are no warranties, which accompany the maps.

Map 9.1.1 Dam Hazard
Map 9.2.1 Wildfire Risk
Map 9.3.1 Landslide Hazard
Map 9.4.1 Problem Soils