

Part 7. Carbon County

Carbon County is a large county in terms of land area and is made up of six municipalities: East Carbon City, City of Helper, Price City, Scofield Town, Sunnyside City, and Wellington City. Carbon is located in the mid-eastern portion of the State.



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 7-1).

Table 7-1 Carbon County Population

	Carbon County	East Carbon	Helper	Price	Scofield	Sunnyside	Wellington	Balance of Carbon	Southeast
1980 Census Population	22,179								54,124
1990 Census Population	20,228	1,270	2,148	8,712	43	339	1,632	6,084	49,801
2000 Census Population	20,422	1,393	2,025	8,402	28	404	1,666	6,504	54,180
2005 Population Projections	20,562								54,559
2010 Population Projections	21,801								57,699
2015 Population Projections	23,769								62,754
2020 Population Projections	25,236								66,489
2030 Population Projections	25,848								67,867
1990-2000 AARC	.01%	0.9%	-0.6%	-0.4%	-4.2%	1.8%	0.2%	0.7%	
2000-2030 AARC	0.79%								0.75%

1990-2000 Percent Change	1.0%								
Rank by 2000 Population	13								
Rank by Percent Change	29								
Rank by AARC	29								

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

The principle towns in Carbon County include Price, Helper, Wellington, East Carbon and Sunnyside. The County's economy relies on coal mining, transportation/railroad, energy, government, services, trade, and tourism. Coal mining has long played vital role in the county's economic and social development. Utah Power and Light built a large electric generating plant in the county. Ninety-eight percent of the power for the company comes from coal-burning thermal plants (Carbon County). The College of Eastern Utah located in Price also plays a significant role in the County's cultural diversity and economic development.

In 2002, the Carbon County unemployment rate was 5.6 (just above the state's 5.1 percent average), non-farm jobs rose 3.4 percent in the first quarter and 6.5 percent in the second quarter, and the mining industry rebounded with around 180 jobs. The service sector (trade, transportation, information, recreation, lodging, and food services) expanded during the first two quarters of 2002 along with fabricated metal manufacturing, construction jobs, health care and social assistance, and goods-production employment. On the downside was the trucking and rail transportation businesses and local government jobs, namely education. The 2002 outlook continues to see an upward trend, but relies heavily on the sustainability of mining jobs (Carbon County Trends). The 2000 estimated average house value is \$78,637 (Annual Statistical).

C. Transportation and Commuting Patterns

The major transportation routes within Carbon County are Highways 6, 10, 123, and 191. The principle north-south corridors through the county are Highways 6 and 191. State Highway 10, between Price and Emery, is the major highway for the populated section of the county, connecting Price to I-70 to the south. Highway 123 runs from highway 6 east through the towns of East Carbon City and Sunnyside (Traffic Volume Map).

D. Land Use and Development Trends

Seventy-six percent of the property in Carbon County is owned and managed by the federal government, 8.7% is owned by the State, and 13.7% is privately owned (Consolidated Plan). These land ownership patterns are similar to many of Utah's rural counties. Because the Federal government administers the majority 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 surrounded by federal land boundaries.

Land development trends for the last 100 years have been principally influenced by the volatile mining industry. Over the last twenty-five years the county has experienced slow and steady development growth mainly in Price, Helper, Wellington, and East Carbon. As available lots were developed within municipalities, growth spread to small and medium sized lots along county roads and/or unincorporated portions of the county. Agricultural growth has also increased with the purchase of "mini-farms" from one-

half to twenty-acres. Suburban development in the larger communities has increased the demand for more community services and infrastructure.

Price City, considered a regional hub city, hosts the county seat and retains the majority of the region's businesses as well as a junior college. Price City is considering annexing surrounding residential and commercial developments.

Carbon County's second largest city, Helper City, is experiencing a financial depression due to closures of the bigger mines (Castle Gate and Willow Creek), and a consolidation of the railroad. The city is currently struggling to restore its historic downtown district and to rejuvenate its infrastructure.

Wellington is the third largest city within Carbon County. Wellington's economy is based on agriculture and a few small businesses and has always struggled with growth. Wellington functions as a bedroom community of Price City and the surrounding areas.

In 1981 the county adopted development codes and building ordinances. In March 2003 these codes and ordinances were revised.

Over the last ten years Carbon County's population growth has been below 1% overall. This trend includes seasons of both local and countywide negative growth. As a result, overall development has been minimal. Building Permits issued from 1998-2002 are as follows.

- Residential permits consist of a large variety of construction activity on residential premises including (but not limited to) remodels, additions, gas meter, electrical upgrade, re-roof, garage, single-family dwellings, manufactured homes, and mobile homes in parks.
- Dwelling permits include single-family dwellings, manufactured homes (new and used), and mobile homes in parks.
- Commercial permits include all construction activity on commercial property.
- Industrial permits include mining, gas wells, etc.

GORDON CREEK & CARBONVILLE & WESTWOOD

310	Residential
139	Dwelling
15	Commercial
10	Industrial

SPRING GLEN & KENILWORTH

164	Residential
24	Dwelling
3	Commercial
4	Industrial

SOUTH PRICE & MILLER CREEK & DRUNKARDS WASH & HIAWATHA & RIDGE RD

314	Residential
124	Dwelling
33	Commercial
25	Industrial

COAL CREEK & CLARKS VALLEY & NINE MILE

22	Residential
12	Dwelling
1	Commercial
11	Industrial

SCOFIELD MOUNTAIN AREA & CLEAR CREEK & BEAVER CREEK

146	Residential
54	Dwelling
2	Commercial
0	Industrial

SCOFIELD TOWN

46	Residential
3	Dwelling
1	Commercial
0	Industrial

HELPER & SPRING CANYON

197	Residential
9	Dwelling
9	Commercial
0	Industrial

EAST PRICE

4	Residential
5	Dwelling
9	Commercial
4	Industrial

WELLINGTON

193	Residential
66	Dwelling
5	Commercial
1	Industrial

SUNNYSIDE & WHITEMORE CANYON & BRUIN

42	Residential
6	Dwelling
1	Commercial
1	Industrial

Employment

Five hundred and seven people entered the Carbon county workforce last year. This is an increase of 5.3% over the previous year. However, the overall unemployment rate increased from 6.96% to 8.34%, or a 1.37% total rate increase. This means that only 66% of the new entries found gainful employment, assuming that last year's workforce retained their employment status.

Residential

Most residential growth in Carbon County occurs in the Circle K and Westwood areas just west and outside of Price City boundaries. The largest growth in the county occurs in summer homes in and around Scofield Town. Real estate sales are higher this year than last by 281.4%, but most sales are of existing stock rather than new construction.

Commercial

Most commercial development occurs in and around Price city.

Industrial

Most heavy industrial development has occurred south of Price along Highway 10 and on Ridge road.

Natural Resource Production

Carbon County mining revenues are down 24.0% from last year -- from \$11.6 million to \$8.8 million. Development of gas wells and high-pressure gas lines in and around the Drunkards Wash area has slowed down recently. Wholesale gas sales are down by 12.6% from last year. Bill Barrett Corp. is contemplating a major development in the Northeastern part of the county around Nine-Mile canyon that may be three times larger in volume than previous county fields.

Roads and Infrastructure

UDOT is currently in the process of widening U.S. 6 from Price to Wellington from two lanes to four. Crews are currently relocating utility lines, which should be completed in November 2004. UDOT is also doing a rotomill, overlay and chip seal project on U.S. 6 from Price Canyon Mile Post 202 to 238; this project was expected to be complete by September of 2003.

Water

Price city and Helper have their own water treatment and distribution but PRIWD handles wastewater. Sunnyside and East Carbon cities jointly own water service through Grassy Trail.

Power

Utah Power supplies electrical power to all of Carbon County.

Carbon County's Future:

Carbon County has specified in the community plan that they will not spot zone, and will avoid practices not consistent with the community plan. 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 various types of residential development and will keep these areas away from industrial zones and high-volume traffic corridors.

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.

As cities and towns have incorporated and grown in the county, incompatible land uses have risen along boundaries. Coordination between municipalities for future development plans will reduce future incompatibility.

E. Risk Assessment

The risk assessment process found Carbon County to be vulnerable to the following 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; these hazards are all covered in a regional annex as Carbon County's condition affects the entire region. Vulnerability maps (found at the end of this section), were compiled for the hazards of dam failure, wildfire, landslide, problem soils, and earthquake. A GIS based risk assessment was completed where appropriate. Refer to Appendix C for a complete list of the critical facilities.

1. Dam Failure

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
		Limited	10-25%
		Critical	25-50%
	X	Catastrophic	More than 50%
Probability		Highly Likely	
		Likely	
	X	Possible	
		Unlikely	
Location	See map in Section H Dam locations are mainly in the southeastern portion of the county.		
Seasonal Pattern or Conditions	Rainy Day Failure happens mainly during heavy precipitation events, can have some warning time. Sunny Day Failure happens with no warning at all can happen at anytime.		
Duration	Hours, Days. Depends on spillway type and area, maximum cfs discharge, overflow or breach type, dam type. Refer to Dam Inventory for more information.		
Analysis Used	Review of BOR inundation maps and plans, FIS, Water Rights.		

Description of Location and Extent

Twenty dams are located in Carbon County, but only one dam is considered a high hazard. A high hazard is defined as a possibility of life being lost due to dam failure. Two 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 seventeen dams have a low hazard rating; meaning if they were to fail there would be insignificant property loss (Table 7-4). 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.

Table 7-4 Dam Hazard Rating

Dam Name	Hazard Rating
1) Scofield Reservoir	High
2) Grassy Trail Reservoir	High
3) Sunnyside Co-Generation Reservoir	Moderate
4) Price Storm Water DB	Moderate
5) Anderson East	Low
6) South	Low
7) US Steel Corp Tailing Up	Low
8) Sunnyside Cogeneration Dragert	Low
9) US Steel Corp Storage	Low
10) US Steel Corp Tailings	Low
11) Mud Springs Reservoir	Low
12) Olsen	Low
13) Powell	Low
14) Millerton	Low
15) Abbott	Low
16) Castle Valley SP SVC DST- Elmo	Low
17) Desert Lake- Desert Lake Dike	Low
18) Rowley Brothers	Low
19) Desert Lake –Wash Lake	Low
20) Desert Lake –Old Desert Lake	Low
21) Desert Lake –Fawn Lake	Low

In the following narrative, downstream towns have been identified that could be potentially affected if any of the identified reservoirs were to breach. However, potential dollar losses were unable to be evaluated for dam failure due to the lack of dam inundation maps that would be needed to conduct such a study.

East Carbon and Sunnyside Cities

The Grassy Trails Reservoir was built in 1952 and is jointly owned by East Carbon and Sunnyside Cities. A possible dam breach would affect both East Carbon and Sunnyside, which are 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 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 City, which is only 0.5 miles away.

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. If it were to fail, it would exhibit a natural breach failure. The drainage area is 161 square miles, the storm duration could last 80 hours, and the peak inflow is 41,000 cubic feet per second. This dam does not have a hazard rating at this time but if it were to breach many areas near the Price River would suffer severe damage from the water and from the lack of the water, including parts of Helper, Spring Glen, Carbonville, Price, and Wellington. Most of the populated areas of the entire county depend heavily on this large water supply.

Price City

The Price Stormwater Dam, owned by Price Municipal Corporation, is planned and/or under construction at the time of the writing of this plan. The reservoir storage at spillway crest will be 900 acre-feet. The first downstream town is Price located just 0.1 miles away. At this time the dam has not been rated.

Vulnerability Assessment

The risk assessment values for dam failure were difficult to analyze due to the quality and age of the dam inundation maps from the Dam Safety Section of Utah Water Rights. The municipalities, roads, critical facilities, and GIS layers were superimposed over the dam identification layers. This analysis reveals the geographic extent of the dams and the critical facilities within the hazard areas. This analysis could not identify potential dollar loss estimates using the available data.

The Carbon County GIS Department overlaid county assessor data, and parcel data from Census 2000 and 2001 with county dam inundation maps.

Figure 7-1, the process used to figure the statistics shown was by selecting the parcels that intersect with the inundation zone. Out of 1498 records 177 of these have either 0 or null value. There are approximately 100 parcels in Helper City that are missing (Figure 7-1).

Figure 7-2, the process used to figure the statistics shown was by selecting the parcels that intersect with the inundation zone. Out of 172 records 50 of these have either 0 or null value. Some parcel information was not available (Figure 7-2).

Figure 7-1

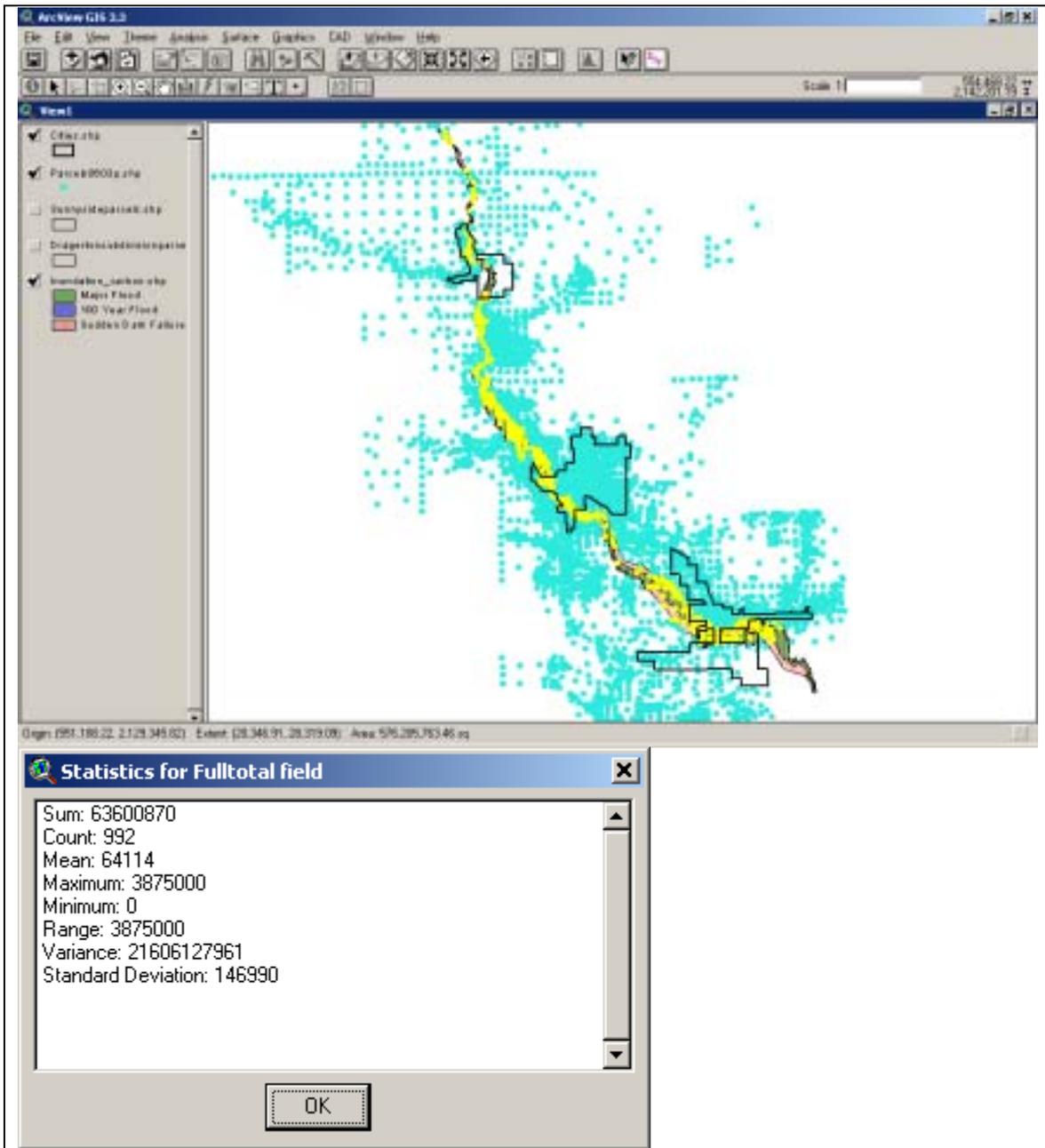
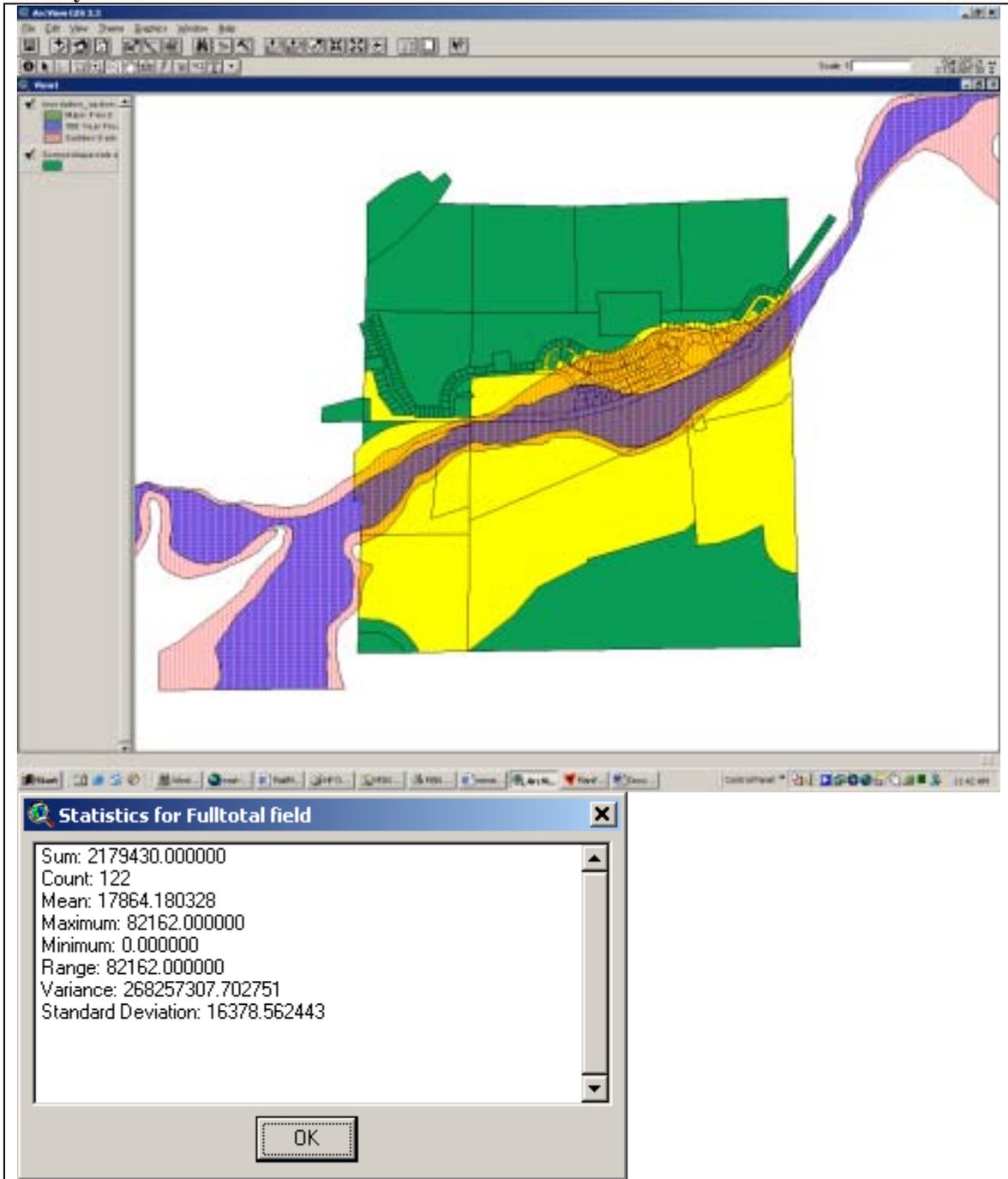


Figure 7-2

Grassy Trail Inundation Area



2. Flood

Hazard Profile

Potential Magnitude		Negligible	Less than 10%
	X	Limited	10-25%
		Critical	25-50%
		Catastrophic	More than 50%
Probability	X	Highly Likely	
		Likely	
		Possible	
		Unlikely	
Location	See map in Section H		
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		

Description of Location and Extent

The local planning team members, including the County GIS department, were able to identify and map flood prone areas within the county. The core planning team utilized this research to conduct the risk assessments. The Army Corps of Engineers compiled a Flood Hazard Identification Study in 2003 that addressed unmapped communities within Southeastern Utah (Appendix E).

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. Overflow generally occurs during summer and fall cloudburst storms.

The following canals also pose a threat to Carbon County: Carbon, Price-Wellington, and Spring Glen. The Carbon Canal is an earthen canal that could potentially affect the west side of Price, Westwood, and Robertson subdivisions. The Price-Wellington earthen canal could threaten the north half of Price and Wellington. The earthen Spring Glen Canal could pose a threat to Spring Glen. 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 (review the Hazard History portion at the end of this section to identify past occurrences).

Vulnerability Analysis

Due to the lack of digitized floodplain maps potential dollar loss estimates were unable to be completed during the making of this plan.

3. 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 and Homeland Security 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.

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 GIS 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 (Table 7-5).

Table 7-5 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 Cost	638/\$50,170,406	954/\$75,019,698	592/\$46,553,104
Population	1347	2048	1491

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

Wildfire Risk with Municipal Boundaries

Table 7-6 Wildfire Risk Area contains the number of acres in each wildfire risk area within the municipal boundaries of the following cities in Carbon County.

Table 7-6 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

Table 7.7 Infrastructure affected by Wildfire

Item	Length (Miles)	Replacement Cost
Local Roads	41.57	\$83,149,600
State Highways	46.31	\$111,760,738
US Highways	8.18	\$19,740,499
US Interstates	0.25	\$900,000
Power Lines	143.93	\$6,948,940
Gas Lines	0.00	\$0

Table 7.8 Wildfire Hazard History

Date	Fire Name	Cause	Size
9/11/88	Bear Fire	Lightning	300 - 999 Acres
7/25/96	East Carbon	Lightning	1000 - 4999 Acres

4. 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.		
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 “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.

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. 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 7-9 and 7-10 identify the infrastructure within landslide areas. In order to accurately capture landslide risks in these areas a more detailed assessment using parcel data rather than Census Block data is required.

Table 7-9 Inventory of Properties in Landslide Risk Areas

Use Type	Number	Estimated Value
Commercial Units	0	0
Residential Units	97	\$7,627,789
Population	127	N/A
Total Estimated Loss \$7,627,789		

Table 7-10 Infrastructure affected by Landslide

Item	Length (Miles)	Replacement Cost
Local Roads	1.01	\$2,020,000
State Highways	0.00	\$0
US Highways	0.00	\$0
US Interstates	0.00	\$0
Power Lines	1.46	\$70,489
Gas Lines	0.00	\$0

5. 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.		
Seasonal Pattern or Conditions	Dependant on geology of county.		
Duration	Constant problem		
Analysis Used	Reviewed information and maps provided by County soil classification books, UGS, DESHS, AGRC, and local input.		

Description of Location and Extent

Carbon County has ongoing problem soil issues. Problem soils pose challenges to construction, utility trenching, and agriculture. The county contains large quantities of compacted mancos shale, as well as soils with high alkali content. Problem soil occurrences are high within the whole county (Refer to the map titled “Carbon County Problem Soils” at the end of this section to identify the location and/or geographic extent).

Vulnerability Assessment

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 Tables 7-11, 7-12 and 7-13. The map “Carbon County Problem Soils ” shows the areas of Problem Soils within Carbon County. The assessed values are considered to be high due to the fact that problem soils were taken into account during construction of most structures.

Table 7-11 Problem Soil Areas and Households within Municipal Boundaries

City Name	Acres within City Boundaries	Households in Problem soil area	Assessed Value
East Carbon/Sunnyside	1730	295	\$23,197,915
Helper	857	890	\$69,986,930
Price	1450	1961	\$154,207,157
Wellington	698	788	\$61,965,956

Table 7-12 Businesses in Carbon County located on Problem Soil Areas

City Name	Number	Annual Sales
Helper	76	\$35,600,000
Price	287	\$445,500,000
Sunnyside	10	\$7,100,000
Wellington	36	\$67,800,000

Table 7-13 Roadways in Carbon County located on Problem Soil Areas

Roadway	Miles	Estimated Replacement Cost
200 West	0.32	\$639,489
4500 N Kenilworth Rd.	0.14	\$281,561
Bryner Canyon	1.07	\$2,147,590
Carbon Ave	4.15	\$8,291,669
Front St.	0.35	\$706,928
Highway 10	4.57	\$9,132,011
Highway 6	2.31	\$4,623,593
Ivy Street	0.16	\$319,240
Kenilworth Rd	3.14	\$6,284,346
Main Street	3.75	\$7,492,319
Mill Street	0.14	\$271,514
Spring Glen Rd	1.48	\$2,968,355
State Highway 290	1.62	\$3,239,574
State Route 10	3.56	\$7,122,959
State Route 122	9.43	\$18,865,779
State Route 123	11.65	\$23,296,467
State Route 124	6.02	\$12,041,025
State Route 139	0.70	\$1,390,961
State Route 264	5.84	\$11,681,174
State Route 55	0.98	\$1,959,904
State Route 96	13.22	\$26,439,169
Total	119.65	\$149,195,626

6. Infestation

Hazard Profile

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

Description of Location and Extent

In the past, Carbon County has been infested with numerous destructive insect species. Surveyors from Boise, Idaho's Forest Health Protection did a study based on infestation in Utah's forests. With help from the Forest Health Coordinator from Utah FFSL the following information was made available. Carbon County has 1,000 acres currently (May 2003) infested with grasshoppers. This infestation is due to Utah's drought, which started in 1999. Because of the amount of forested lands within the county, infestation risk potential is countywide. Drought weakens tree species rendering them more susceptible to disease; as the drought continues the probability of infestation also continues. Infestation affects all segments of the economy, particularly agriculture. Infestation once in place can last several months, even years.

In 1998, 4% or approximately 99,000 acres of Carbon County's total of 985,294 acres was surveyed. Of the 39,500 acres surveyed it was determined that the Douglas Fir Beetle affected 15 acres, the Spruce Beetle affected 119 acres.

In 1999, 10% or 98,529 acres of the county's total acres were surveyed, the Douglas Fir Beetle affected 65 of the surveyed acres, the Spruce Beetle affected 102 acres, and the Sub-Alpine Fir Complex affected 30 acres.

In 2000, 14% of Carbon County's total acreage was surveyed. The Mountain Pine Beetle affected 42 acres of ponderosa, 299 acres of Douglas Fir, and 184 acres of Spruce. The Fir Engraver Beetle infested 40 acres of Sub Alpine Fir Complex; and Aspen Discoloration affected 30 acres.

In 2001, 16% of Carbon County's acres were surveyed. The Mountain Pine Beetle Ponderosa affected 47 acres, the Douglas Fir Beetle affected 486 acres, the Spruce Beetle affected 1,238 acres, the Fir Engraver Beetle affected 39 acres, the Sub Alpine Fir Complex affected 2,356 acres, and Aspen Discoloration affected 246 acres.

In 2002, 26% of Carbon County's total acres were surveyed and the Mountain Pine Beetle Ponderosa affected 88 acres, the Douglas Fir Beetle affected 742 acres, the Spruce Beetle 539 acres, the Fir Engraver Beetle infested 75 acres, and the Sub Alpine Fir Complex affected 141 acres.

Vulnerability Assessment

Potential loss estimates were unable to be completed during the making of this plan due to the lack of digitized datasets related to infestation. Future studies and maps need to be completed to fully understand this hazard.

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 7-14). 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 7-14 Hazard Histories

Hazard	Date	Location	Critical Facility/ Area Impacted	Comments
Drought	1930-1936	Countywide	Municipal and agricultural water supplies.	Resulted in the construction of reservoirs, development of groundwater resources, and improved land management.
Drought	1953-1965	Countywide	Agriculture	10-25 year recurrence interval period.
Earthquake	August 2, 1968	Hiawatha		Richter magnitude 3.5
Earthquake	November 17, 1968	Wattis		Richter magnitude 4.6
Earthquake	June 11, 1971	Near Scofield		Richter magnitude 3.2
Earthquake	April 14, 1972	South of Sunnyside		Richter magnitude 3.6
Earthquake	August 10, 1973	West of Sunnyside		Richter magnitude 3.0
Drought	1974-1978	Countywide	Agriculture	10-25 year recurrence interval period.
Earthquake	1985-1986	County	Minor structure damage, no deaths.	
Flash Flood	August 6, 1901	West of Scofield	Winter Quarters. 2 deaths and property damage.	
Flood	1911		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.	
Flood	September 12, 1939	Wellington City	Infrastructure damage	
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.	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.	
Flash Flood	August 5, 1948	Sunnyside City	1 death, property damages.	
Flood	July 17, 1953	Price City. Willow Creek Canyon	Property and road damage.	
Flood	July 5, 1961	Price City	Property and road damage.	
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	
Flood	1983	Countywide- Presidential Declaration	Thistle landslide created severe economic loss of \$7 million. Road, property, water, culvert, and sewer line damage.	Price River.
Flood/ Mud and Debris Flow	May 13, 1984	Clear Creek	1 death, property damage.	
Earthquake	August 14, 1988	Epicenter at San Rafael Swell, Emery County.	Impacted almost all of Carbon County.	Richter magnitude 5.3
Flood	1996	Wellington City. Center Street and Main Street.		Cloudburst storm. Flooded sewer mains and basements. \$100,000+
Drought	1999-present	Countywide	Agriculture and Industry.	
Flood	2002	Wellington City. Main Street and 800 East to 1600 East.		Cloudburst storm
Severe Weather: Wildfire	2002	Price Canyon	3 miles north of Price Canyon	
Severe Weather: Infestation	May, 2003	County	1,000+ acres	Grasshoppers. Related to drought.

G. Mitigation Goals, Objectives, and Actions

Mitigation Strategies Workbook Carbon County

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

WILDLAND FIRES

Countywide Problem Identification

Wildfire can significantly impact identified areas and communities in Carbon County.

Goal 1 – Priority HIGH

Objective 1 - Decrease fuel potential in areas of western Carbon County

Action: Remove dead and diseased trees

Time Frame: Ongoing

Funding: Private

Estimated Cost: Sale of trees will generate income

Staff:

Background:

Goal 2 – Priority HIGH

Objective 1 - Maintain adequate fire breaks between wildfire zones and residences in East Carbon County

Action 1: Secure up-to-date property mapping

Time Frame: Ongoing

Funding: None

Estimated Cost: Unknown

Staff: City staff to include; County Assessor, Recorder, and GIS Specialists

Background:

Action 2: Build roads between fire interface zone and residential areas

Time Frame: 6 months

Funding: City funds

Estimated Cost: Unknown

Staff: City staff and public works staff

Background:

Countywide Problem Identification

Urban contiguous fire impact lives and property in the county.

Goal 1 – Priority MEDIUM

Objective 1 - Prevent fire hazards within city limits

Action 1: Review building codes

Time Frame: Immediately

Funding: None

Estimated Cost: Minimal

Staff: Local

Background:

Action 2: Install parapets on building tops

Time Frame: Extended

Funding: Private

Estimated Cost: Unknown - Variable

Staff: Contract

Background:

DAM FAILURE

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 1 – Priority HIGH

Objective 1 - Lives and property from dam failure inundation risk. Prevent or mitigate damage and loss of life from Scofield Dam failure.

Action 1: Install Remote Warning System building codes

Time Frame: Immediately

Funding: None

Estimated Cost: Minimal

Staff: Local

Background:

Action 2: Maintain periodic testing of dam

Time Frame: Immediate

Funding: State, Federal and Local

Estimated Cost: Unknown

Staff: Federal

Background:

Action 3: Build new bridge to bypass Scofield Dam Road

Time Frame: Undetermined

Funding: State, Federal and Local

Estimated Cost: \$10,000,000

Staff: State and Local

Background:

Action 4: Construct series of dams on Lower Fish Creek

Time Frame: Ongoing/Extended

Funding: Unknown

Estimated Cost: \$5,000,000 each

Staff: Contractor

Background:

Action 5: Construct water holding reservoir in Price Canyon

Time Frame: Begin now with proposals, could take several years

Funding: Unknown

Estimated Cost: \$Millions

Staff: Contractor

Background:

Objective 2- Prevent or mitigate damage and loss of life from Grassy Trails Dam failure

Action 1: Install Remote Warning System

Time Frame: One year

Funding: Unknown

Estimated Cost: \$30,000

Staff: Contracted

Background:

Action 2: Build riprap dike to redirect flow from Grassy Trails Dam failure

Time Frame: 3 years

Funding: County

Estimated Cost: \$100,000

Staff: County employees

Background:

Objective 3 - Protect lives and property from Grassy Trail Dam failure.

Action 1: Obtain funding for engineering, equipment and long-term system maintenance

Time Frame: Unknown

Funding: Unknown

Estimated Cost: Unknown

Staff: City Administrative Staff

Background:

Action 2: Install sensors at dam site and monitor devices at City Offices

Time Frame: 6 months

Funding: Federal Grant

Estimated Cost: Unknown

Staff: Private engineering firm will work with East Carbon and Sunnyside administrations

Background:

Action 3: Monitor dam

Time Frame: Ongoing

Funding: Unknown

Estimated Cost: Unknown

Staff: City Administrative Staff

Background:

Objective 4 - Minimize safety risk and property damage to Sunnyside City from dam failure

Action 1: Construct riprap dike on the east side of Highway 13 from northern Sunnyside City boundary to Sunnyside Park

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: Unknown

Staff: Private construction firm to work with City

Background:

Action 2: Excavate wash

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: Unknown

Staff: Private construction firm to work with City

Background:

FLOODING

Countywide Problem Identification

Flooding continues to be of concern in the County and cities and towns within the County. The County experience flooding during spring snow melt and summer thunderstorm season.

Goal 1 – Priority HIGH

Objective 1 - Minimize safety risk and property damage to Carbon County residents due to flooding by establishing, upgrading and maintain structural control measures.

Action 1: Build catch pond on Meads Way

Time Frame: Underway

Funding: City and Federal

Estimated Cost: \$100,000

Staff: City staff

Background:

Action 2: Build catch pond on Cardinal Wash

Time Frame: 2 years

Funding: State, County, and City

Estimated Cost: \$75,000

Staff: County

Background:

Action 3: Build catch pond on Grassy Trails

Time Frame: 2 years

Funding: State, Federal, County, and City

Estimated Cost: \$30,000

Staff: County and City

Background:

Action 4: Excavate wash

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: Unknown

Staff: Private construction firm to work with City

Background:

Action 5: Increase culvert size on Cardinal Wash at Highway 50-6

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: \$500,000

Staff: UDOT

Background:

Action 6: Excavate wash

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: Unknown

Staff: Private construction firm to work with City

Background:

Action 7: Enlarge culvert and Pine Street and Edgehill Drive in Sunnyside City

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: Unknown
Staff: Private construction firm to work with City
Background:

Problem Identification

Reduce economic loss due to flooding

Goal 2 – Priority HIGH

Objective 1 - 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 and City Floodplain Administrators, State Floodplain Manager, DES

Background: General public is usual not aware they can purchase flood insurance.

DROUGHT

Countywide Problem Identification

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

Goal 1 – Priority MEDIUM

Objective 1 - Minimize the loss of life, damage to property and disruption in commerce and governmental services caused by drought through proactive water conservation measures

Action 1: Promote water recycling utilizing secondary water sources

Time Frame: Underway

Funding: State, Federal, And Local

Estimated Cost: Unknown

Staff: City(s)

Background:

Objective 2 - Create new water storage facilities

Action 1: Construct new dam in Garley Canyon

Time Frame: 5 years

Funding: Federal, State, And Local

Estimated Cost: \$100,000,000

Staff: Contractor

Background:

Action 2: Construct dam in Willow Creek Canyon

Time Frame: 5 years

Funding: Federal, State, And Local

Estimated Cost: \$100,000,000

Staff: Contractor

Background:

Objective 3 - Find new water sources

Action 1: Research the possibility of “cloud seeding”

Time Frame: Immediately

Funding: County

Estimated Cost: \$100,000

Staff: Contractor

Background:

Goal 2 – Priority MEDIUM

Objective 1 - Secure adequate water for culinary and agricultural needs of East Carbon and Sunnyside through structural measures

Action 1: Design and build silt control coffer at water inlets at Grassy Trail Reservoir to prevent buildup.

Time Frame: 1 year

Funding: Federal Grant

Estimated Cost: Unknown

Staff: Contractor, private engineering firms to work with cities

Background:

Action 2: Obtain funding to Build Range Creek water delivery tunnel

Time Frame: Unknown

Funding: Unknown

Estimated Cost: Unknown

Staff: Unknown

Background:

Action 3: Tunnel from Range Creek dam site to drop off point

Time Frame: 2 years

Funding: Federal Grant

Estimated Cost: \$100,000

Staff: Contractor, private engineering firms to work with cities

Background:

Action 4: Obtain funding to build Range Creek Dam

Time Frame: Unknown

Funding: Unknown

Estimated Cost: Unknown

Staff: City Staff

Background:

Action 5: Construct Range Creek Dam

Time Frame: 5 years

Funding: Federal Grant

Estimated Cost: \$100,000

Staff: Contractor, private engineering firms to work with cities

Background:

LANDSLIDE

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 1 – Priority LOW

Objective 1 - Minimize loss of life, damage to property and disruption in residents, commerce and government services caused by landslides through structural measures.

Action 1: Build retaining fences and momentum absorbers along highways

Time Frame: 5 years

Funding: Federal, State, And Local

Estimated Cost: \$1,000,000

Staff: UDOT

Background:

Action 2: Dislodge large rocks along highways

Time Frame: Immediate

Funding: Federal, State, And Local

Estimated Cost: \$100,000

Staff: UDOT

Background:

Action 3: Build retaining walls on residents identified at risk

Time Frame: 5 years

Funding: Individual

Estimated Cost: Variable

Staff: Unknown

Background:

Action 4: Develop pathways to capture falling rocks adjacent to residences

Time Frame: 5 years

Funding: Federal, State, And Local

Estimated Cost: \$100,000

Staff: City and County

Background:

PROBLEM SOILS

Countywide Problem Identification

Problem soils are a risk to property and life due to its volatility

Goal 1 – Priority LOW

Objective 1 - Protect roadways

Action 1: Increase width of slope adjacent to roadways

Time Frame: Extended

Funding: Federal, State, And Local

Estimated Cost: Unknown

Staff: State, County, and City

Background:

Action 2: Educate homeowners about problem soil risk

Time Frame: 2 years

Funding: Local

Estimated Cost: \$3,000

Staff: Local

Background:

Action 3: Monitor and control water on alkali soils

Time Frame: Ongoing

Funding: Local

Estimated Cost: \$3,000

Staff: Local

Background:

INFESTATION

Countywide Problem Identification

Infestation of noxious insects and bird species can impact the health, safety and welfare of County and its residents.

Goal 1 – Priority LOW

Objective 1 - Control insects and birds

Action 1: Insecticide spray

Time Frame: Ongoing

Funding: Local

Estimated Cost: \$100,000

Staff: Local

Background:

Action 2: Remove dead and diseased trees

Time Frame: Extended

Funding: Private

Estimated Cost: Trees will be harvested by commercial enterprise.

Staff: Private

Background:

Action 3: Pigeon removal

Time Frame: Undetermined

Funding: Federal, State, And Local

Estimated Cost: \$15,000

Staff: Local

Background:

SEVERE WEATHER

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.

Priority MEDIUM

Objective 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.

Time Frame: 1 Year

Funding: Minimal

Estimated Cost: Minimal

Staff: County Emergency Management State Hazard Mitigation Team members, Utah Avalanche Forecast Center.

Jurisdictions: Countywide

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 Carbon County and the cities within the 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

Jurisdictions: Countywide

Background: Proposed alternate Command Centers (Public Works, Public Utilities), Sheriff's Dispatch, Command Vehicle(s) and associated equipment need to be protected from severe weather events including lightning.

HAZARDOUS MATEIALS

Countywide Problem Identification

Highway 6 is one of the main arteries going east and west in the State. In most places this is a two-lane highway that experiences numerous accidents and hazardous material incidents.

Goal 1 – Priority Medium

Objective 1 - Protect lives and property from hazardous materials spills.

Action 1: Work with County LEPC to help identify hazardous materials traffic on Highway 6

Time frame: Ongoing

Funding: Federal Grants

Estimated Cost: Unknown

Staff: County Emergency Management/LEPC, State HMI

Jurisdictions: Countywide

Background:

H. Maps

All of the following maps have been created for the purposes related to PDM using the best available data. WERC and its staff members cannot accept responsibility for any errors, omissions, or positional accuracy; As such, there are no warranties, which accompany the maps.

Map 7.1.1 Dam Hazard

Map 7.3.1 Wildfire Risk

Map 7.4.1 Landslide Hazard

Map 7.5.1 Problem Soils

Map 7.9.1 Earthquake Hazard