



MONTROSE COUNTY
COLORADO

Pre-Disaster Hazard Mitigation Plan

February 2009

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Pre-Disaster

Hazard Mitigation Plan

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Introduction

Montrose County, located on the Western Slope of Colorado, has an extremely diverse geography, as well as diversities in economic base, population, and potential hazards. This plan discusses many possible hazards, prioritizes them as to how likely their occurrence, and considers mitigation techniques to reduce their impacts by better protecting lives, property and the environment, with the County's unique diversity in mind.

Executive Summary

The Montrose County Pre-Disaster Hazard Mitigation Plan is representative of a collaborative effort among departments within Montrose County, State of Colorado, local jurisdictions and emergency responders. The following report encompasses the best efforts of the Pre-Disaster Mitigation Plan's participants to comply with guidance from the State of Colorado, Division of Emergency Management, and the Federal Emergency Management Agency. While it is believed to be fully responsive to the requirements of the State and Federal governments, it is understood and acknowledged by all participants that the disaster mitigation planning process is dynamic and requires periodic review, analysis and amendment.

Purpose, Goals and Objectives

The purpose of this Plan is to:

- Protect life, safety, and property by reducing the potential for future damages and economic losses that result from natural and human-caused hazards;
- Support future grant requests for pre- and post-disaster initiatives;
- Speed recovery and redevelopment following future disaster events;
- Demonstrate Montrose County's commitment to hazard mitigation; and
- Comply with federal and state legislation and guidance for local hazard mitigation planning.

An important product of this plan is the Recommended Mitigation Action Plan (pg.62), which is designed to help minimize the potential negative impacts that could be caused by the prioritized hazards. The Recommended Mitigation Action Plan states specific goals and objectives for each rated hazard to produce measurable benefits to County residents. These actions have been justified and prioritized using accepted national practices and methods that are outlined within this document.

Scope of the Plan

While the Planning Team looked at many possible natural hazards (with input from the public, Board of County Commissioners and the City/Town councils), the Plan is focused on those that pose high and moderate risks to Montrose County residents.

Hazards with higher priorities have the potential to greatly impact health and safety, emergency response capability, or property and/or critical infrastructure.

Project Participants

Those who participated in developing this plan include members from professional and volunteer agencies that handle emergency preparedness, response and recovery throughout Montrose County as well as Montrose County, City of Montrose, and Town of Olathe employees. Members of the public also contributed to the Plan.

Disaster Mitigation Act of 2000

To better protect the United States from natural occurring disasters, the United States Congress passed the Robert T. Stafford Disaster Relief and Emergency Assistance Act, enacted as the Disaster Mitigation Act of 2000 (DMA 2000). With this legislation, there is renewed emphasis on pre-disaster mitigation of potential hazards. The most relevant to state and local governments under DMA 2000 are its amendments to Sections 203 (Pre-Disaster Hazard Mitigation) and 322 (Mitigation Planning).

Section 203 establishes a *National Pre-Disaster Mitigation Fund* to support a program that will “provide technical and financial assistance to state and local governments to assist in the implementation of pre-disaster hazard mitigation measures that are cost-effective and designed to reduce injuries, loss of life and damage and destruction of property, including damage to critical services and facilities under the jurisdiction of the state or local governments.”

Section 322 of DMA 2000 provides the following approach to mitigation planning:

- Establishing a requirement and delivering new guidance for State, Local and Tribal mitigation plans;
- Providing for states to receive an increased percentage of Hazard Mitigation Grant Program (HMGP) funds if, at the time of the declaration of a major disaster, they have in effect an approved State Mitigation Plan that meets criteria defined in the law; and
- Authorizing up to 7 percent of the HMGP funds available to a state to be used for development of state, local and tribal mitigation plans.

Montrose County applied for and received funds from the Federal Emergency Management Agency Pre-Disaster Mitigation Grant program planning, to support the development of this Pre-Disaster Hazard Mitigation Plan.

Authority

The Plan is developed in accordance with current State, Federal and Local rules and regulations including:

- Section 332, Mitigation Planning of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Interim Final Rule published in the Federal Register on Feb. 26, 2002 at 44 CFR Part 201;
- The State of Colorado, Division of Emergency Management, Office of the Governor;
- Montrose County, Colorado Resolution No. 25-1999; and
- Montrose County, Colorado Resolution No. 47-2003

This Plan will also be adopted by Montrose County Commissioners with a Resolution after the plan has been reviewed and deemed approvable by FEMA. A draft Resolution is included as Attachment #1.

Project Planning and Methodology

This Pre-Disaster Hazard Mitigation Plan was created by a Planning Team. Members of the team were invited to the first meeting by an email sent by the Emergency Management Coordinator. The Coordinator also made the announcement of the first Hazard Mitigation planning meeting at the Local Emergency Planning Committee. Updates were provided to all members of both groups by email and at subsequent meetings.

Meetings

The first meeting was June 4, 2008. Agendas for this and subsequent meetings are in Attachment #2 to this Plan.

At the first meeting, the following actions were taken:

- All potential hazards were listed
- Hazards were grouped into categories
- Hazards were rated
- Members of the Planning Team drew on a map where populations met risk
- Homework assignments were given
 - o History of hazards in Montrose County
 - o Other plans that discuss the hazard
 - o Maps

- o Populations at risk
- o Values at risk

At the second meeting, the following actions were taken by the Planning Team:

- Probability of each hazard
- Severity of each hazard
- Impact of the hazard
 - o Economic
 - o Social
 - o Historical
 - o Environmental
- Mitigation strategies for each hazard were identified
- Homework assignments were reviewed

The focus of the third meeting was to use the STAPLEE method to rate the mitigation strategies. This means The Planning Team evaluated each mitigation action based on its **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental repercussions.

An additional meeting was attended by several County elected officials and staff. The focus of that meeting was the *Geologic Hazards Mapping Project for Montrose County, Colorado*. This report was prepared as part of this grant application by the Colorado Geological Survey. A synopsis of the report is included in this Pre-Disaster Hazard Mitigation Plan., and the plan in its entirety can be found online at the Montrose County website.

Planning Team

The Plan was developed by the following people:

Title	Agency	Tasks assigned/ completed
Assessor	Montrose County	<input type="checkbox"/> Values at risk <input type="checkbox"/> Increases in values
Chief	Montrose Police Department	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Chief	Paradox Volunteer Fire Department	<input type="checkbox"/> Interviewed via email about hazards, mitigation priorities
Chief	Olathe Police Department	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Chief	Nucla/Naturita Volunteer Fire Department	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Deputy Chief	Montrose Fire Protection District	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Director	Montrose County Health & Human Services	<input type="checkbox"/> Participated in planning meetings
Director	Montrose County Land Use	<input type="checkbox"/> Development Trends <input type="checkbox"/> Reviewing plans for other information <input type="checkbox"/> Provided subdivisions where growth is occurring
District Forester	Colorado State Forest Service	<input type="checkbox"/> Provided wildfire Information
ED Director	Montrose Regional Hospital	<input type="checkbox"/> Reviewed the plan <input type="checkbox"/> Discussed plan at Hospital Safety Committee
Emergency Management Coordinator	Montrose County	<input type="checkbox"/> Wrote plan <input type="checkbox"/> Facilitated meetings
Emergency Preparedness Coordinator	Montrose County Health & Human Services	<input type="checkbox"/> Note taker at meetings
Engineer	City of Montrose	<input type="checkbox"/> Assisted with prioritization of mitigation projects
Engineer	Montrose County	<input type="checkbox"/> Review other plans for hazard information <input type="checkbox"/> Historical information

		<input type="checkbox"/> Participated in planning meetings
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Environmental Health Officer	Montrose County Health & Human Services	<input type="checkbox"/> Participated in planning meetings <input type="checkbox"/> Provided Hazardous Materials (Uranium) information
Flood Plain Administrator	Montrose County Land Use	<input type="checkbox"/> Provided information on flood plains
Mitigation Specialist	State of Colorado/ Division of Emergency Management	<input type="checkbox"/> Read drafts <input type="checkbox"/> Facilitated first meeting
Planner	City of Montrose Community Development	<input type="checkbox"/> Provided information on other plans
Public Works Director	Town of Olathe	<input type="checkbox"/> Attended meetings
Regional Planner	State of Colorado/ Division of Emergency Management	<input type="checkbox"/> Interviewed for historical hazards
Sheriff	Montrose County	<input type="checkbox"/> Interviewed for historical hazards
Staff	Colorado Geological Survey	<input type="checkbox"/> Compiled geological hazards information <input type="checkbox"/> Mapped geological hazards <input type="checkbox"/> Presented information in working group to Montrose County staff and interested parties
State Dam Engineer	Division of Water Resources	<input type="checkbox"/> Interviewed for historical hazards <input type="checkbox"/> Participated in planning meetings <input type="checkbox"/> Provided mitigation actions
Supervisor	Montrose County Road & Bridge	<input type="checkbox"/> Interviewed <input type="checkbox"/> Historical hazard information
Supervisor	Olathe Public Works	<input type="checkbox"/> Participated in planning meetings
Technician	Montrose County GIS	<input type="checkbox"/> Maps
Undersheriff	Montrose County	<input type="checkbox"/> Interviewed for historical hazards

Volunteer	Montrose Sheriff's Posse	<input type="checkbox"/> Interviewed for historical hazards
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Volunteer	Citizen Emergency Response Team	<input type="checkbox"/> Discussion of hazards at CERT meeting; responses back to Emergency Management Coordinator
Volunteer	ARES	<input type="checkbox"/> Historical fires <input type="checkbox"/> Participated in one planning meeting
Volunteer	Olathe Volunteer Fire Department	<input type="checkbox"/> Interviewed for historical hazards
Volunteer	RACES	<input type="checkbox"/> Interviewed for historical hazards
Volunteer	Montrose Historical Society	<input type="checkbox"/> History of Montrose County <input type="checkbox"/> History of hazards
Table 1: Planning Team		

This team includes representatives from several communities and agencies within Montrose County. In addition to the jobs listed, each person reviewed the plan and offered comments. Most of the participants attended the meetings and completed homework assignments as well as participated in discussions at public meetings and email. The Emergency Management Coordinator also interviewed several members of the team individually.

Public Participation

Prior to the first meeting, a press release was published in the local newspapers and posted on the Public Notices board in Montrose County Administration. A second article was posted in the local newspapers directing the public to the Montrose County website to fill out a survey. A copy of this survey is Attachment #3. A total of 87 surveys were returned. The results are also included in Attachment #3.

The intent of the survey was to sample a wide variety of stakeholders within the resources available. Although this survey was not conducted to scientific standards, the responses from community members were consistent with those of the Planning Team. This input was considered valid. The survey requested the public rank certain hazards. The public ranked wildfire as the most significant threat to Montrose County residents.

Public involvement in the planning process:

- Articles in the local newspapers
- Invited to the meetings
- Information about the Plan posted on the County website

- Requested to complete a survey, which was posted on the Montrose County website, to rate hazards within the County
- Public meetings held prior to the adoption of any Plan updates
- Copies of the draft Plan staged at public libraries and other government buildings, as well as online
- Able to comment on these documents
- Invited to the public hearing before the Board of County Commissioners in October 2008

- Comments made from any of these sources incorporated into the Plan as appropriate

Hazard Identification Process

The process of identification of the hazards included a roundtable discussion of the possible hazards which can occur throughout the United States and narrowing those down to ones which have the potential to happen in Montrose County. All of the hazards discussed are listed in the plan. This discussion was part of the first meeting.

Risk Assessment Process

The process of identifying the risks was also a roundtable discussion, of the prioritized hazards that we had identified that have the potential to happen in Montrose. Sample list of those hazards included with ratings below:

Prioritized Hazard	Probability
Severe Weather	High
Wildfire	High
Floods	Medium
Geological Hazards	Medium
Hazardous Materials ~ Uranium	Low
Table 2: Prioritized Hazards	

Mitigation Planning

The risk assessment process identified hazards considered a priority within Montrose County, and the Planning Team developed and documented goals and objectives to guide mitigation planning efforts. The team also developed and evaluated strategies for implementing justified and prioritized mitigation actions. These goals and objectives were first evaluated for reducing impacts to better protect lives, property and the environment.

The Montrose County Pre-Disaster Hazard Mitigation Planning Team conducted research, reviewed other plans and interviewed experts to collect potential mitigation actions for these prioritized hazards. Potential mitigation actions and strategies then were evaluated using the FEMA-recommended STAPLEE methodology, which seeks to identify options acceptable and appropriate for the community. STAPLEE evaluates mitigation options by comparing them to these criteria:

- Social acceptance
- Technical merit
- Administrative support
- Political support
- Legal support
- Economic viability
- Environment

Mitigation alternatives were also evaluated for cost-benefit and compared to current mitigation projects already in process. The results of this process defined the mitigation actions included in the plan submitted for adoption by Montrose County.

Implementation strategies for prioritized mitigation actions were developed at a strategic level to guide ongoing planning efforts. All targeted mitigation strategies were assigned points of contact.

Review of Current Plans, Studies and Reports

To validate potential mitigation options and to coordinate outcome from the Plan with existing mitigation strategies and plans, the Planning Team reviewed hazard studies, emergency planning reports and other documents currently covering prioritized hazards within Montrose County. These existing plans and documents are reviewed and summarized in the Hazard Mitigation section of this document.

Some of the plans reviewed were originally drafted to “maintain or improve safety from fire, flood or other potential disasters,” according to the Montrose County Subdivision Regulations. The City of Montrose’s Comprehensive Plan was written for similar reasons, stating it is charged to address “promotion of safety from fire, flood waters and other dangers.” One of the Guiding Principles for the City’s Comprehensive Plan is to “provide public services and facilities necessary for health, safety and welfare.” One of the goals outlined in the Comprehensive Plan is to keep “our community attractive and safe.”

Most plans reviewed are incorporated into this Pre-Disaster Hazard Mitigation Plan when mitigation techniques that specifically address safety of lives and property are mentioned. Since the Montrose County Master Plan is currently being revised, this plan was only reviewed and not discussed within the Pre-Disaster Hazard Mitigation Plan.

Plan Adoption and Maintenance

The Plan will be adopted by Montrose County with a Resolution after the Plan has been deemed approvable by FEMA. A draft resolution is attached. At this time, the Plan is not multi-jurisdictional; therefore, it will not be adopted by other communities within the County. At the time of the first update, the Plan will be made multi-jurisdictional.

This plan shall be evaluated yearly by the Montrose County Emergency Management Coordinator, and updated by all participating agencies once every five years. If a disaster occurs that significantly affects Montrose County residents, the plan will be updated. That update will occur as soon as possible after the event, and not to be longer than 12 months. Routine maintenance will include adding or removing projects from the list. In the event of significant modifications to the Plan, it will be resubmitted for approval by the Board of County Commissioners.

Community Profile

Montrose County is diverse with several distinct communities and geographic areas. Montrose County encompasses 2,247 square miles. Of that, 1,573 square miles are owned by public agencies.

Bureau of Land Management	992 square miles
United States Forest Service	523 square miles
National Park Service	43 square miles
Colorado Division of Wildlife	15 square miles
Total	1,573 square miles

Table 3: Land Ownership

A land ownership map is included in Attachment #4.

Geography

Montrose County is located on the Western Slope of the Continental Divide approximately 300 miles from the Denver area in the center of the Uncompahgre Valley. The City of Montrose serves as a main thoroughfare between Grand Junction and Telluride, Ouray, Ridgway, Gunnison, Nucla, Naturita, Norwood, and the Black Canyon of the Gunnison National Park. It is the regional shopping center and airport for many of the residents in Montrose and neighboring communities.

Montrose County has an extremely diverse topography and geographical layout. At the lowest point of the County, the elevation is 4,700 feet and at the highest point the elevation is 11,453 feet. Montrose County is large and has two separate geographical areas. The City of Montrose, the County Seat, is located on one side of the County, and on the other side, commonly known as the West End, are the Towns of Nucla, Naturita, and Paradox. The Town of Naturita is situated 85 miles from Montrose, and the Town of Nucla is another five miles beyond that. To get to these West End towns, unless traveling over the unpaved roads on the Uncompahgre Plateau, one must travel through San Miguel and Ouray counties. The Community of Paradox is located 30 miles, or 50 minutes from Nucla. This 115-mile trip from Montrose takes more than two and a half hours. Paradox is located close to the Utah border. The Community of Bedrock, also located close to the Utah border, is 108 miles from Montrose, or a two and half hour drive. The 40-minute drive from Nucla is a 25-mile trip. The West End population is rural based. Due to the unique mineralogical makeup of the West End, there are uranium, coal, gas, and oil interests located here and many residents have ties to the mining industry.

The Town of Olathe is located in the County, about 10 miles north of Montrose, half a mile off of Highway 50. The Town is largely comprised of people in the business of agriculture, and the retail stores reflect those interests.

The Community of Maher is a rural town in the northeastern corner of the County that is home to a small number of residents who ranch or are retired. In order to reach Maher, one has to either drive through Gunnison County or Delta County to reach the town located along the rim of the Black Canyon.

The surrounding area includes Grand Mesa to the north, and the San Juan Mountains to the south. The Uncompahgre Plateau divides Montrose County in half. The eastern portion is further divided by the Gunnison River and Black Canyon.

A map of these Montrose County communities is included in Attachment #4.

Demographics

Montrose County's current population, according to the Colorado Economic and Demographic Information System, is estimated at 40,923. The forecasted population for 2010 is 43,875.

From this source, the estimated 2006 population for each area is:

Montrose	16,486
Naturita	675
Nucla	753
Olathe	1,766
Unincorporated Area	19,223
Total	38,903

Table 4: 2006 Population

History

Montrose County and surrounding area can lay claim to an interesting history that includes several historically significant events involving indigenous cultures, range wars, and exploration that evidence a tenacity of its settlers that has ensured the area's survival beyond all expectations.

The town of Montrose, originally named "Pomona," was incorporated May 2, 1882, but the human history of the area begins several hundred years before with the settlement of the Tabeguache and Uncompahgre Ute Indians on the central Western Slope of present-day Colorado. These were nomadic tribes, and swept across vast acres of plains and valleys in their quest for game.

In 1765 a Spanish soldier by the name of Don Juan Rivera ventured as far north as present-day Olathe. Rivera stayed long enough to carve his initials into a tree and then, apparently not finding much reason to tarry in the wilderness, returned to his New Mexican home.

The next explorers of note to enter the area were the Franciscan friars, Francisco Dominguez and Silverstre de Escalante in 1776. Looking for an inland route from Santa Fe to California, they traveled thousands of miles against incredible odds and explored an extensive portion of present Montrose County, all the while logging their adventures, which included those with the locals, for posterity.

For the next half-century, the Indians remained in relative isolation. By the second quarter of the nineteenth century; however, fur trappers and traders began to enter the area more frequently. As the land became more attractive and valuable, the Indians began to lose their traditional domicile. Beginning with the initial treaty of 1863, the United States government, and those seeking land for various reasons led to the expulsion of the Utes from Western Colorado in 1881. This was in spite of efforts by the famous Chief Ouray.

Mining in the West End of Montrose County, beginning in the 1880s, is what developed the towns of Nucla, Naturita, Paradox, Uravan and Bedrock. By 1917, Standard Chemical's mill in Uravan was producing two-thirds of the United States radium. Some of the uranium produced there was used for the Manhattan Project.

Ranching and farming were soon common. These ranches and in particular orchards were used to supply the nearby mining towns. The location of Montrose provided a link between the mountain towns of Ouray, Silverton, Telluride and the West End communities, and the needed supplies. Dave Wood, one noted entrepreneur in the area, capitalized on this and built a road over the Uncompahgre Plateau to Telluride. This road is still used today. Further expansion of Montrose County was facilitated by railroads.

As Montrose grew, the need for it to become its own County became evident. In 1883 it was split from Gunnison County. This led to a need for an independent water source. Canals were dug from the Uncompahgre River in an attempt to provide irrigation to the orchards and farms. The first and most notable ditch was built by O.D. "Pappy" Loutsenhizer, one of the two original town founders. Even with the extensive ditch system, historian Wilson Rockwell in his *Uncompahgre Country* states that "water from this source could only irrigate 10,000 acres of land ... while there are about 185,000 acres of irrigable land in the Uncompahgre Valley." (87). By 1890 there was still 65 percent of this land without water.

With the Gunnison River nearby, it was only a matter of time before enterprising Montrose citizens began constructing a tunnel through the Black Canyon in order to divert water to the Valley. The first survey crew, a band of untrained and ill-equipped

farmers and ranchers attempted an excursion down the river in 1901. After three weeks the crew was forced to turn back. This venture raised support for tunnel construction.

Once federal funding was secured, construction of the Gunnison Tunnel began in 1905 and was completed in 1909. President William Howard Taft cut the ribbon that inaugurated the first flow of water from the Gunnison River to Montrose County farms.

As the farming became more prevalent, dissension grew between the cattle ranchers and the sheep ranchers. An influx in sheep ranches at the end of the century caused range wars which continued for the next quarter of a century. At least one Montrose citizen was shot and killed over territorial disputes and families waged feuds that lasted generations.

By the end of the 1920s, Montrose had become an established community. Although still primarily an agricultural center, Montrose has seen the introduction of such amenities as cars, movie theatres and a downtown shopping area.

During World War II, the Uravan area provided uranium for the Manhattan Project. Vanadium was also mined here and was used to harden steel for the war effort. Production was stimulated between 1948 and 1962 when the Atomic Energy Commission guaranteed a minimum price for uranium. Because “of the wartime secrecy the Manhattan Project would only publicly admit to purchasing the vanadium, and did not pay the uranium miners for the uranium ore (in a much later lawsuit, many miners were able to reclaim lost profits from the U.S. government).”¹

The focus of Montrose as an ancillary of the mining towns began to fade as other industries began to profit and the D&RG Railroad to Ridgway from Montrose had its final run in 1976.

The Three-Mile Island reactor core meltdown in 1979, along with the public’s perception of safety, caused uranium prices to drop 75 percent, thus preventing any new reactors from being built in the United States. This downturn caused most of uranium mines to be closed by the mid-1980s. The industry’s town and mill site, Uravan, was dismantled and underwent clean up as a Superfund Site. The other West End towns of Paradox and Bedrock were also disappearing. The only two incorporated areas on the West End that remain are Nucla and Naturita. Recently, uranium prospects have been looking into the area again so there may be resurgence in mining activities in the near future.

Land Use Development Trends

From mid-1990 to 2006, Montrose County was in a strong growth trend. This increased development is evidenced by the number of building permits issued by the Montrose County Land Use Department for residential projects.

¹ [http://en.wikipedia.org/wiki/Uravan, Colorado](http://en.wikipedia.org/wiki/Uravan,_Colorado)

Building permits for single family homes had the most increase for the years of 2004 through 2006, with 134 permits being issued in 2006. This was the most permits issued for single family homes since 1994, in which 140 permits were issued.

In the past few years the development trend for single family homes has slowed, again evidenced by the number of building permits being issued. The County issued 106 permits for single family homes in 2007.

Development trends for commercial growth have steadily increased in Montrose County. From mid-1990 to 2006, 10 permits were issued for commercial projects. In 2007 and so far in 2008, 14 building permits have been issued for commercial development.

Essential Facilities

The Planning Team reviewed Montrose County's critical infrastructure using the 13 critical infrastructure areas defined by the Department of Homeland Security. Impact from the prioritized hazards was ranked as low, moderate or high for the identified critical infrastructure within the County. Findings from risk assessment activities were used to determine hazard impact on the identified critical infrastructure. Montrose County weighed mitigation actions for hazards affecting life and safety at our points of critical infrastructure.

Due to the potentially sensitive nature of the critical infrastructure inventory, and in keeping with State of Colorado practices for controlling critical infrastructure identification, Montrose County monitors access to this information on a need-to-know basis by application to the appropriate offices identified in this Plan.

Declared Disasters

This chart shows the declared disasters for Montrose County.

Year	Type of declaration	Event
1984	Presidential Disaster	Flooding
1984	Governor Disaster	Flooding
2002	USDA Disaster	Drought
2002	Presidential Disaster	Wildfires
2006	USDA Disaster	Heat, high winds, insect pests, late freeze, ongoing drought

Table 5: Disaster declarations

Historical Hazards within Montrose County

A volunteer with the Montrose Historical Society composed the following overview of hazards which have occurred within Montrose County, beginning in 1883. Most of these hazards are not likely to reoccur within Montrose County due to mitigating and several other factors. These factors could include:

- Ridgway Dam being built, which mitigates potential flooding
- Decrease in train traffic
- Rare occurrences due to proximity of mountains (tornadoes)

- Modern building codes
- Improved storm water drainage
- Being in a location that is considered to be seismically stable (earthquakes)

Some of these hazards; however, could have the potential to occur within Montrose County in the future. These include:

- Epidemics
- Airplane crashes
- Fires to homes and businesses
- Flooding
- Wildfires, which are not mentioned in this history; however, they are discussed in detail in the Wildfire section

Epidemics

Two historically documented epidemics have occurred in Montrose County. The first was in 1883 and the second in 1918.

1883

A smallpox epidemic hit Montrose County in 1883. It is unknown how many deaths were caused by this epidemic. During the event, the town of Montrose did purchase a “pest-house” and provided \$17 for medications.²

1918

In 1918, the Spanish influenza hit Montrose County. By the year’s end there were 920 reported cases and 62 deaths. During this time the City officials did attempt to quarantine the Montrose area.³

² Brethouwer, Dr. Norman A. “Medical.” *Montrose, Colorado Centennial*; (Grand Junction, CO: Great Western Printing and Binding, 1982), 82.

³ Freeman, Dona, ed. *100 Years Montrose, Colorado* (1982), 69.

Floods

Floods mentioned in the history books were localized to damage of crops, homes and bridges. Some floods were caused by snowmelt run off and others by precipitation.

1917

The Uncompahgre River flooded surrounding farmland west of Montrose in 1917; most of the land was north of Colona which is on the border of Montrose and Ouray counties. This flood caused significant crop damage and the inundation of several ranches resulting in significant economic impacts. During this time frame it is unlikely that any of the businesses or farms were insured.⁴

1921

The Uncompahgre River flooded again in 1921 in Montrose and its environs. During the incident standing water was reported in many homes “in and around the city.” This generalized flooding throughout Montrose County and southwestern Colorado caused the disruption of train service.⁵

1938

Two consecutive days of heavy rain overwhelmed storm sewer capacity turning the City into a “vast lake.” This flood caused significant and sustained damage to private property, roads and bridges.⁶

1963

An arroyo spilled over at the corner of Main and Junction streets which flooded part of the City of Montrose. This flood was caused by snowmelt in February when a strong Chinook wind blew in.⁷

1964

Heavy rain caused flooding damage to agriculture.⁸

⁴ Freeman, 67-68.

⁵ Freeman, 74.

⁶ City of Montrose, Colorado and the Colorado Water Conservation Board, Gingery Associates, Inc., *City of Montrose Flood Control and Drainage Plan* (Englewood, CO, 1981), 12.

⁷ Gingery, 14.

⁸ Gingery, 14.

1967

A thunderstorm dumped more than one inch of rain and hail on Montrose in June. This caused some crop damage and flooded many City streets, especially Uncompahgre and Main. The water deposited about a foot of silt over a 12-acre plot of sugar beets, destroying the entire crop.⁹

1996

Heavy rains precipitated a flash flooding event Sept. 6, 1996, in Naturita. Approximately \$200,000 in damages were caused as a result of this storm. Many basements were flooded causing damage to home foundations and road infrastructure.¹⁰

1999

July 31st, heavy rains precipitated flash flooding and caused minor damages. One of these damages, estimated at \$10,000, was the washing out of a portion of the road on Ashenfelter Hill.¹¹

2002

A section of County Road Y11 was washed out Sept. 12th, as heavy rains precipitated flash flooding and caused minor damage near the town of Bedrock. Total estimated damages were \$3,000.¹²

Fires

The fires listed here are those which destroyed private property, mostly businesses, in Montrose. The wildfires that have occurred are listed in the Wildfire section.

1897

A devastating fire occurred in the primary commercial block of downtown Montrose. Six business buildings were completely destroyed.¹³

⁹ Gingery, 14-16.

¹⁰ <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm~CO~Montrose>

¹¹ <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm~CO~Montrose>

¹² <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm~CO~Montrose>

¹³ Freeman, 25.

1953

A fire occurred which caused \$100,000 worth of damages to a local lumber yard. This event completely destroyed the Independent Lumber Company's investment.¹⁴

1955

A fire caused damages exceeding \$100,000 to the Montrose Potato Growers Co-op.¹⁵

1958

The Mill at Framer's Union Supply Company was completely destroyed by fire. The damages were estimated to exceed \$100,000.¹⁶

1966

The Colorado Studs plant caught fire in July and suffered a loss estimated at \$130,000.¹⁷

The interior of Vurl's Farm Supply was damaged in 1970 by fire. The estimated damages were more than \$150,000.¹⁸

Weather Events

1933

A funnel cloud produced a small, localized tornado that briefly touched down and destroyed the east end of the County Courthouse and did some damage to nearby buildings.

A tornado is a column of extremely destructive swirling winds. The funnel-shaped rotating column of air passes in a narrow path over land.

1950-2008

The following chart is a summary of weather events produced from a search of the National Climatic Data Center from 1950 to Feb. 28, 2008.

¹⁴ Freeman, 118.

¹⁵ Freeman, 120.

¹⁶ Freeman, 123.

¹⁷ Freeman, 134.

¹⁸ Freeman, 139.

Date	Location (Town)	Type	Magnitude	Result
8/14/1968	Montrose	Hail	1.75 inches	
9/19/1972	Montrose	Thunderstorm Wind	50 knots	
6/4/1973	Montrose	Hail	.75 inches	
7/12/1973	Montrose	Hail	.75 inches	
8/8/1983	Montrose	Hail	1.75 inches	
8/8/1983	Montrose	Thunderstorm Wind	62 knots	
6/16/1985	Montrose	Thunderstorm Wind	50 knots	
5/10/1989	Montrose	Thunderstorm Wind	68 knots	
5/19/1992	Montrose	Thunderstorm Wind	50 knots	
6/25/1992	Montrose	Thunderstorm Wind	50 knots	
5/26/1993	Montrose	Lightning		\$300K of property damage from fire
5/17/1994	Montrose	Winds		\$1K
5/31/1994	Montrose	Thunderstorm Wind		\$5K
7/14/1994	Montrose	Thunderstorm Wind		\$5K
9/9/1994	Olathe	Lightning		1 death
6/20/1996	Olathe	Thunderstorm Wind	0 knots	
6/20/1996	Nucla	Lightning		
9/6/1996	Naturita	Flash Flood		\$200K of property damage
5/6/1997	Naturita	Thunderstorm Wind	70 knots	\$10K of Property Damage

9/11/1997	Montrose	Funnel Cloud		
4/17/1998	Montrose	Funnel Cloud		
7/26/1998	Paradox	Heavy Rain		
6/21/1999	Olathe	Lightning		One injury
7/31/1999	Montrose	Flash Flood		\$10K of property damage
6/15/2000	Nucla	Thunderstorm Wind	65 knots	\$2K of property damage
8/30/2000	Montrose	Hail	1.75 inches	
7/9/2001	Redvale	Hail	.88 inches	
7/15/2001	Nucla	Thunderstorm Wind	50 knots	
8/14/2001	Paradox	Funnel Cloud		
8/22/2001	Uravan	Urban, small stream flood		
7/28/2002	Paradox	Funnel Cloud		
8/5/2002	Nucla	Urban, small stream flood		\$10K of property damage
9/7/2002	Olathe	Thunderstorm Wind	55 knots	\$2K of property damage
9/10/2002	Naturita	Urban, small stream flood		
9/12/2002	Uravan	Hail	1 inch	
9/12/2002	Bedrock	Flash Flood		\$3K of property damage
9/18/2002	Naturita	Funnel Cloud		
8/16/2003	Paradox	Heavy Rain		
9/5/2003	Montrose	Heavy Rain		
5/12/2004	Montrose	Lightning		1 death
5/13/2004	Maher	Tornado	F1	\$2K of property damage
6/16/2004	Montrose	Thunderstorm Wind	52 knots	\$10K of property damage
7/23/2004	Montrose	Thunderstorm Wind	56 knots	

7/23/2004	Montrose	Funnel Cloud		
10/25/2004	Montrose	Funnel Cloud		
5/6/2005	Olathe	Tornado	F1	20K
5/6/2005	Olathe	Hail	.88 inches	
5/6/2005	Olathe	Funnel Cloud		
5/30/2005	Montrose	Thunderstorm Wind	62 knots	
8/16/2005	Montrose	Hail	1 inch	
9/8/2005	Paradox	Heavy Rain		
10/4/2005	Bedrock	Tornado	F1	\$1K of property damage
5/22/2006	Naturita	Thunderstorm Wind	50 knots	
7/9/2006	Montrose	Flash Flood		\$20K of property damage
7/10/2006	Bedrock	Flash Flood		
7/10/2006	Montrose	Heavy Rain		
7/10/2006	Nucla	Flash Flood		
7/19/2006	Montrose	Heavy Rain		
9/7/2006	Uravan	Lightning		1 death
9/7/2006	Uravan	Flash Flood		
7/27/2007	Montrose	Flash Flood		
7/27/2007	Paradox	Heavy Rain		
8/27/2007	Redvale	Heavy Rain		
9/16/2007	Paradox	Heavy Rain		

Table 9: Weather Events

Earthquakes

Three minor earthquakes were noted in the history books.

1944

In 1944, “an earthquake of moderate intensity rocked Montrose and surrounding areas for almost a minute.”¹⁹

1960

A “small” earthquake centered south of Ouray impacted the Montrose area. Montrose County saw minimal damage, which included crumbled chimneys, buckled sidewalks and broken glass jars.²⁰

¹⁹ Freeman, 105.

²⁰ Freeman, 125.

1983

A minor earthquake occurred in Montrose County in August. The earthquake centered 28 miles southeast of Montrose in a sparsely populated area.²¹

Transportation accidents

Though not natural disasters, the following transportation accidents were listed in historical documents as hazards. One incident involved a train and the other three were aircraft accidents.

1919

In 1919, 30 people were injured, some seriously, in a train wreck. A westbound Rio Grande train derailed one mile east of Cerro Summit.²²

1970

One person was killed and three injured as a small private plane crashed during liftoff. The plane crashed into a residence at 701 North Fourth Street, and the roof of that residence was partially sheared.²³

2004

A private jet carrying NBC Sports President Dick Ebersol crashed during takeoff Nov. 28, 2004. This accident caused three deaths and injuries to three others.²⁴

2005

On an airstrip near Bedrock Jan. 30, 2005, an ultra light aircraft crashed during a practice flight. Both of the people on board perished.²⁵

Hazards in Montrose County

The State of Colorado is vulnerable to a wide variety of natural and manmade hazards, some of which can affect the residents of Montrose County. These hazards can threaten life and property. Damage caused by these hazards could disrupt essential facilities and life lines as well as have a significant impact on whole communities. The section below discusses the hazards deemed to have a potential impact on Montrose County. It also outlines priority hazard considerations that the County residents selected by consensus.

The high priority hazards, listed in this Plan, have significant loss potential; however, other hazards with less potential impact or with less effective mitigation action possibilities are also listed. Methods used when determining the priority of hazards, in the addition to the planning team members' round table discussion, included:

²¹ <http://earthquakes.usgs.gov/regional/states/colorado/history.php>

²² Freeman, 70.

²³ Freeman, 139.

²⁴ http://www.montrosepress.com/articles/2005/11/28/local_news/3.prt

²⁵ http://www.montrosepress.com/articles/2005/02/09/local_news/3.prt

- Interviews with first responders
- Research of historical information
- Questionnaires distributed via several sources
- Surveys posted on the Montrose County website, and an article published in the *Montrose Daily Press*

The following natural hazards that exist in Montrose County were identified at the first Planning Team meeting to be:

- | | |
|---|---|
| <input type="checkbox"/> Wildfire | <input type="checkbox"/> Erosion |
| <input type="checkbox"/> Floods | <input type="checkbox"/> Smog |
| <input type="checkbox"/> Flash Floods | <input type="checkbox"/> Smoke, agricultural burning/wildfire |
| <input type="checkbox"/> Spring Run Off | <input type="checkbox"/> Debris Flow |
| <input type="checkbox"/> Severe Winter Storms | <input type="checkbox"/> Drought |
| <input type="checkbox"/> Hazardous Materials | <input type="checkbox"/> Uranium |
| <input type="checkbox"/> Dam Failure | <input type="checkbox"/> Epidemic/Pandemic |
| <input type="checkbox"/> Earthquakes | <input type="checkbox"/> Beetle Kill |
| <input type="checkbox"/> High Winds | <input type="checkbox"/> Crop Damage |
| <input type="checkbox"/> Microbursts | <input type="checkbox"/> Vectors |
| <input type="checkbox"/> Landslides | <input type="checkbox"/> Storms |
| <input type="checkbox"/> Tornadoes | |

- Volcanoes
- Terrorism
- Lightning
- Hail
- Avalanche
- Subsidence
- Ground water contamination
- Expansive soil

Definitions of some hazards are listed below. Any not listed below will be discussed in greater detail throughout the Pre-Disaster Hazard Mitigation Plan.

The geological hazards listed: earthquakes, landslides, avalanches and subsidence as well as others are discussed in the Geological Hazards section of this plan as well as in the Mapping Project by Colorado Geological Survey. This report can also be viewed on the Montrose County website: <http://www.montrosecounty.net>.

Vector: in this case, a vector is an organism that does not cause disease itself, but rather transmits infection from one host to another. (ex: mosquitoes)

A pandemic is a disease that is found in a large part of a population. It also has a widespread effect and affects people in many different countries simultaneously. The epidemic hazard for humans may be considered somewhat greater than that of other communities because of the numbers of visitors who travel through Montrose County to get to Telluride, Ouray and Mountain Village. Many of these visitors travel frequently and arrive from all parts of the world. The County, some municipalities and a few businesses have implemented continuity of operations plans to enable rapid response to outbreaks.

The planning team grouped the hazards by categories: weather, geological, manmade or unlikely to occur in Montrose County. Some of these were left as stand-alone hazards. Each was given a prioritization.

Category	Hazard	Prioritization
<i>Weather</i>		High
	Severe Winter Storms	
	High Winds	
	Microbursts	
	Drought	
	Lightning	
	Hail	
	Tornadoes	
<i>Geological</i>		Medium
	Earthquake	

	Landslides	
	Subsidence	
	Expansive soils	
<i>Manmade Hazards</i>		Not Applicable
	Terrorism	
<i>Unlikely to occur in Montrose County</i>		Not Applicable
	Volcanoes	
	Avalanches	

<i>Stand-alone hazards</i>		
Wildfire		High
Floods		High
	Dam failures	
	Flash floods	
	Spring run-off	
Hazardous Materials(uranium, vanadium, radium, etc.)		Medium
Pandemic		Medium
Crop damage	Beetle kill, vectors or pests	Medium
Smoke due to agricultural fires		Low
Smog		Low
Table 6: Hazards categorized		

The Planning Team determined that the five top priority hazards posed a greater overall risk to life, safety, critical infrastructure and vital services. These prioritized hazards are:

- Severe Weather Events
- Wildfire
- Floods
- Hazardous Materials; Uranium
- Geological Hazards

Prioritized Hazard	Geographical Location	Severity	Probability
Severe Weather Events	Entire County	Moderate to High	High
Wildfire	Priority Areas; Wildland Urban Interface; Unincorporated areas of	High	High

	Montrose County		
Flood	Flood Plains	High	Moderate
Geological Hazards	East End	Moderate	High
Hazardous Materials ~ Uranium	West End	Moderate	Moderate

Table 7: Rating

Those hazards of secondary concern to the Planning Team were the following hazards:

- Pandemic
- Crop damage due to beetle kill, vectors or pests
- Smoke due to agricultural fires/wildfires
- Smog

The Planning Team did not focus on the hazards listed above due to the lack of history of these hazards, the likelihood of their occurrence, and current mitigation practices. In the future, the secondary hazards as well as other hazards could be included in the hazard mitigation actions.

Overall, the Planning Team for the Pre-Disaster Hazard Mitigation Plan determined that public education on the likely hazards in our area with focus on those with special needs could be improved with specific mitigation goals.

Severe Weather Events

The scope of severe weather events that could affect Montrose County includes, but is not limited to, the following:

- Severe Winter Storms
- High Winds
- Microbursts
- Drought
- Lightning
- Hail
- Tornadoes

While some of these weather events happen annually, they rarely have the potential to be classified as emergencies, and others are fairly unlikely to occur. The National Weather Service will make announcements for severe weather watches or warnings over radio and television stations. A watch is when weather conditions indicate the possibility of severe weather. A warning is when weather patterns show that severe weather is approaching. Residents should be aware of the types of adverse weather conditions Montrose County has seen in the past and plan accordingly. One of the mitigation actions that could help Montrose County residents be aware of the weather conditions is by becoming a Storm Ready County. This National Weather Service designation has an educational component, as well as a system to notify the public of adverse weather. Montrose County also currently employs WENS (Wireless Emergency Notification System) to notify residents via cell phone text messages and email of impending warning status.

Overall, the average weather for Montrose County includes the following:

Number days of sunshine	274
High winter temperature	44
Low winter temperature	20
High summer temperature	83
Low summer temperature	52
Humidity	Minimal
Annual precipitation	9.8"

Table 8: Average weather

At any one time, the entire County could be affected by any of these weather events. There also could be parts of the County that see no impacts from the same weather event. All areas are prone to such conditions, but not all could be affected at the same time. It is

hard to measure the potential impacts to any specific portion when there are so many variables for each occurrence.

The severity of these types of events also differs in size, strength, frequency, intensity, duration, and impact to the residents of Montrose County. For each hazard, the following will be discussed:

- Profile of how the hazard might impact Montrose County
- Relevant historical information

Most of the information in this Severe Weather section, unless otherwise noted, has been provided by the National Weather Service.

Overall, severe weather can impact Montrose County in a variety of ways. These were all discussed at the second meeting of the Hazard Mitigation Planning Team. Impacts can and are likely to include communication and power failures, which can lead to the following outcomes:

- Economic impacts
 - Businesses closed for any amount of time
 - Loss of agriculture and livestock
 - Infrastructure, inventory, and capabilities damage
 - Cost of recovery and repair
- Social impacts
 - Loss of life
 - Increased violence/chaos
 - Increased hospitalizations
 - Strain on resources
 - Communications issues/breakdown

One of the most significant historical impacts by a weather event was the destruction of a corner of the Courthouse by a tornado in 1933. This could have had a very detrimental historical impact to the County. The Courthouse, which is still standing, has been placed on the National Historic Registry and there are many historical documents housed there.

Through out history, several flooding events have occurred, caused by both snowmelt in the spring and flash flooding events damaging roads, bridges and utilities. See Table 9 for details.

Severe Winter Storms

Ice and snow storms occur fairly frequently in Montrose County. Temperatures can drop below freezing for several days and snow can accumulate rapidly and cause blizzard –

like conditions. An ice and/or snow event, according to the National Weather Association, is an occasion when damaging accumulations of ice and snow are expected. Significant amounts of ice/snow can pull down trees and utility lines resulting in a loss of power and communications, make walking and driving dangerous, and depending on the time of year, they can destroy crops as well. The problems associated with ice and snow can be exacerbated when conditions last for several days. Significant ice events are accumulations of ¼ inch or more.

Blizzards are one of the most common snow and ice events that happen in Montrose County. Described by National Weather, a blizzard occurs when winds of at least 35 miles per hour are present with snow falling for at least three hours. These severe winter storms create blowing snow and icy conditions to create low visibility and treacherous roads. Often blizzard-like conditions are created from snow already on the ground, so more falling snow can significantly compound the problem. The Planning Team states that these icy road events occur several times throughout each winter.

The Planning Team made note of the increasing numbers of people living at higher elevations within Montrose County, which means they are dealing with more snow. Montrose County Road and Bridge Department is currently able to manage our snow removal efforts; however, any storm of record will require more specialized equipment and manpower.

High Winds

A high wind event is a severe weather condition that can occur anytime throughout the year. The National Weather Service describes high winds below 7,000 feet, as winds that are sustained for speeds of at least 40 miles per hour, lasting for at least 1 hour, or winds of 58 miles per hour or greater for any duration. Above 7,000 feet, the criteria for a strong wind storm is sustained 58 miles per hour winds and/or gusts of 75 miles per hour or greater.

High wind events can knock down trees and power lines and pick up debris; resulting in damage to structures, personal and public property, and injuries.

Between 1950 and February 2008, strong wind storms, not associated with thunderstorms, were documented as occurring 11 times below 7,000 feet, and 4 times above 7,000 feet. These winds are widespread pressure gradient winds associated with cold fronts, or similar events.

Microbursts

According to the National Weather Service, a microburst is a convective downdraft with an affected outflow area of less than 2.5 miles wide and peak winds lasting less than 5 minutes. They are difficult to detect and predict with standard weather instruments and may include dangerous horizontal/vertical wind shears. Microbursts can adversely affect

aircraft performance, especially during takeoff and landing, cause property damage, and many effects similar to those listed above in the high winds and severe weather sections.

In Montrose County, between 1950 and February 2008 there have been six documented microbursts or thunderstorm winds within Montrose County with wind gusts of 58 miles per hour or greater.

Drought

A drought occurs when there is less-than-normal amounts of moisture to satisfy an area's usual water-consuming activities. National Weather states drought is a deficiency of moisture that results in adverse impacts on people, animals or vegetation over a sizeable area. This drought condition can be caused naturally or by human influence. With Colorado's irregular climate, it is often difficult to predict when there will be a water shortage.

Four types of drought are defined:

Meteorological is when actual precipitation is less than expected.

Hydrological is based on precipitation shortfall effects on stream flows as well as reservoir, lake and groundwater levels.

Agricultural drought is when soil moisture deficiencies are relative to water demands of plant life.

Socioeconomic drought occurs when the demand for water is greater than the supply due to a weather-related supply shortfall.

According to the local United States Department of Agriculture (USDA) office the most recent drought experienced by Montrose County occurred in 2002 and 2006. In 2002, snowpack across the State was only 53% of the average. In both years, the USDA officially declared drought disasters. The USDA disaster declaration was requested by the governor. To qualify, a minimum of 30% of production loss of at least one crop in the County must have occurred. When the USDA declares a drought, small businesses can meet criteria to apply for low-interest Economic Injury Disaster Loans. The driest period in Montrose County history was 1959. The total precipitation during that time was 4.42 inches, whereas the average annual precipitation in Montrose County is 9.8 inches.

According to the Colorado Drought Mitigation and Response Plan, a study completed by the Department of Atmospheric Science at Colorado State University, "93 percent of the time at least 5 percent of the State is experiencing drought at the 3, 6, 12 or 24 month time scale."

The Colorado Climate Center says, “precipitation west of the Continental Divide is more evenly distributed throughout the year than in the eastern plains. For most of western Colorado, the greatest monthly precipitation occurs in the winter months, while June is the driest month.”

Long droughts can result in:

- loss of fish and wildlife habitat
- reduction in food and drinking water for wild animals
- more disease prevalence in wildlife
- lower water levels in lakes and rivers
- loss of wetlands
- more wildfires
- erosion of soils
- reduced production of agriculture
- impacts to tourism
- limited municipal water usage
- decline in commerce
- decline in recreation
- electric power generation limitations
- water quality deterioration

The Planning Team expressed concern about future growth impacting available water storage, for City of Montrose residents specifically. The City of Montrose's Comprehensive Plan addresses this issue in relation to how much potable water consumption will be necessary for a population of 30,000, which is 7.59 million gallons per day based on 253 gallons consumed per day per person. The Comprehensive Plan states, the "City is fortunate enough that past councils and staffs have acquired adequate water use and storage rights to carry the City well into the next century."

Lightning

Lightning is a natural event that can occur whenever there is a thunderstorm in the area. It is a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between the cloud and the ground or between the ground and a cloud. People can be injured or property damaged by a lightning strike. The site of the strike can be several miles away from the storm.

When lightning approaches people are advised to seek shelter immediately. If getting to shelter is impossible, they are advised to crouch low to the ground and make themselves as small as possible, away from trees and tall objects. Water conducts electricity, so staying away from puddles and swimming pools is critical. Lightning can present a hazard even if you are inside. It is recommended that a person avoid electrical appliances, windows, bathtubs full of water, and even land line telephones.

Since 1968, there have been three human fatalities, one dog fatality, and at least two human injuries caused by lightning in Montrose County.

Hail

Hail is frozen rain. It is most common in Colorado March through October. While most of the storms are in the Front Range and along the Eastern Plains, Montrose County has gotten some severe hail storms. Property damage, crop loss and injury can, and have resulted from hail storms.

The following is a chart which describes classification of hailstones:

Description	Diameter (inches)
Pea	0.25
Marble or Mothball	0.50
Penny or Dime	0.75
Nickel	0.88
Quarter	1.00
Half Dollar	1.25
Ping Pong Ball	1.50
Golf Ball	1.75
Hen's Egg	2.00
Tennis Ball	2.50
Baseball	2.75
Tea Cup	3.00
Grapefruit	4.00
Softball	4.50

Table 10: Hail sizes

Between 1950 and 2008 in Montrose County, there have been eight documented storms when the size of the hail has been penny or dime size ($\frac{3}{4}$ inch in diameter) or greater.

Wildfire

Wildfire in Montrose County occurs almost every summer. A wildfire is any free burning, uncontained wildland fire not prescribed for the area, which consumes natural fuels and spreads in response to its environment.

More than half the wildfires in Montrose County are naturally ignited, and result in more than three-quarters of the acres burnt. As new developments are planned and built in the wildland urban interface this ratio could change.

A wildfire can be characterized by three classes:

- Surface fire: burns along the floor of a forest, moving slowly and killing or damaging trees. This is the most common class.
- Ground fire: is started by lightning or a human and burns on or below the forest floor.
- Crown fire: spreads rapidly by wind and moves quickly by jumping along the tops of trees.

One contributing factor to wildfires is the Mountain Pine Beetle. The Mountain Pine Beetle causes mortality in the old, slow-growing ponderosa, lodge pole and limber pines. The beetle then spreads to healthy trees, after the older ones are destroyed. This is commonly referred to as Beetle Kill. According to the experts, it is this insect that causes the most significant damage to Colorado's low and mid-elevation pine forests. Once the trees have been killed by this beetle, they begin to dry up and serve as the perfect kindling for forest fires.

The Montrose County Wildfire Plan contains valuable historical information about local wildland fires. Approximately one-half the wildfires represented are naturally ignited. The trend since 1975 is demonstrated by the following list of historic fires that were within Montrose County, greater than 5 acres in size, and most of them involved federal jurisdiction.

Year	Fire Name	Cause	Size in acres
1978	Copper King	Lightning	56
1979	Uncontrolled	Human	155
1982	Clay Creek	Lightning	32
1982	Bedrock	Human	180
1985	Kinikin	Human	60
1986	Third Park	Lightning	169
1987	Red Rocks	Lightning	86
1987	Shavano	Lightning	5
1987	Little J	Lightning	10

1988	Mailbox	Lightning	80
1988	Pit	Lightning	8
1988	Devinney	Lightning	20
1988	Paradox	Lightning	8
1988	Third Park	Lightning	40
1989	Monogram	Lightning	10
1989	Traver	Lightning	22
1990	Horsefly Creek	Lightning	3,676
1990	Old Blue	Lightning	11
1990	Maggie	Lightning	142
1993	Spring Creek	Lightning	31
1994	Atkinson	Lightning	30
1994	Craig Point	Lightning	12
1994	Garvey	Lightning	100
1994	Hallelujah	Lightning	70
1994	Halley	Lightning	41
1994	Horsefly 2	Lightning	170
1994	Son of a Gun	Lightning	50
1994	Wray	Lightning	1,631
1995	Chukar	Lightning	14
1995	Rawhide	Human	7
1996	Crawford	Human	21
1996	Red Rocks	Lightning	5
1996	San Miguel	Human	10
1996	Telephone	Lightning	1,314
1996	Warner	Lightning	847
1998	Red Ranch	Human	15
1999	Braimer	Lightning	1,664
1999	Cotter	Lightning	10
1999	Dump	Lightning	10
1999	Third Park	Lightning	8
2001	Carpenter	Lightning	231
2001	Long Park	Lightning	12
2002	Bucktail	Lightning	2,244
2002	Forty Seven	Lightning	1,409
2002	Dry Park	Lightning	12
2002	Vancorum	Human	16
2002	Ouray Spring	Lightning	49
2003	Burro	Lightning	22
2003	Crystal Creek	Human	298
2003	Horsefly Creek	Lightning	10
2003	Little Bucktail	Lightning	113

2003	Poison	Lightning	12
2003	Spring Gulch	Human	242
2004	Lillyland	Lightning	4
2004	Campbell	Lightning	4,187
2005	Naturita Ridge	Lightning	729
2005	Piñon	Lightning	15
2005	Dry Fork	Lightning	30
2005	Pitts	Lightning	21
2005	Naturita Ridge	Lightning	729
2005	Craig Draw	Lightning	550
2006	Dry Creek	Human	230
2006	Bedrock #2	Lightning	8
2006	Dead Horse	Lightning	11
2006	Green Mountain	Lightning	5
2007	Section 28	Lightning	118
2007	Hauser	Lightning	41
2007	Pinion	Lightning	6
2007	Red Canyon	Lightning	207
2008	Beehive	Lightning	13
Table 11: Fires			

The effects of wildfire include economic, social and historical impacts. These could include:

- Displaced people
- Roads closed or damaged
- Agriculture and livestock lost
- Infrastructure damaged
- Property damage and subsequent devaluation
- Tourism decrease
- Potential damage to historical sites

Past fires have come close to destroying these local historical landmarks:

- Old School House on Sanborn Park
- Cabins of settlers to the area
- Rock Art by the Ute Indians

The values at risk in Montrose County were identified in the County Wildfire Plan, and the meetings that took place for that project. This County Wildfire Plan was used as a reference document for the Pre-Disaster Hazard Mitigation Plan and can be found on the Montrose County website: www.montrosecounty.net

During these planning sessions, communities at risk were identified based on a weighted formula of risk and value. Other factors the GIS Department used to prioritize these communities included structure density, proximity to a fire protection district, types of infrastructure, and proximity to past larger fires. The higher numbers indicate higher fire risk. For example, the “7” priorities have the greatest risk; therefore, will be mapped by the GIS Department first. A map of these locations is included in Attachment #4. For this Pre-Disaster Hazard Mitigation Plan, the GIS Department and the Assessor’s Office worked to determine the values of the commercial and real properties at risk. Then, the Land Use Department determined if any new subdivisions were proposed for each area.

Values at Risk for Wildfire

Within the priority areas listed in the County Wildfire Plan, the following values could be considered at risk. Each of these Priority Areas will eventually be mapped by the GIS Department. Because of the identified risk assigned to each of these areas, it would benefit them to have a County wide Community Wildfire Protection Plan as well as specific a specific neighborhood/are plan including geographical locates to be kept on file with the Montrose County GIS Department. Some of these areas would also benefit from regulations pertaining to roads, the wildland urban interface area and defensible space practices.

These are only the priorities through rating “3.”

Priority Area	Priority Rating	Value in dollars of Commercial Property at risk	Value in dollars of Real Property at risk
Pea Green Corner	3	116,450	14,277,030
Hoovers Corner	3	0	19,125,560
Shavano Valley	3	0	3,420,580
Buckhorn Heights	3	0	7,133,800
Coventry	3	470,010	8,724,430
Olathe	4	15,711,020	249,044,200
Maher	4	0	7,513,420
Gould Reservoir	4	0	1,459,440
Eagle Ridge	4	0	3,626,880
Paradox	4	0	6,627,540
Bedrock	4	145,630	2,505,020
Government Spring	4	550,550	10,436,300
Vernal	4	5,088,860	21,461,000
Horsefly Creek	4	150,790	5,641,760
Deer View	4	0	5,108,700
Nucla	4	3,787,250	38,028,160
Horsefly Subdivision	4	0	3,231,760

Coke Ovens	4	0	80,410
Deer Mesa	4	0	9,896,930
Fruitland Mesa	5	16,880	10,593,480
Cathedral Peaks	5	0	3,448,380
Montrose	5	460,267,255	1,683,942,960
25 Mesa	5	0	188,400
Transfer	5	0	839,500
Shinn Park	5	0	2,678,980
Uncompahgre	5	4,570,470	53,002,190
Sims Mesa	5	0	20,242,590
Happy Canyon	5	0	3,183,480
Uravan	5	16,520	0
Blue Mountain	5	0	722,830
Buckhorn/ Elk Spring	5	0	878,320
Second Park	5	0	4,084,370
Piñon	5	0	0
Mailbox Park	5	0	754,560
Redvale	5	280,380	12,771,440
Sanborn Park	5	0	3,204,160
Paxton Lake	5	0	286,670
Cornerstone	5	0	0
Poison Springs	6	0	3,707,890
Lower Bostwick Park	6	0	9,982,480
Crystal Valley	6	0	1,422,320
Mesa Creek	6	0	634,380
Cimarron	6	1,401,660	2,489,690
Cerro Summit	6	0	107,260
Baldy	6	0	371,990
Beaver Hills	6	263,090	9,172,010
The Meadows	6	0	1,650,580
Lower Dave Wood	6	400,210	14,872,190
Mountain View	6	0	7,560
Naturita	6	4,866,940	19,017,970
Upper Dave Wood	6	0	39,922,900
Vancorum	6	22,040	1,123,180
Upper Bostwick Park	7	0	12,456,150
Kinikin Heights	7	0	5,077,910
Waterdog	7	8,820	1,174,810
Third Park	7	0	3,600
Ute	7	0	724,300
Broad Canyon	7	0	226,310
LaSal Creek	7	0	476,620

TOTAL	\$498,134,825	\$2,342,787,330
Table 12: Values at Risk from Wildfire		

These values do not include state-assessed or exempt properties. The goal, of both this Pre-Disaster Hazard Mitigation Plan and the County Wildfire Plan is to reduce the risk to these properties by collecting geographical information about each property located within these areas. The next step is to map these communities in greater detail for Community Wildfire Protection Plan development. These community plans will identify mitigation needs on all ownerships and become attachments to the County Fire Plan and CWPP documents.

The following areas have proposed subdivisions in the Land Use Department:

Priority Area	# of proposed lots	% of value increase/ decrease
Shavano Valley	3	0%
Uncompahgre	12	0%
Sims Mesa	2	0%
Vernal	9	0%
Paxton Lake	300	0%
Cornerstone	300	0%
Table 13: Growth projections ~ Wildfire Areas		

This information on percentage of values that will increase or decrease was provided by the Montrose County Assessor, based on projections. Some factors in those projections include current building trends, economic factors and sales of existing properties.

The Montrose County Fire Plan addresses mitigation for both new and existing structures within these areas. This plan, adopted by the Board of Montrose County Commissioners in October 2005, gives specific information and incentives to making a structure fire wise. The plan also gives instruction on hazardous fuels treatment methods.

The Montrose County Subdivision Regulations, last amended in August 2008, make multiple provisions intended to reduce the risk of wildfire in the unincorporated areas of the County. When a subdivision is proposed that may be located within the County, the following conditions must be met:

- Subdivision in which residential activity is to take place shall be designed so as to minimize significant hazards to public health and safety and to property.
- Subdivision in wildfire hazard areas must have adequate roads for service by fire trucks, fire fighting personnel and other safety equipment and have firebreaks and other means of reducing conditions conducive to fire, as determined by the applicable fire protection district.²⁶

²⁶ Montrose County Subdivision Regulations, 3.6B

The Montrose County Subdivision Regulations also state that any new development in a wildfire hazard area, a must add a standard note on the plat stating such.

Another wildfire mitigation technique is the Annual Operating Plan meeting. All interagency fire suppression organizations meet in February to discuss some of the following:

- Cooperative agreements
- Memorandums of understanding
- Wildfire Emergency Response Fund
- Resource availability
- Predicted fire conditions
- Communications
- Additional items

Floods

Floods can occur in Montrose County either by flash flood, snow melt, or a dam breach. The impacts of these floods can cause economic, social and historical damage which can include:

- Increased pests
- Septic contamination
- Food and water issues
- Breathing problems
- Toxins and disease in flood water
- Electric grid damage
- Infrastructure damages
- Personal and public property losses

Dam Breach

Breaches could occur from a variety of problems to include but not limited to outlet failure, overflow, seepage, settlement, slides, or erosion.

There are nine Class I dams within Montrose County. In addition, there are eight Class I dams in neighboring counties which could effect Montrose County residents.

A Class I dam is defined by the probability of loss of human life if a failure occurs. Significant damage is expected with the failure of a Class II dam; however, it will

probably not lead to loss of human life. The phrase “significant damage” refers to structural damage where humans live, work or recreate or to public or private facilities. “Damage” refers to rendering these structures uninhabitable or inoperable. None of the 16 Class I dams are known to have failed since the dams were built.

The areas affected by a dam breach would include everything downstream of the dams.

The Class I dams in Montrose County are:

- Buckeye #1
- Cerro
- Crystal
- Fairview
- Morrow Point
- Onion Valley
- Roatcap Wash Watershed
- Shavano Valley #1
- Shavano Valley #2

And the ones located in other counties that could affect Montrose County residents are:

- Blue Mesa
- Silver Jack
- Gurley
- Lone Cone
- Miramonte
- Priest
- Trout Lake
- Ridgway

Colorado State Statute dictates that Emergency Action Plans be written by each dam owner and submitted to the State Engineer and County Office of Emergency Management. The inundation maps and plans need to be updated annually because of stream bed flow changes as well as new development. Unfortunately, these maps are not compatible with new technology; therefore, one of the future goals for proper mitigation of these possibilities is to hire a contractor to ensure all the Emergency Action Plans and required inundation maps are updated and useable with our GIS system

Because of the older maps, the only mitigation technique listed in the current Subdivision Regulations for Montrose County is specific to Ridgway Dam, which is in Ouray County. It states any property proposed for subdivision “that is located within the inundation area

of Ridgway dam shall include the ‘Standard Plat Note for Ridgway Dam’ on the Final Plat. Other properties similarly affected by other dams where inundation information is available or can be generated from known record sources shall include an equivalent plat note on the Final Plat.”

Values at Risk

It is difficult to determine the potential losses from these outdated flood inundation maps; however, the GIS Coordinator estimated these losses. The following is an estimate of the values at risk:

Dam	Value in dollars of Ag Property at risk	Value in dollars of Real Property at risk	Value in dollars of Commercial Property at risk	Estimated number of people potentially at risk
Buckeye	1,276,390	164,870	0	35
Cerro	2,213,810	6,376,870	410,440	120
Crystal	0	0	0	0
Fairview	1,891,320	15,233,310	15,510,300	320
Morrow Point	0	0	0	0
Onion Valley	970,860	0	0	10
Roatcap	1,583,970	871,120	0	30
Shavano Valley 1 & 2	554,070	763,400	0	30
TOTAL	\$8,490,420	\$23,409,570	\$15,920,740	545*

Table 14: Values at Risk from dam breach

* This is estimated by the number of houses in each of these areas multiplied by an average of 2.5 people per house then rounded up to the nearest factor of 5.

The GIS Coordinator determined these values by placing a buffer along the affected waterway until it connected to the next major waterway downstream. All properties in that area were included in the values at risk.

Exempt properties as well as those assessed by the State are not included in these calculations; therefore, the value of the infrastructure is not taken into consideration. The values for Crystal and Morrow Point are zero because they are located in the Black Canyon of the Gunnison National Park. This location would potentially not affect any Montrose County properties. It is possible; however, that if the dam at Morrow Point was to breach, some water could flow into Cimarron Creek and the town of Cimarron.

As these flood inundation maps are updated, the Montrose County Office of Emergency Management and the GIS Coordinator will re-evaluate for potential losses and potential mitigation strategies to protect lives, property and the environment.

The only proposed subdivision in the Land Use Department for any of these areas is below the Shavano Valley dams. There are three new homes proposed, yet these proposed homes will neither increase nor decrease the overall property values. This information on percentage of values was provided by the Montrose County Assessor, based on the same projections used in the Wildfire section.

Flash Floods

Flash floods are caused by excessive rainfall, rapid snowmelt or sudden release of water from a blockage in the drainage system. The National Weather Service states that “a flash flood is a rapid and extreme flow of high water into a normally dry area, or rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event, which could be an intense rainfall, quick snowmelt, dam failure or ice jam.” The actual time threshold may vary in each of the areas due to absorption rate of soils, how large the flood plain, and other factors.

The dry, sandy soils in the area do not absorb much of the water that flows during a flood event. Another factor of flooding is whether or not the area being flooded has incurred development. An area that was used for agricultural purposes that is now a subdivision has less ground available that can absorb excess water. The rapid moving water of the flash floods have the potential to roll boulders, tear out trees and destroy buildings. If a flash flood warning is issued, residents are advised to get to higher ground. After water starts to run, residents are advised to not drive, walk or swim through the running water because of its potentially toxic nature.

The areas where flash flooding may occur are in natural drainage areas and next to rivers, streams and dry creek beds. The most common areas for this flash flooding are along the 100-year floodplains for all rivers, creeks and tributaries in Montrose County. The potential for flooding is high, especially during spring.

Major rivers in the County include:

- Dolores
- Gunnison
- San Miguel
- Uncompahgre

Smaller water resources include:

- Cimarron River
- Cottonwood Creek
- Crystal Creek
- Dry Creek
- Dry Fork of the Escalante Creek
- Escalante Creek
- Long Creek
- Monitor Creek
- Moore Creek
- Potter Creek
- Roubideau Creek
- Spring Creek
- Tabeguache Creek
- Traver Creek

People who live near the confluences of these rivers and creeks are the populations most at risk from this type of flooding:

Hydrological Feature	Confluence	Area	Value in dollars of Real Property at risk	Value in dollars of Commercial Property at risk	Comments
Gunnison River	Crystal Creek	Maher	0	0	Confluence within BLM
Crystal Creek	Cottonwood Creek	Maher	875,190	0	
Gunnison River	Cimarron Creek	Cimarron	0	0	Confluence within BLM
Uncompahgre River	Spring Creek	Uncompahgre Valley	1,430,720	0	

Roubideau Creek	Long Creek	Uncompahgre Plateau	0	0	Confluence within Forest
Roubideau Creek	Traver Creek	Uncompahgre Plateau	0	0	Confluence within Forest
Roubideau Creek	Moore Creek	Uncompahgre Plateau	0	0	Confluence within Forest
Monitor Creek	Potter Creek	Roubideau	0	0	Confluence within BLM
Roubideau Creek	Potter Creek	Roubideau	0	0	
San Miguel River	Cottonwood Creek	Uncompahgre Plateau	385,650	0	
San Miguel River	Dry Creek	West End	866,860	22,040	
San Miguel River	Tabeguache Creek	West End	0	0	Confluence within BLM
Dry Fork of the Escalante	None	Roubideau	0	0	
Escalante	None	Roubideau	0	0	

Table 15: Values at Risk near confluences

The information above was provided by the Montrose County GIS Department. It includes the values of all structures for a mile radius of each of the confluences. A map of these water features can be found within Attachment #4.

The rivers listed above in Montrose County are included in the Federal Insurance and Mitigation Administration's floodplain maps; however, these maps were completed in 1986. Since that time, the flow of the rivers has changed and these maps do not give a completely accurate depiction of the floodplains and the structures in those areas. The State is working on re-mapping those areas. Montrose County is 55th on the priority list, out of the 64 counties within the State. Along with the improved flood plain mapping, the County and City would like to study the hydrology of each creek.

According to the National Weather Service, there have been three potentially life-threatening flash floods here in the past eight years. There were not any documented river floods, such as during the spring snow melt, in the same time frame. However, the County Engineer is working on a Road and Bridge Capital Improvement Plan which outlines some bridges that should be raised in the event that the Uncompahgre River, or others, flood.

The Cimarron Ridge area is a high-risk drainage area. In 1983 and 1984, flooding in this area caused \$300,000 worth of damage. In 1984, flash flooding occurred in Montrose,

Naturita, Olathe and in unincorporated Montrose County. In 1996, there was \$200,000 worth of property damage in and around Naturita.

To help mitigate flash flooding within the County, the Subdivision Regulations state any new subdivision requires a “drainage report, authored, signed and sealed by a Professional Engineer ... All drainage reports shall be prepared in accordance with the Montrose County Stormwater and Drainage Regulations and shall be subject to the approval of the County Engineer or his/ her designee.”

The City of Montrose also has a Stormwater Pollution Prevention section in the Municipal Code. This code addresses environmental violations to potential stormwater drains. It regulates how stormwater should be managed at new construction sites.

According to FEMA, in Montrose County and in the City of Montrose, and the towns of Olathe, Naturita and Nucla, there have been no repetitive loss properties. As a mitigation goal, Montrose County will continue to work to stay in compliance with the National Flood Insurance Program standards.

Montrose County demonstrated compliance with the NFIP (National Flood Insurance Program) standards by adopting the “Montrose County Flood Damage Prevention Ordinance,” which includes Statement of Purpose, Establishment of Development Permit, and Provisions for Flood Reduction. Montrose County originally was in the program in Feb. 15, 1984, was then suspended on June 19, 1989, and has been in the program since reinstatement Nov. 22, 1989.

Montrose County will continue to comply by identifying flood plains on new subdivision proposals and final plats. Building permit requirements mandate Flood Plain permits where identified on the Flood Insurance Rate Maps (FIRM). Sanitation permits also require compliance with the ordinance.

The Flood Plain Management Regulations, which are included in the City of Montrose’s Municipal Code, address the development and building in floodplains. This Code states all new construction shall be:

- “designed to prevent flotation, collapse or lateral movement ...”
- “constructed with materials ... resistant to flood damage ...”

The City’s Comprehensive Plan also addresses Stormwater Drainage Ways. This issue is mentioned as one of the greater challenges to Montrose, because it could involve expensive capital improvements to existing neighborhoods. The plan states that although, “the average annual precipitation for the Montrose vicinity is only 9 inches, these relatively dry conditions can compound the stormwater drainage problem. Arid conditions limit the vegetation growth within the natural drainage basins, and

consequently, there is little cover to absorb and infiltrate runoff when heavy rainfall does occur; which then leads to flash flooding.”

The City recognizes that improvements to the drainage system as well as cooperation with Montrose County are future mitigation actions that must be addressed.

Geological Hazards

The Geologic Hazards Mapping Project for Montrose County, as prepared by the Colorado Geological Survey, can be found in its entirety on the Montrose County website: www.montrosecounty.net.

This is a summary of what geological hazards were addressed in that plan. This summary is taken from the presentation by the Colorado Geological Survey to Montrose County. The mapping project included the entirety of Montrose County's private lands.

The project methodology included the collection, digitization, and geo-referencing of all relevant data for each hazard. The hazard map layers for each of the following were developed:

- Landslide
- Rock fall
- Debris/ mud flow
- Avalanche
- Swelling soil
- Collapsible soil
- Corrosive soil
- Flooding
- Earthquakes and faults
- Mancos shale/ salinity/ selenium

The Colorado Geologic Survey determined landslides and potentially unstable slopes are the most significant geological hazard to mitigate for future land use development within Montrose County. The next significant hazard to address is mudflows. These two hazards can be mitigated with codes and regulations within the Montrose County Land Use Department.

The other geological hazards only require regulations future development. To mitigate the other hazards, developments will need to be appropriately engineered for the specific hazard in their area. These hazards are mapped and final plats included in the study are posted on the Montrose County website. These maps are also in the Montrose County GIS data base and will be made available to all developers who apply for subdivisions.

Landslides

Landslides were considered by the Colorado Geological Survey to be the most dangerous geological hazard. A landside is a subsurface shearing and downward movement of rock and soil. This phenomenon occurs in weak rock and clay soils on steeper slopes where driving forces exceed the resisting forces.

The main study area in Montrose County where landslides are common:

- Upper Cedar Creek
- Cimarron Ridge
- Bostwick Park
- Shinn Parks
- Pleistocene terraces within irrigated Uncompahgre Valley
- Morrison Formation underlying Dakota sandstone on the Uncompahgre Plateau

With growth in Montrose County occurring on the potentially unstable mesas that were once agricultural land, we may start to see new impacts to residences. The mesas will soon need specific mitigation techniques to address landslides. The Colorado Geological Survey outlined the following considerations that should be addressed in the Land Use Department:

- All slopes underlain by Mancos Shale along the mesa rims should be considered potentially unstable
- Off-property water usage can directly impact slope stability

The impact of landslides to agricultural land is minimal. This is usually a temporary loss of an irrigation ditch as well as minor acreage loss along the mesa edge. The potential for structural damage is increasing; however, as new people move to the area. These newcomers are unaware of the potential danger; therefore, Land Use codes need to mitigate these threats.

Rock fall

A rock fall occurs when weathering and gravity causes rocks to detach and fall or roll down a slope. This occurs on steep slopes and can be catastrophic in nature to houses, or anything, located in its path. The areas of potential rock falls in Montrose County include the Black Canyon area, the canyon rims of the Uncompahgre Plateau, within large landslide deposits; and exposed gravel at mesa rims. Building or developing in these rock fall areas, according to the Colorado Geological Survey, should be avoided or properly mitigated. Some of the mitigation techniques include rock reinforcement and protection systems and a mechanism for maintenance should be in place.

Avalanche

There is only one sparse area in Montrose County prone to avalanches, which are wet snow slides that may occur along drainage channels in steeper slope areas, this is the high-elevation terrain on the west side of the Cimarron Ridge.

Mudflow or debris flow

Mudflow, or debris flow, is a geologic phenomenon whereby a wet, viscous, fluid mass of fine to coarse-grained material flows rapidly down a slope. It is generally initiated by an intense rainfall in the steeper slopes of the drainage basin. It occurs in the drainages and spreads at the mouth of the ephemeral stream to form alluvial fans, or large deposits.

The hazard areas identified for mud and debris flows are:

- Side canyons of the Uncompahgre Plateau on the west side of the valley
- Mud fans from the Mancos Shale adobe hills
- Large mud fans in the southern project area
- Alluvial fans in steeper terrain in the eastern project area
 - Bostwick Park
 - Upper reaches of Cedar Creek
 - Pool Gulch on Poverty Mesa
 - Cimarron River valley

The recommendation by the Colorado Geological Survey was that all new subdivisions and other developments within this mapped hazard area should include an in-depth drainage report that specifically addresses the potential for off-site bulked flows onto the property.

Swelling soils

The swelling soils are soils that contain expansive clay which expand upon absorbing water and shrink as they dry. This expansion causes soils to heave. Within Montrose County Mancos Shale and Morrison Formations Mudstones contain expansive clays.

Colorado Geological Survey recommends areas mapped with moderate to high ratings of these types of soils require the developer to provide Montrose County with subsurface soil sampling as well as proper irrigation and grading plans.

Collapsible soils

The collapsible soils in Montrose County are low-density, hydrocompactive and dispersive clay soils. These soils cause ground subsidence and can cause various types of settlement damage to foundations built at shallow depths.

The recommendations for future development include investigating to determine the thickness of soils and potentials for subsurface voids; testing for swell consolidation; engineering for irrigation and grading; and digging deep for foundations of larger buildings.

Corrosive soils

The soils with a high concentration of salt and sulfates may be considered corrosive. The Mancos Shale, which is prevalent in Montrose County, is considered corrosive. The only mitigation technique suggested by the Colorado Geological Survey is that concrete used in building be resistant to the corrosive nature of these soils.

Flooding

Colorado Geological Survey digitized then geo-referenced the available Uncompahgre Valley Flood Insurance Rate Maps. Using this information CGS prepared a flood frequency map, which can be viewed online at: www.montrosecounty.net.

Earthquake and faults

An earthquake and fault map for a 70-mile radius was compiled by Colorado Geological Survey. This information was added to the HAZUS system and modeled after the 1960 5.5 magnitude earthquake. This earthquake was the largest instrumentally recorded earthquake in Colorado, with an epicenter located just inside Ouray County, just south of Montrose County. The projected economic loss in today's dollars would equal \$27.2 million.

Mancos Shale, salt precipitate, and selenium impairment

The salinity and elevated selenium concentrations are a concern for the Uncompahgre River Valley. Irrigation drainage contributes the most to selenium loading. Irrigation drainage from areas underlain by Mancos Shale will cause high salt loading; deep percolation, and dissolution. New development in Mancos Shale will also lead to a spike in concentrations; and these soils are corrosive.

Hazardous Materials

The most prevalent Hazardous Materials in Montrose County are the ones that occur naturally in the West End of Montrose County. The population of the West End, which includes the towns of Nucla, Naturita and Paradox, is about one-third the total population of the County. The West End of Montrose County has a long history of uranium, radium and vanadium mining. While there have been no documented 'disasters', per se, recent interests in reviving these mines creates potential hazards.

The Colorado Department of Public Health and Environment has information on the remediation of the old Uravan site, which is a Superfund Site. Superfund Site means that the Environmental Protection Agency determines there is a release or threatened release of hazardous substances that may endanger public health, welfare or the environment.

The site, which was placed on the list of Superfund sites on June 6, 1986, states "a complex mixture of chemicals exists at the site. Contaminates include radioactive products including raffinates, raffinate crystals, and mill tailings containing uranium and radium."

Uranium, as defined by the dictionary, is a radioactive chemical element which is a heavy silvery-white radioactive metallic element occurring in three isotopes. Vanadium, also defined by the dictionary, is a poisonous silvery-white metallic element.

Uranium is a raw material comprised of oxidized uranium that is mined from ore, then processed for the scant radioactive elements it contains. It is put through various milling processes that turn the element into fuel rods, which are used in nuclear power plants. This mined ore was trucked by highway to the mill, where it is processed to separate the uranium and the vanadium from other materials. The ore was put into the 55-gallon drums and trucked to a uranium enrichment company to turn it into a form that makes it easier to further enrich the uranium for nuclear reactors at power plants.²⁷

The trucks took ore from the mines of the surrounding areas to the processing plant at Uravan. Between the years of 1936 and 1984, people at the plant "milled 42 million pounds of vanadium. The mildly radioactive tailings (byproducts of the extraction) were deposited in huge piles above the canyon next to the plant."²⁸

These tailings have since been relocated in covered cells. The soil surrounding the mill site, as well as the groundwater, still contain radionuclides and heavy metals; however, since "no one lives in the town of Uravan and the groundwater is not being utilized, the human health risks are considerably limited."²⁹ However, the potential for contamination of other groundwater sources of near by towns is still possible.

²⁷ Chakrabarty, Gargi. "Interest revives in Colorado uranium," *Rocky Mountain News*, March 27, 2005.

²⁸ www.uravan.com

²⁹ <http://www.cdphe.state.co.us/hm/rpuravan.htm> "Exposure"

Uranium mining on the West End of Montrose County has been significant to the economy. The West End is continually feeling the impact because of its cyclical nature. According to the West End Museum website in [Uravan History ~ Longer Version](#) “The history of Uravan [and the entire West End] is a series of repeated crises that have had the uranium~vanadium mining swinging up and down for almost a century.” This “swinging up and down” has affected the County financially, socially and physically.

Mining has been prevalent in Montrose County since the 1880s, and the West End was developed to support these efforts. Currently, a search of the Colorado Division of Minerals and Geology shows 73 permitted mines in the West End of Montrose County. Most of these permits are for uranium and vanadium. Several of these are kept in a ready state, in order to be put into production within short notice. These areas in the West End can become operational when the price and demand warrants.

Although they value the economic benefits of mining, citizens on the West End have expressed concerns about water quality, soil contamination and other environmental effects. At this time the County does not have any programs to look at concerned neighbors’ water wells, soil or to conduct any air quality monitoring in the area. This leaves the citizens of the West End of Montrose County without any way of establishing what base line environmental quality is in existence at this time. Some of their voiced concerns are:

- Will a producing well with acceptable water quality become affected?
- Will farm land or air quality be impaired or contaminated with activities from the milling, mining or transportation of ore in to the mill or from the product being shipped out of the area?

Growth in the West End of Montrose County is directly related to large energy corporations and even and small mining operators with historically established mining permits. Environmental monitoring and environmental services to the West End of Montrose County would at least leave the County better prepared to respond to developing issues before they become a public health hazard.

In a news article, “Even residents of this area who say their uranium-miner relatives died of lung cancer or have suffered emphysema, welcome new jobs that come with another spike in the element that is marbled into their land.”³⁰

The potential impacts of an actual incident are:

social: displaced people and animals

environmental: long term contamination of wells and land

economic: road damages, loss of jobs, high health care costs, loss of

produce/productive land and personal and public property

³⁰ Lofholm, Nancy. “Prices revive Colorado’s dormant uranium mines,” *Denver Post*, Jan. 4, 2005.

One current mitigation effort is a study funded by the Colorado Department of Local Affairs that will look at all the past and potential future impacts the energy industry has on the area. One focus of that study will be road codes and impacts on the infrastructure of the West End of Montrose County.

Risk Assessment

This Pre-Disaster Hazard Mitigation Plan focuses on the Town of Olathe, City of Montrose, and Montrose County; however, it is not a multi-jurisdictional plan. Risks related to each jurisdiction should also be assessed for vulnerabilities and loss potential specific for those jurisdictions. Montrose County conformed to this guidance by conducting the following risk assessment activities to establish risk potential and hazard impact within the planning areas:

- Public risk assessment input
- Historical research
- Identification of critical infrastructure
- Risk assessment of critical infrastructure
- Risk of hazard impact by participating jurisdiction
- Geological survey

Montrose County used the risk assessment activities discussed in this section to identify hazards that pose high risks to Montrose County. The planning team determined that these hazards justify mitigation planning and are the focus of the mitigation actions described in this Pre-Disaster Mitigation Plan:

- Severe Weather
- Wildfire
- Floods
- Hazardous Materials ~ Uranium
- Geological Hazards

It is anticipated that future versions of this Pre-Disaster Mitigation Plan will not only refine the risk assessment for these hazards, but may encompass further analysis and planning for additional hazards not prioritized in this first plan.

Public Risk Assessment Input

Public comment was collected through invitation to meetings and a publicly available survey. The planning team solicited input from professionals in the following fields: emergency management, fire services, medical and health services, law enforcement, planning, government administration, community development, transportation, utilities and many others in the public and private sectors.

These invitations were issued using newspaper advertisements, public notices in selected government offices and individual invitations to the aforementioned groups.

The Montrose County planning team identified these as the prioritized hazards for mitigation planning:

Prioritized Hazard	Probability
Severe Weather	High
Wildfire	High
Hazardous Materials	High
Floods	High
Geological Hazards	Medium

Table 16: Prioritized hazards

Montrose County completed the risk assessments using a process deemed most effective by the Planning Team. The team, under direction of the Emergency Management Coordinator, conducted multiple sessions where project participants reviewed all hazard impact possibilities and in round table discussions determined the best ranking for each one.

The risk assessment activities conducted as part of this project provided the planning team with sufficient information and justification to describe the hazard threats to the County. Montrose County ranked each hazard according to the risk scale defined below:

Low: Hazard impact causes minor disruption to critical infrastructure and emergency services. Risks to life or safety are minor and hazard impact causes little disruption to Montrose County.

Medium: Hazard impact causes some disruption to critical infrastructure and emergency services, but the likelihood of such disruption directly contributing to personal injury, loss of life, or extensive property damage is not significant.

High: Hazard impact results in disruption to critical infrastructure and emergency services and contributes to personal injury, fatalities or extensive property damage.

The Planning Team also considered the potential for the occurrence and future impact of the prioritized hazards. Expert input indicates that probability exists that the prioritized hazards will continue to affect the County. Based on population growth projections and anticipated property value increases, it was determined that the future impact potential from these hazards would increase in the absence of effective mitigation actions.

Hazard Impact on Critical Infrastructure

The planning team reviewed Montrose County's critical infrastructure using the 13 critical infrastructure areas defined by the Department of Homeland Security. Impact from the prioritized hazards was ranked as low, medium or high for the identified critical infrastructure. Findings from risk assessment activities were used to determine the hazard impact on these critical places. Montrose County weighed mitigation actions for hazards affecting life safety as well as damages that could occur to any of these critical infrastructures.

Due to the potentially sensitive nature of the critical infrastructure inventory, and in keeping with the State of Colorado's practice for controlling critical infrastructure identification, Montrose County monitors the access to this information through the Emergency Management Coordinator. This information is available on a need-to-know basis by application to the appropriate person(s) identified in this plan.

Hazard Vulnerability based on projected land use and demographics

Based on land use and population growth projections, Montrose County anticipates continued rapid population growth. In the absence of effective mitigation measures, these projections indicate increasing loss potential from the prioritized hazards identified in this plan.

Hazard Impact on populations

The prioritized hazards listed in this Plan could have potentially large implications to life safety of Montrose County citizens. With proper education campaigns, warning and other mitigation techniques outlined in this plan, effects could be minimized. At any one time, Montrose County in its entirety could be affected by any disaster. There could also be portions of the County that see no impacts from the same event.

Hazard Mitigation Strategy

During the planning process meeting on June 25, 2008, as many mitigation strategies as possible were looked at for each hazard. The risk assessment identified and gave priority to these hazards for future mitigation planning:

- Severe Weather
- Wildfire
- Floods
- Hazardous Materials ~ Uranium

Since the geological hazards were discussed at a separate meeting, these mitigation strategies are to be considered as well. These were not ranked using STAPLEE; however, future versions of this Pre-Disaster Hazard Mitigation Plan will require the Geological Hazard Mitigation Strategies be developed with that process.

These hazards were prioritized, in part, by the potential broad impact to life safety, property and environment and more specifically impacts to Montrose County's residents, critical infrastructure and vital services.

Montrose County has adopted mitigation strategy guidance from FEMA that suggests a risk-analysis method that uses two general categories for pre-disaster mitigation:

- Actions to reduce the frequency and/or severity of hazard events
- Actions that reduce the vulnerability of community assets

Existing Hazard Mitigation Reports, Studies and Programs

Montrose County already has some plans, studies and programs in place or in progress, that identify, assess or mitigate the hazards discussed. These are:

Montrose County Existing Hazard Mitigation Reports, Studies and Programs				
Jurisdiction and Lead Agency	Plan	Mitigation Actions	Mitigation Category	Relevant Hazard(s)
City of Montrose	Building Codes	Various	Protection to Life, Public Safety, Property Protection	Fire
City of Montrose	Engineering standards and	Various	Protection to Life, Public	All

	specifications		Safety, Property Protection	
City of Montrose	Flood Plain Regulations	Various	Protection to Life, Public Safety, Property Protection	Flood
City of Montrose	Master Plan	Various	All	All
City of Montrose	Storm Water Plan	Drainage Standards	Property Protection	Flood
Colorado Division of Emergency Management	Colorado Hazard Mitigation Plan, 2008	Various	All	All
Colorado Division of Water Resources	Emergency Action Plans	Some plans in place by dam owners	Property Protection	Flood
Montrose County	Comprehensive Plan	Various	All	All
Montrose County	Emergency Operations Plan	All	Protection to Life, Public Safety, Property Protection	All
Montrose County	Engineering standards and specifications	Various	Protection to Life, Public Safety, Property Protection	All
Montrose County	Flood Plain Regulations	Various	All	Flood
Montrose County	Geological Hazards Plan	Various	All	All
Montrose County	Montrose County Wildfire Plan	Community Wildfire Protection Plan (CWPP)	Property Protection	Wildfire
Montrose County	Subdivision and Zoning Regulations	Land Use and Zoning	Property Protection	All

Table 17: Plans currently in existence

The Planning Team recognizes the benefit of incorporating, as appropriate, mitigation actions resulting from the Pre-Disaster Hazard Mitigation Plan with current and future hazard mitigation reports, studies, and programs to include capital improvement plans, building code reviews, hazards site reviews and permitting. The Local Emergency Management Planning Committee will work with the participating jurisdictions to facilitate coordination to update the mitigation plan.

Proposed Mitigation Actions

The mitigation actions set forth in the next section draw on these concepts as well as from a collection of respected resources. (See Appendix A for the full list) For example, some of the proposed mitigation actions were suggested by members of the Montrose County Planning Team and others were found during the course of research conducted for this project. Additional items were proposed by citizens of Montrose County. Each item was evaluated to determine which would best protect lives, save property and shield the environment.

Once collected, proposed mitigation actions were evaluated using the Social, Technical Administrative, Political, Legal, Economic and Environmental (STAPLEE) methodology. This is a standard methodology approved by FEMA that seeks to objectively evaluate mitigation options to ensure those selected are consistent with and complementary to other community goals and objectives. The results of the STAPLEE evaluation process produced prioritized mitigation actions for implementation within the planning area. A summary of STAPLEE evaluation criteria is shown in the following table:

S- Social	Actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause unreasonable impact to lower income people, and if they are compatible with the community's social and cultural values
T- Technical	Actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A- Administrative	Proposed actions can have the necessary staffing and funding
P- Political	Public support for the action is evident and all stakeholders have had adequate opportunity to participate in the process
L- Legal	The jurisdiction or agency implementing the action has the legal authority to do so
E- Economic	An evaluation of whether or not the proposed action is cost-effective, as determined by a cost-benefit review

	and able to be funded
E- Environmental	Verification that the proposed actions do not have an adverse environmental effect, comply with existing environmental laws and are consistent with the jurisdiction's environmental goal
Table 19: STAPLEE	

An example of the STAPLEE analysis tool is shown in Attachment #5. The Planning Team considered risk analysis, input from all project stakeholders, and results of the STAPLEE evaluation to identify the hazard mitigation goals, objectives and specific actions to be undertaken.

Cost/Benefit Analysis

The Planning Team conducted a high-level cost/benefit analysis on the mitigation actions. These mitigation actions have been prioritized (high, medium, low) according to initial analysis. Continuing review, analysis and implementation planning will occur following the adoption of this plan.

Mitigation Goals and Objectives

To serve as a guideline for Montrose County's Pre-Disaster Mitigation Plan implementation and to comply with FEMA guidance from the Hazard Mitigation Grant Program Final Rule, Montrose County identified goals and objectives for mitigation actions. These goals and objectives provide metrics to gauge results of mitigation actions and to guide updates and improvements to this plan.

A mitigation goal is a principle that explains what is to be achieved as well as the vision for mitigation actions. Objectives are specific steps or measureable outcomes needed to achieve those goals. The Planning Team considered and developed goals and objectives as part of the mitigation actions, and those goals and objectives are summarized with the related proposed mitigation actions listed.

The Planning Team for the Pre-Disaster Hazard Mitigation Plan determined the overarching goal was to protect the life safety of Montrose County citizens. The Planning Team also determined that protecting infrastructure, property and the environment were also important. Each mitigation action reflects one or all of these values.

The hazards identified for mitigation include:

- Severe Weather
- Wildfire
- Floods
- Hazardous Materials ~ Uranium
- Geological Hazards

The Planning Team did a cost-benefit analysis on each of these mitigation actions. The Planning Team listed each action; however, not all were cost effective. The costs were listed by subject-matter experts in these areas.

These actions reduce the effects and impacts on new and existing buildings and infrastructure throughout Montrose County.

The mitigation actions listed below are functional in nature and are actions intended for implementation by Montrose County. Each community is aware that they can apply for funding for which it is eligible. As Montrose County is a rural/frontier area, the actions, many of which are dependent on funding, will be coordinated between the County and the specific jurisdiction it affects at the time of anticipated implementation.

Such actions are not limited to just an individual jurisdiction; therefore, the actions below are encompassing for all partners associated with the development of this Plan making the neighboring projects collaborative in order to be most effective.

Goals, objectives and mitigation actions are listed below:

All Listed Hazards				
Goal	Work more closely with the public			
<i>Objective</i>	<i>Create and implement a public information/ education program</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$20,000	Create kiosks to include telephones, maps and phones	High	PIO Group	Medium-range
\$2,500 per time	Public information campaign on where shelters are located and what to do with pets and livestock	Medium	PIO Group	Sustained
\$2,500 per time	Public information campaign on 72-hour kits	Medium	PIO Group	Sustained
\$2,500 per time	Increase public information and education on potential for emergencies within Montrose County	Medium	PIO Group	Sustained
Now included in current system	Sustain technology to send emergency text messages to cell phones	Low	Emergency Management Coordinator	Sustained

<i>Objective</i>	<i>Improve response time for special needs population</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$5,000 per year	Website for special needs population to register information: where live, medications, etc.	High	Health & Human Services	Medium-range
Salary of employee	Map all of registrants on map	Medium	GIS	Long-range

Severe Weather				
Goal	Minimize the impact of severe storms			
<i>Objective</i>	<i>Become a Storm Ready community</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
Salary of employee	Write and implement plans for Storm Ready designation	High	Emergency Management Coordinator	Short-term
<i>Objective</i>	<i>Purchase Equipment</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$800,000	Purchase large snow blower for Road & Bridge for the Department to clear major arterials more quickly	Medium	County Engineer	Medium-range

Wildfire				
Goal	Reduce impact of wildfire			
<i>Objective</i>	<i>Write, update and implement plans</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$65,000	Write Community Wildfire Protection Plans to be	High	USFS/CSFS/BLM/ Fire	Short-term

	incorporated into the Montrose County Fire Plan		Districts/ Emergency Management Coordinator	
Salary of employee	Implement defensible space for Wildland Urban Interface in Land Use Regulations	High	Land Use	Medium-range
Salary of employee	Implement specific road codes in Land Use Regulations: <input type="checkbox"/> width to handle emergency vehicles <input type="checkbox"/> more than one access into subdivisions	Medium	Land Use	Medium-range
\$2,500	Implement a defensible space education component	Medium	USFS/CSFS/ BLM/ Fire Districts/ EM	Short-term
<i>Objective</i>	<i>Improve geographic information data in GIS Department</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$100,000	Collect GPS points and structure survey information for all properties in the prioritized areas	High	GIS	Short-term; sustained
<i>Objective</i>	<i>Implement a fuels treatment program</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
	Rent equipment to allow Montrose County citizens to bring slash to an area for a set time	High	Engineer	Medium-range

Floods				
Goal	Minimize the impact of floods			
<i>Objective</i>	<i>Stay in compliance with National Flood Plain Insurance Program</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
Current permit fees offset costs	Continue to comply with National Flood Plain Insurance Program by identifying flood plains on new subdivision plats	High	Flood Plain Manager	Sustained

<i>Objective</i>	<i>Improve flood plain mapping</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$500,000	Improve flood plain mapping	High	GIS/ City & County Engineer	Medium-range
\$500,000	Study the hydrology of creeks	Medium	City & County Engineer	Long-term

<i>Objective</i>	<i>Implement Capital Improvement Plan in Road and Bridge Department</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$600,000	Raise Blossom Road Bridge	Medium	County Engineer	Medium-range
\$600,000	Raise La Salle Bridge	Medium	County Engineer	Medium-range
\$300,000	Engineer flooding issues on 6900 Road	Medium	County Engineer	Short-term
\$150,000 each	Install larger culverts at 4 locations within City of Montrose	Medium	City Engineer	Medium-range

<i>Objective</i>	<i>Update Emergency Action Plans</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$22,000 per EAP	Hire a contractor to work with dam owners in County to update Emergency Action Plans to include flood inundation maps	High	Division of Water Resources/ Dam owners/ Emergency Management Coordinator	Medium-range

Hazardous Materials ~ Uranium				
Goal	To reduce the impact from Hazardous Materials in the West End			
<i>Objective</i>	<i>To improve County Roads on West End for traffic of Hazardous Materials</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline

\$350,000 per mile	Improve County Roads on West End so they are built to handle increased truck traffic	High	County Engineer	Medium-range
Geological hazards				
Goal	To reduce the impact from geological hazards			
<i>Objective</i>	<i>To rework Land Use documents to include mitigation techniques for Geological Hazards</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
Staff salary	To include information relating to Geological Hazards into Master Plan	High	Land Use/ Planning Commission/ Board of County Commissioners	Short-term
Staff salary	To incorporate new Master Plan and Geo Hazards report information into new Building and Zoning Codes	High	Land Use/ Board of County Commissioners	Long-term
<i>Objective</i>	<i>Create and implement a public information/ education program</i>			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$2,500	To inform public	High	Land Use/ PIO Group/ EM	Short-term

Table 18: Mitigation Goals & Objectives

Mitigation Action Implementation Strategy

The mitigation actions identified above will be implemented under guidance from mitigation work groups in Montrose County. These work groups will be formed under direction of the Emergency Management Coordinator and will include public participants from the planning area as well as others representing jurisdictional agencies.

Budget availability for hazard mitigation is minimal within Montrose County. Recent changes to federal law; however, encourage a more pro-active strategy. Montrose

County's Local Emergency Planning Committee will use the implementation plans contained herein to build on the work accomplished in this Plan and to meet proactive strategies.

Montrose County's mitigation action implementation plans will be formed by the Local Emergency Planning Committee. Initial activities will assess each proposed mitigation action listed and complete an implementation plan to include some of the following information:

- Prioritized mitigation action
- Jurisdiction(s) covered in mitigation action
- Mitigation category
- Relevant hazard(s) addressed by the action
- Priority
- Estimated cost for implementation
- Potential funding sources
- Cost/Benefit analysis results
- Lead/Responsible department
- Implementation schedule
- Implementation status
- Environmental review for required studies and approvals

Plan Maintenance and Adoption

The Pre-Disaster Hazard Mitigation Plan is intended to be a living document that informs stakeholders about hazard mitigation projects and plans undertaken by Montrose County. Montrose County understands the need to regularly review and update this Plan based on:

- Evolving hazards
- New mitigation techniques
- Changes in land use and critical infrastructure

This review and update occurs on a schedule that meets the minimum provisions, rules and laws regulating hazard mitigation planning. This section provides a general overview of Montrose County's maintenance process.

Mitigation Update Committee

Montrose County has designated the Local Emergency Planning Committee to participate in any future updates of this plan. These individuals will:

- Guide plan maintenance
- Update activities
- Ensure that information is current
- Disseminate information to other stakeholders

Public Participation in Plan Maintenance

Although the Committee members represent jurisdictions and agencies, Montrose County understands the importance of direct public input to updating the Plan. To facilitate public involvement of the plan maintenance process, some of these ways to encourage public input may be used:

- Copies of the Plan staged at public libraries and other government buildings
- Articles in the local newspapers
- Information about the plan and copies posted on the County website
- Public meetings prior to the adoption of any Plan updates
- Comments made from any of these sources incorporated into the Plan as appropriate

Montrose County did request public comment by the above measures and will use the same methods for any and all updates made to this Plan.

Annual Plan Review

The Plan will be reviewed by the Committee annually or when:

- Determined by the Local Emergency Planning Committee
- Significant changes occur within the planning area involving a threatened impact or potential impact
- Changes occur to mitigation actions that are part of the Plan

As part of the annual Plan review, these members will follow a process that:

- Requests input from project stakeholders not represented, including members of the public. This input will include information on projects and programs important to mitigation planning

- Makes minor adjustments to the Plan to keep mitigation items aligned with approved goals and actions
- Allows for a formal approval process for major changes to the Plan
- Makes change suggestions, as appropriate, to the Committee

Plan Review Criteria

The Planning Team has defined initial criteria for evaluating the Plan, and these criteria will be modified and approved by the Local Emergency Planning Committee as appropriate. When evaluating the Plan, the following items will be assessed:

- Mitigation goals and objectives address current and expected conditions
- The nature and magnitude of threats have changed
- Current resources are appropriate for implementing the Plan
- The mitigation actions underway continue to be compatible with STAPLEE criteria and any other criteria deemed relevant
- The maintenance process includes a cross-functional set of participants, including members of the public and jurisdictions
- Mitigation actions encounter problems in implementation
- Mitigation actions are achieving outcomes as planned
- Mitigation actions are coordinated with other planning studies, reports and programs in effect in Montrose County

Montrose County's Local Emergency Planning Committee meets monthly, and during these meetings will periodically ensure that mitigation actions are incorporated into on-going planning activities. For instance certain mitigation actions affect Montrose County's

- Land Use Regulations
- Capital Improvements plans
- Wildfire plans
- Others

Following the adoption of this Pre-Disaster Hazard Mitigation Plan, the committee will work with agencies and departments within the County to align mitigation actions recommended in this Plan to the policies, plans and regulations, some of which were identified in this document. Montrose County believes that this process will allow the Plan to effectively address the hazard mitigation requirements within the planning area and incorporate input from a broad cross section of stakeholders, including community members.

Plan Adoption

Montrose County will adopt the plan according to this general process:

- Posting of the draft plan with a public notice to allow community members to review and comment on the plan prior to adoption
- Final adoption by the Board of County Commissioners at a formal meeting

The public posting of the draft Plan will occur using an Internet posting to the Montrose County website as well as distribution to public libraries and other government office buildings. Announcements of the public postings will be made through local newspapers as well as the Montrose County website.

The actual adoption process of the document by the Board of Montrose County Commissioners will follow standard procedures:

- Reviewed and approved by Montrose County Attorney
- Posted on agenda for Board of County Commissioners regular meeting
- Public hearing
- Adoption of resolution, if no comments, approval the Pre-Disaster Hazard Mitigation Plan
- Recorded with Montrose County Clerk and Recorder
- Posted to Montrose County website
- Press release to all major news outlets

Every five years the updated plan will be re-submitted for adoption following the general process outlined, or the processes in place established by State or Federal guidelines.

Appendix A

Mitigation Action Sources for Various Hazards

Potential Mitigation Action Sources for Various Hazards	
Prioritized Hazard	Interviews and Document Reviews Conducted for Potential Mitigation Actions
Severe Weather	<ul style="list-style-type: none"> <input type="checkbox"/> National Oceanic and Atmospheric Administration <input type="checkbox"/> Engineer, Montrose County <input type="checkbox"/> Engineer, City of Montrose <input type="checkbox"/> Community Development Director, City of Montrose <input type="checkbox"/> National Weather Service <input type="checkbox"/> Montrose Historical Society <input type="checkbox"/> Land Use Director, Montrose County <input type="checkbox"/> Chief of Police, Montrose <input type="checkbox"/> Deputy Chief, Montrose Fire Protection District <input type="checkbox"/> Emergency Preparedness Coordinator, Montrose County Health & Human Services <input type="checkbox"/> <i>Montrose Daily Press</i>
Wildfire	<ul style="list-style-type: none"> <input type="checkbox"/> Chiefs of local fire districts <input type="checkbox"/> Wildfire Mitigation Specialist, Bureau of Land Management <input type="checkbox"/> District Forester, Colorado State Forest Service <input type="checkbox"/> RACES volunteer <input type="checkbox"/> <i>Montrose Daily Press</i> <input type="checkbox"/> Montrose County Wildfire Plan <input type="checkbox"/> Coordinator, Montrose County GIS <input type="checkbox"/> National Fire Plan <input type="checkbox"/> Colorado State Statutes <input type="checkbox"/> Gunnison County Hazard Mitigation Plan
Floods	<ul style="list-style-type: none"> <input type="checkbox"/> Engineer, Colorado State Division of Water Resources <input type="checkbox"/> Manager, Project 7 Water <input type="checkbox"/> Manager, Uncompahgre Valley Water Users <input type="checkbox"/> Engineer, Montrose County <input type="checkbox"/> Road Supervisor, Montrose County <input type="checkbox"/> Engineer, City of Montrose <input type="checkbox"/> Volunteer, Civil Air Patrol

	<input type="checkbox"/> <i>Montrose Daily Press</i> <input type="checkbox"/> Senior Maintenance Supervisor, Colorado Department of Transportation <input type="checkbox"/> Local Emergency Action Plans <input type="checkbox"/> Bureau of Reclamation <input type="checkbox"/> Coordinator, Montrose County GIS
Geological Hazards	<input type="checkbox"/> Colorado Geologic Survey Report <input type="checkbox"/> Engineer, Montrose County <input type="checkbox"/> Land Use Director, Montrose County
Hazardous Materials ~ Uranium	<input type="checkbox"/> Environmental Health Specialist, Montrose County <input type="checkbox"/> Environmental Protection Agency website <input type="checkbox"/> Director, Montrose County Health & Human Services <input type="checkbox"/> <i>Montrose Daily Press</i>

Attachment #1 ~ Resolution

A draft resolution for adoption of this plan by the Montrose County Board of Commissioners is included in this attachment.

**RESOLUTION
OF
THE MONTROSE COUNTY BOARD OF COMMISSIONERS
CONCERNING: Pre-Disaster Hazard Mitigation Plan**

WHEREAS, Montrose County has a number of possible natural hazards that have potential for broad impact to the life safety of Montrose County Citizens, public and personal property (including critical infrastructure), our economy, and our environment at any given time.

WHEREAS, such emergencies and disasters fall under the responsibility of governmental agencies whose main purpose is to protect citizens from collective harm. In accordance with C.R.S. 24-32-2107(9), as amended, each political subdivision in the State of Colorado is responsible for emergency management functions.

WHEREAS, emergencies have become more complex, involving more Departments, impacting more people, and requiring more detailed coordination than in previous times in Montrose County’s history.

WHEREAS, we have the ability and responsibility to collectively plan for the effective mitigation of these hazards when and where we are able.

WHEREAS, In order to receive reimbursement from the Federal Emergency Management Agency (FEMA) after a disaster, the Pre-Disaster Hazard Mitigation Plan must be completed and adopted.

NOW THEREFORE BE IT RESOLVED, that the undersigned Board of County Commissioners of Montrose County, Colorado, does hereby accept the Pre-Disaster Hazard Mitigation Plan, as it was deemed “approvable” by FEMA.

Approved and adopted this day of

BOARD OF COUNTY COMMISSIONERS,

ATTEST: _____ David White, Chairman

Deputy Clerk to the Board

Gary J. Ellis, Vice-Chairman

Ron Henderson, Commissioner

Attachment #2 ~ Meeting Agendas

The following are meeting agendas for the Pre-Disaster Hazard Mitigation Plan.

Hazard Mitigation Plan

June 4, 2008

2-4 p.m.

Resource Room

1. Hazards within the County
 - List all potential hazards
 - List hazards with greatest risks
 - History of hazards within County (homework)
2. Where the populations meet that hazard
 - Wildland Urban Interfaces
 - Flood Plain
3. Types and numbers of structures in that area
 - Values of those structures (homework)
 - Projected growth in those areas (homework)
4. Other plans that discuss the hazard
 - For Example: (homework)
 - Master Plan
 - Community Wildfire Protection Plans
 - Watershed plans
5. Next Meeting Date
 - Deliverables for that meeting:
 - History of hazards
 - Value and types of structures
 - Projected growth
 - Other plans that discuss this hazard

Hazard Mitigation Plan
June 25, 2008
2-4 p.m.
Resource Room

1. Review of hazards
2. Review of maps
3. Homework assignments
 - a. History of the hazards (Robyn, Vernon Estes~ Wildfire)
 - b. Values and Types at Risk (Brad Hughes)
 - c. Plans that discuss the Hazard (Keith Caddy, Steve White)
4. Probability of each hazard
5. Impact of the hazard
 - a. Economic
 - b. Social
 - c. Historical
 - d. Other
6. Mitigation Strategies for each hazard identified

Attachment #3 ~ Survey Results

The following is a copy of the survey, which was posted to the Montrose County website, as well as the results of the survey.



Montrose County is participating in a federally-funded effort in accordance with the Disaster Mitigation Act of 2000 to develop a pre-disaster hazard mitigation plan to reduce risk from natural hazards. The input of all County residents is sought through this public survey about potential natural hazards.

This survey is available on the Montrose County website or copies are at the Montrose County Administration Building, 161 S. Townsend, or the Courthouse Annex in Nucla.

Your participation in this survey is greatly appreciated and will contribute to the quality of the County's emergency planning efforts.

This survey will be available from July 28 through Aug. 8, 2008

Please circle or check the most appropriate answer:

Are you 18 years or older	Yes/ No
Where do you reside	City of Montrose Town of Olathe Town of Nucla Town of Naturita Unincorporated Montrose County, East End Unincorporated Montrose County, West End
Are you an Emergency Response Professional	Yes/No
If yes, are you	Firefighter Law Enforcement Officer EMS Healthcare professional Sheriff's Posse Other Public Safety

Continued on next page

In your opinion, which of the following natural hazards and the potential consequences most threaten life, health and property in Montrose County?

Please rate each hazard from 1 to 10

1 = Least Threatening

10 = Most Threatening

Wildfire	1	2	3	4	5	6	7	8	9	10
Seasonal flooding (melting snow, seasonal rain)	1	2	3	4	5	6	7	8	9	10
Flash flooding	1	2	3	4	5	6	7	8	9	10
Landslides	1	2	3	4	5	6	7	8	9	10
Avalanche	1	2	3	4	5	6	7	8	9	10
Drought	1	2	3	4	5	6	7	8	9	10
Tornado	1	2	3	4	5	6	7	8	9	10
High Winds	1	2	3	4	5	6	7	8	9	10
Earthquake	1	2	3	4	5	6	7	8	9	10
Dam Breach	1	2	3	4	5	6	7	8	9	10
Hazardous Materials ~ Uranium	1	2	3	4	5	6	7	8	9	10
Microbursts	1	2	3	4	5	6	7	8	9	10
Erosion	1	2	3	4	5	6	7	8	9	10
Smog	1	2	3	4	5	6	7	8	9	10
Debris Flow	1	2	3	4	5	6	7	8	9	10
Pandemic	1	2	3	4	5	6	7	8	9	10
Hail	1	2	3	4	5	6	7	8	9	10
Severe Snow storms/ blizzards	1	2	3	4	5	6	7	8	9	10
Subsidence	1	2	3	4	5	6	7	8	9	10
Lightning	1	2	3	4	5	6	7	8	9	10
Other Hazards, please list and rank										
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10

Please return this survey to

Robyn Funk

Montrose County

Emergency Management Coordinator

161 S. Townsend Avenue

Montrose, CO 81401

rfunk@co.montrose.co.us

The survey was posted on the website for 2 weeks, and a story about the survey appeared in the local newspapers. The purpose of this survey was to collect public input on risks from natural hazards that could affect Montrose County residents. This survey was accessible through the Montrose County website as well as in hardcopy forms that were available at Montrose County Administration and the Courthouse Annex in Nucla.

Results from the survey are listed. This information was used to guide the Montrose County planning efforts; however, it will not be used as a determining factor in determining the investment strategy for mitigation. In some cases, mitigation activities will not produce adequate benefits compared to implementation and maintenance costs. This survey was used; however, to provide general guidance to planning activities related to this Pre-Disaster Hazard Mitigation Planning initiative.

The results were tabulated according to area, and ranked on a scale from 1 to 10, with 10 describing hazards with the most impact on Montrose County. The values shown represent the average ranking for each hazard from all respondents.

Hazards listed first are those the Planning team elected to prioritize for remediation in this plan. Emergency responders were asked to identify themselves as part of the survey, and this class of survey respondent comprised of approximately 10 percent of the survey takers.

Jurisdiction	Number of surveys returned	Averages								
		Wildfire	Flooding Seasonal	Flash Flooding	Landslide	Avalanche	Drought	Tornado	High Winds	Earthquake
City of Montrose	41	6.83	5.03	4.58	3.15	2.55	6.78	2.80	6.15	3.33
Town of Olathe	4	9.00	7.00	5.25	4.75	4.50	7.00	2.25	5.50	1.67
Unincorp East	24	7.50	5.64	4.83	3.33	3.29	6.74	1.92	5.79	3.04
Unincorp West	5	7.00	5.40	5.20	6.20	3.40	5.40	4.40	5.00	4.20
Town of Nucla	3	9.00	4.00	4.00	1.33	1.33	9.33	1.33	5.33	2.33
Town of Naturita	2	4.00	2.00	5.50	5.00	1.00	7.00	2.00	7.50	1.50
Maher	1	10.00	1.00	1.00	1.00	1.00	8.00	2.00	6.00	3.00
Unknown	7	6.00	4.43	4.00	3.57	2.50	6.00	2.57	7.43	2.57
Total number of surveys returned	87									
Weighted Averages		7.10	5.11	4.63	3.44	2.79	6.74	2.53	6.06	3.08
Weighted Ranking		1	6	7	14	18	2	20	3	16

Total number of surveys completed by first responders	9
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Averages											Jurisdiction
Dam Breach	Haz Mat	Micro bursts	Erosion	Smog	Debris Flow	Pandemic	Hail	Snow	Subsidence	Lightning	
4.90	4.68	3.39	3.95	2.90	2.85	4.68	4.00	6.15	3.00	5.49	City of Montrose
5.25	7.67	5.00	4.50	3.67	3.00	5.50	4.25	6.25	2.50	5.50	Town of Olathe
3.83	4.26	3.57	3.43	2.04	3.19	4.96	4.17	6.04	2.90	5.50	Unincorp East
5.20	3.60	4.00	3.20	2.00	2.50	6.00	6.50	6.40	3.00	6.00	Unincorp West
1.00	3.33	2.00	3.00	1.00	2.33	1.50	3.67	7.33	3.67	5.33	Town of Nucla
1.50	4.50	5.00	2.00	1.50	1.50	4.50	1.50	4.50	2.00	6.00	Town of Naturita
1.00	5.00	3.00	7.00	10.00	1.00	3.00	4.00	1.00	7.00	10.00	Maher
3.67	3.57	4.00	4.00	2.43	3.14	3.00	4.43	4.86	4.50	6.43	Unknown
4.28	4.50	3.58	3.75	2.59	2.88	4.60	4.17	5.98	3.12	5.66	Weighted Averages
10	9	13	12	19	17	8	11	4	15	5	Ranking

Hazards ranked by Public

1	Wildfire
2	Drought
3	High Winds
4	Severe Snow
5	Lightning
6	Seasonal Flooding
7	Flash Flooding
8	Pandemic
9	Haz Mat ~ Uranium
10	Dam Breach
11	Hail
12	Erosion
13	Microbursts
14	Landslide
15	Subsidence
16	Earthquake
17	Debris Flow
18	Avalanche
19	Smog
20	Tornado

Other hazards written in by public	Rating
Bad roads	10
Crazy people	10
General government	10
Small special interest groups	10
Political agendas	10
Rockslides	10
Haz Mat through town*	9.5
Chemical truck*	9
Walking in Montrose	9
Food Shortage	8
Non-wildfire	8
Traffic*	7.66
Front Range incident	7
Traffic accidents	7
Farm accidents	7
Crime	7
Undersized spillway at Ridgway Dam	7
Pesticide spray (ag)*	7
Large aircraft crash*	6.5
Illegal immigration	6
Disruption of water supply	5
Insects	5
Long-term power outage	5
Technological emergency	4
Large-scale prison break	4
Terrorism	3
Poisonous plants & fungi	2

* more than one response, rating is averaged

Attachment #4 ~ Maps

The following maps are included in Attachment #4:

- Land Ownership Map
- Montrose County communities
- Wildfire Priority Areas
- Water Resources
- Geological Hazards

Attachment #6 ~ References

The following were used as references to write the Montrose County Pre-Disaster Hazard Mitigation Plan:

- Colorado Climate Center
- Colorado Division of Emergency Management Mitigation Plan
- Colorado Division of Emergency Management website
- Colorado Drought Mitigation and Response Plan
- Colorado Geological Survey
- Colorado Water Conservation Board
- Delta County Hazard Mitigation Plan Documents
- Department of Atmospheric Science at Colorado State University
- Department of Local Affairs, Energy & Mineral Impact
- Drought Draft Final Report Update
- Grand County Pre-Disaster Mitigation Plan ~ Draft
- Gunnison County All-Hazard Mitigation Plan
- <http://www.colorado.edu/hazards>
- http://www.fema.gov/plan/mitplanning/approved_plans_reg8.shtm
- MSN Encarta Dictionary
- Montrose County Fire Plan
- Montrose County Master Plan
- Montrose County Wildfire Plan
- Montrose Daily Press* website
- Montrose Historical Society
- Multi-Jurisdictional All-Hazards Pre-Disaster Mitigation Plan for Pitkin and Eagle counties
- National Weather Service
- NOAA
- San Miguel County All-Hazard Mitigation Plan
- United States Department of Agriculture
- West End Museum website
- Wikipedia

Attachment #7 ~ Glossary

Alluvial Relating to, consisting of, or formed by sediment deposited by flowing water.

Ancillary Providing support for someone or something.

Breach Breaking down an obstruction to allow something to pass through it.

Causative Involving or being the cause of something or the relationship or cause and effect.

Collaborate To work with another person or group in order to achieve a common goal.

Comprehensive Including everything so as to be complete.

Consensus General or widespread agreement among all the members of a group.

Conservation The protection, preservation, and management of natural and cultural resources.

Constraint The state at which freedom of action is severely restricted.

Corridor A narrow strip of land cleared of trees or other growth.

Critical Extremely important or essential that is absolutely necessary for the success of something.

Deteriorate To become or make something worse in quality, value or strength.

Detrimental Causing harm or damage to something else.

Dispatch Instructing someone to go somewhere to do something rather quickly, as in an emergency situation.

Dispersive Tending to cause the scattering or distribution of something within an area or space.

Emphysema A chronic medical disorder of the lungs in which the air sacs are dilated or enlarged and lack flexibility, so that breathing is impaired and infection sometimes occurs.

Ephemeral Lasting for only a short period of time and leaving no permanent trace.

Erosion The wearing away of rock or soil by physical breakdown, and transportation of materials that can be caused by water, wind, and ice.

Exempt Freed from or not subject to something such as taxes.

Faults The displacement of rock layers in the Earth's crust in response to stress, accompanied by a break in the continuity of the rocks on each side of the fault line.

Feasible An idea or thought that is capable of being accomplished or put into effect.

Foundation The part of a building, usually below ground, that transfers and distributes the weight of the building onto the ground.

Gradient the upward or downward slope and the rate at which the steepness of the slope increases.

Habitat The natural conditions and environment in which a plant or animal lives.

Hazard Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

Imminent An event that is about to happen, or conditions are such that it is threatening to happen.

Incident Commander (IC) The individual responsible for the command of all emergency functions at the field level.

Indigenous Originating in a naturally living, growing or occurring in a region or country. Something that is natural to a place.

Interface The place or way in which two things act together or affect each other or the point of connection between things.

Inundation An accumulation of an overwhelming amount of water.

Jurisdiction The area over which legal authority extends.

Liability Legal responsibilities for something, especially for costs or damages.

Mandate The official command or instruction from an authority.

Mitigation The steps taken to make the effects of a disaster less harsh, severe or violent.

Myriad Comprised of many different elements.

Nomad A member of a people who move seasonally from place to place to search for food and water.

Nuisance An annoying thing.

Overflow To flood, cover, or flow over the surface or something; or to spread beyond the area intended to contain it.

Percolation To force a liquid to pass through a porous substance to filter.

Potential Having a latent possibility or likelihood of occurring, or of doing or becoming something.

Preparedness Readiness for action.

Prominent Something that is noticeable or conspicuous.

Recovery The return of something to a normal or improved state after a disaster.

Response Something done in reaction to something else.

Risk The chance of something going wrong with the danger of injury, damage or loss will occur.

Rupture A break in something, or a breaking apart of something.

Salinity Containing a high content of salt; relating to or containing alkali metal salts or magnesium salt.

Seepage The escape of a liquid or the amount of liquid that escapes.

Selenium A nonmetallic element that occurs in several forms ranging from a red powder to gray black crystal and is an essential trace element that is toxic when found in excess.

Shearing To cause something to deform or break by applying a twisting force.

Stabilize To make something stable.

Subdivide To divide a section of land into smaller parcels.

Transcend To go beyond a limit or range; to surpass something in quality or achievement.

Unincorporated Not organized into a corporation or municipality.

Viscous Thick and sticky, difficult to stir and is reluctant to flow.

Vulnerable Open to physical or emotional harm; unable to resist illness, debility or failure.

Weather Spotter A person who is trained to spot adverse weather conditions as they approach.