Garfield County

Natural Hazards Mitigation Plan

Garfield County, Colorado

Acknowledgements

Garfield County developed this Natural Hazard Mitigation Plan (NHMP) as part of a suite of Emergency Management plans that also include a Continuity of Operations Plan (COOP) and a Local Recovery Plan. In the summer of 2009, Garfield County contracted with ECONorthwest to begin the process of developing a Risk Assessment, evaluating hazards and vulnerabilities, and developing a method for understanding relative risk. That Risk Assessment provides a foundation for this NHMP and the County's comprehensive approach to risk reduction. The acknowledgements below therefore reflect the work of the many people involved in the various plans and processes.

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Garfield County Natural Hazard Mitigation Plan Readers Guide

Garfield County's Natural Hazard Mitigation Plan (NHMP) provides a reference to risk reduction activities that is designed to be easily updated to remain relevant in the future. It provides specific information and resources to assist readers in understanding the County and the hazard-specific issues facing citizens, businesses, and the environment. Combined, the sections work together to create a mitigation plan that guides actions to reduce risk and prevent loss from future natural hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows County government to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant to Garfield County. Each section of the NHMP is described below.

Executive Summary

The Executive Summary provides an overview of the development of the mitigation plan, the mission, goals, and describes how the action items are organized. It also summarizes key findings from the community profile and vulnerability assessment and connects those findings to the actions items.

Section 1: Introduction

The Introduction describes the background, purpose, and effect of developing the mitigation plan for Garfield County. This section also describes the methodology used to develop this multi-jurisdictional NHMP.

Section 2: Community Profile

This section presents a brief overview of County demographic and other contextualizing factors including Environment and Geography; Population; Land Use and Development; Economy; Infrastructure and Critical Facilities; and Cultural and Historic Assets. This description is intended to act as a snapshot of the County to identify vulnerabilities and assets to be protected.

Section 3: Risk Assessment Summary

This section provides a summary of the Garfield County Comprehensive Risk Assessment.

Section 4: Action Items and Implementation

The NHMP Steering Committee assessed risk and vulnerability and developed a refined set of actions that are aimed at reducing risk over the next five years. Actions are divided by the type of hazard they are intended to mitigate against: flood,

landslide, severe weather, wildfire, and earthquake. Hazardous materials spills or releases were considered as a secondary hazard.

Section 5: Plan Maintenance and Update

This section describes a process by which the County and participating communities will implement the mitigation plan, and outlines a process for updating the plan in the future.

Jurisdictional Plan Addenda

Several jurisdictions opted to participate in the development of this plan by producing action items and risk assessments that are specific to their communities. The results of those jurisdictional planning processes are captured in addenda that each community produced, as follows:

Cities and Towns

- Glenwood Springs
- New Castle
- Rifle
- Silt

Fire Districts

- Burning Mountains Fire District
- Glenwood Springs Fire Protection District
- Grand Valley Fire Protection District
- Rifle Fire Protection District

Appendices

- Appendix A: Detailed County Action Item Forms
- Appendix B: Cost-benefit analysis methodology
- Appendix C: Results of 2009 process
- Appendix D: Public Participation and Documentation

Executive Summary

Why develop a Natural Hazard Mitigation Plan?

Natural hazards impact citizens, property, the environment, and the economy of any community. Wildfire, landslides, and severe winter storms have exposed Garfield County residents and businesses to the financial and emotional costs of recovery. The risk associated with natural hazards increases as more people move to vulnerable areas. The inevitability of natural hazards, and the growing population and activity within hazard-prone parts of the County, create an urgent need to develop strategies, coordinate resources across jurisdictions, and increase public awareness to reduce risk and prevent loss from future natural hazard events.

It is impossible to predict exactly when disasters will occur, or the extent to which they will affect a community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards. Mitigation plans assist communities reduce risk by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the County.

This Natural Hazard Mitigation Plan (NHMP) provides a set of actions to reduce risk from natural hazards through education and outreach programs, the development of partnerships, and implementation of preventative activities such as land use or watershed programs. It is a multi-jurisdictional plan that contains actions specific to the County and to some of the cities, towns, and fire districts within it.

The resources and information within the mitigation plan: (1) establish a foundation for coordination and collaboration among agencies and the public in Garfield County; (2) identify and prioritize future mitigation projects; and (3) meet qualifications for federal assistance programs. The mitigation plan works in conjunction with other County plans; many of its actions are implemented through other plans and policies, including the County Comprehensive Land Use Plan and County and jurisdictional building codes.

This mitigation plan is part of a suite of plans that together form a comprehensive emergency management program for Garfield County. Those plans include a Continuity of Operations Plan, a Recovery Plan, a Comprehensive Risk Assessment, and Community Wildfire Protection Plans. All of these plans will be implemented and maintained in a coordinated way.

Who does the mitigation plan affect?

The Garfield County NHMP affects unincorporated urban areas, and the rural, unincorporated areas of the County. Some incorporated areas and fire districts are also covered by this plan. The resources and background information in the plan are applicable Countywide, and the goals and recommendations can lay groundwork for local mitigation plans and partnerships. The County, working with the Colorado Division of Emergency Management's mitigation team, invited the participation of all jurisdictions within the County in a process that is described in more detail in the

next section of the executive summary and in the Plan document itself, and several jurisdictions accepted.[1] As a result, this Plan is a multi-jurisdictional NHMP, and documents the actions that the following jurisdictions will undertake to reduce risk from natural hazards:

Cities and Towns

- Glenwood Springs
- New Castle
- Rifle
- Silt

Fire Districts

- Burning Mountains Fire District
- Glenwood Springs Fire Protection District
- Grand Valley Fire Protection District
- Rifle Fire Protection District

NHMP Mission, Goals, and Actions

The Garfield County NHMP provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities through the County development code, source water protection plan, community wildfire protection plan, emergency operations plan and 5-year Plan. The actions described in the NHMP are intended to be implemented through existing plans and programs within the County and its jurisdictions.

Mission

The mission of the Garfield County NHMP is to reduce risk to life and property from natural hazards.

Goals

The NHMP goals describe the overall direction that Garfield County agencies, organizations, and citizens can take to work toward mitigating risk from natural hazards. They were developed by the NHMP Steering Committee and are substantially similar to the goals included in the State of Colorado Natural Hazard Mitigation Plan. The Committee felt that this alignment with the State Plan would

[1] The NHMP and accompanying multi-jurisdictional addendums are intended to be living documents, updated as new hazard information becomes available or as mitigation projects are completed. The four communities and four Fire Protection Districts included in the 2012 NHMP confirmed their participation via a resolution or letter of agreement. At any date in the future additional jurisdictions within Garfield County can develop an addendum to the Garfield County NHMP.

improve opportunities for collaboration during implementation. The goals are discussed in depth in Section 1 of the plan.

- Goal 1: Reduce the loss of life and personal injuries from natural hazard events.
- Goal 2: Reduce damage to county assets.
- Goal 3: Reduce County costs of disaster response and recovery.
- Goal 4: Minimize economic losses
- Goal 5: Reduce damage to personal property

Actions

The NHMP actions are summarized here and discussed in detail in Section 4 and its associated appendix. Data collection and research, together with a public participation process resulted in the development of a comprehensive range of action items.

Multi-Hazard Mitigation Action Items

- Develop maintenance and update processes, in coordination with the other emergency management related plans, and with multi-jurisdictional partners.
- Conduct ongoing public outreach activities during mitigation plan implementation, and in conjunction with the update and maintenance of other emergency management plans.
- Collaborate with neighboring counties and cities with established GIS services to develop Memoranda of Understanding or Service Agreements for the provision of GIS services in the event of staffing issues.
- Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens and private property owners, owners associations, public agencies, businesses, and schools. Coordinate with participating towns, cities, and fire districts on outreach inside of their jurisdictions. Coordinate implementation efforts with the update of recovery and other emergency management plans, as appropriate.
- Collaborate with regional, state, and federal agencies, and private industry to increase the extent of data available for hazard mapping, e.g., floodplain, landslide and debris flow, fire hazard, hazardous or volatile material.
- Continue to develop and maintain a GIS inventory of hazard risks and vulnerable assets, to include all critical facilities, large employers, public assembly areas, lifelines, and mitigation successes. Reflect results in a continuously updated on-line Risk Assessment.

- Evaluate lifeline and evacuation routes to identify any necessary mitigation actions to ensure that they remain viable in any emergency situation requiring evacuation.
- Establish critical infrastructure protection plans.

Wildfire Mitigation Action Items

- Support existing cross training efforts that coordinate industry and fire district response to fires affecting the oil and gas fields.
- Continue to update the database of the location of industry assets for use by fire responders (industry or fire protection district personnel) in real time. Transfer data for use in Emergency Responders vehicles.
- Increase coordination among mitigation planning efforts and actions with the soon-to-be-developed County-wide Community Wildfire Protection Plan (CWPP). Coordinate future updates of the mitigation plan with the CWPP updates.
- Ensure that all areas of Garfield County are served by a fire protection district.

Flood Mitigation Action Items

- Emphasize critical public infrastructure and facilities located in special flood hazard areas for mitigation and preparedness measures.
- Identify floodway obstructions for all parts of Garfield County. Integrate with Pubworks (GIS software) to map obstructions and track progress toward reducing obstructions.
- Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.
- Continue to incorporate hazard mapping information into development review process to avoid or reduce risk of development in flood hazard areas.

Geologic Hazard Mitigation Action Items

- Review and evaluate development codes to incorporate soil type in addition to slope as a criterion for further environmental studies before permitting.
- Partner with Colorado Geological Survey to enhance mapping of Garfield County landslide, debris flow and soil instability risk areas, especially in areas of more recent residential development (Roaring Fork and Colorado River Valleys; Areas 1 - 3).
- Reduce impacts of landslides on existing developments by developing a tool kit for homeowners regarding resources that are available for risk reduction.

- Conduct engineering studies to identify feasible mitigation actions for high activity landslide or debris flow areas.

Actions to Enhance Response Capabilities

- Continue to implement the Infectious Disease Action Plan.
- Create in-house training for Department Heads and Steering Committee members.
- Develop an ESF-14 Communication Plan.
- Develop a debris management plan with a defined transition team.
- Develop a response and recovery plan specifically for hazardous material spills.
- Update the Airport Emergency Procedures Manual and create 72-hour Emergency Operations List.

In the more detailed description of each action item in Appendix A, the following information is provided:

- **Coordinating Organization:** The coordinating organization is the public agency with regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include city or town, County, or regional agencies that are capable of or responsible for implementing activities and programs.
- **Partner Organizations:** Partner organizations are agencies or public/ private sector organizations that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization. Partner organizations may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

  The partner organizations listed in the Garfield County NHMP are potential partners recommended by the project steering committee, but not necessarily contacted during the development of the NHMP. Partner organizations should be contacted by the coordinating organization during implementation to establish a commitment of time and or resources to action items.
- **Timeline:** Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. Short-term action items (ST) are activities which County agencies are capable of implementing with existing resources and authorities within one to two years. Long-term action items (LT) may require new or additional resources or authorities, and may take between two and five years to implement.

- **Ideas for Implementation:** Each action includes ideas for implementation and potential resources, which may include grant programs or human resources.
- **Plan Goals Addressed:** Actions were developed to achieve one or more of the NHMP goals. By calling out the connection between actions and goals directly, County staff can monitor and evaluate progress towards the goals.

Section 1: Introduction

Plan methodology

Mitigation plans are created through a process that brings together the best available data to solve the problem of risk reduction. During this process, the various hazards are inventoried, the risks from each are judged, the full range of possible loss prevention measures are reviewed, current mitigation measures are identified, and the most appropriate and affordable new ones are recommended for implementation. The following describes the development of the Garfield County NHMP.

Pre-plan development research and outreach

The County began the process of reviewing its emergency management structure in 2009. The review included a process that identified issues and vulnerabilities that needed to be addressed, via outreach to community-based non-profits, utilities, local community colleges, and others. In that process, County staff and community members identified and described previous hazard events, and described some of the losses that the County has incurred, or might incur in the future, as a result of those losses. This process, and the recommendations that flowed from it, are summarized in Appendix C.

The review identified several planning and organizational gaps, which the County began to systematically address in the following years. These included continuity of operations, recovery, and mitigation plans. As a starting place, the County developed a comprehensive, all-hazard risk assessment, which is summarized in Section 3 of this mitigation plan and is now part of a comprehensive suite of plans that the County maintains and updates as new data become available. The risk assessment is a GIS-based analysis that uses the best available land use, parcel, floodplain, and risk data available to quantify the amount of County property and population that is at risk from various hazards. The County's GIS staff maintains the data and is responsible for updating the risk assessment as new information becomes available. The risk assessment is the foundation for all of the emergency management-related plans that were subsequently developed, including this mitigation plan.

Mitigation Plan Steering Committee

In early 2011, the County created a steering committee to begin the process of developing a mitigation plan, building on the risk assessment described above.

The Steering Committee was composed of department heads and other key County staff. The committee met several times to facilitate the creation of this plan. During the course of this planning process, the Steering Committee met with representatives from FEMA, DEM and the Garfield County Board of County Commissioners to ensure the plan was on course and provide opportunity for public comment.

Steering Committee members were:

- Ed Green
- Dale Hancock

- Chuck Vale
- Deanna Butterbaugh
- Marilyn Gally
- Chris Bornholdt
- Lisa Dawson
- Fred Jarman
- Betsy Suerth
- Tamra Allen

Additionally, in the Spring of 2011, members of the steering committee held a kick-off workshop with interested multi-jurisdictional representatives to begin work on the multi-jurisdictional plan; eight additional jurisdictions joined the NHMP planning process.

Following the workshop, the County further developed its action items by:

- Working with the multi-jurisdictional partners to identify weakness in the action items
- Continued outreach through regional fire chiefs
- Continued to outreach and collect information from the separate Public Safety Council that has representation from area fire districts, police offices, industry, county departments, public health, CDOT, hospitals, mental health, CDEM, Colorado State Patrol, RFTA, CDOW, National Weather Service, communications center and all of the municipalities.
- Met with the Board of County Commissioners to discuss plan
- Met with County Manager to discuss implementation of the plan

Results of the multi-jurisdictional planning process (described in summary in the next section and in detail in each of the relevant addenda) were accounted for in a final steering committee meeting to review and finalize the full plan document. A work session to review the final plan will be held with the Board of County Commissioners, representatives form Multi-Jurisdictional partners and the interested public on March 13, 2012. Subsequently, a public meeting was held on [Date] to adopt the plan.

Multi-jurisdictional involvement

In April of 2011, the County organized an initial outreach meeting and invited all towns and cities, fire districts, school districts, and other overlapping districts, to discuss the possibility of creating a multi-jurisdictional mitigation plan. Colorado Division of Emergency Management and Federal Emergency Management Agency (FEMA) representatives were present, and described the mitigation planning process and plan requirements. As a result of that meeting, the following jurisdictions agreed to participate and develop addenda to the County NHMP:

Cities and Towns

- Glenwood Springs
- New Castle
- Rifle

- Silt

Fire Districts

- Burning Mountains Fire District
- Glenwood Springs Fire Protection District
- Grand Valley Fire Protection District
- Rifle Fire Protection District

The County then organized an intensive workshop for all jurisdictions developing addenda and invited a broad range of participation from City staff and community representatives in the towns and Fire Districts. The purpose of the workshop, which was held on June 27, 2011, was to identify areas in the jurisdictions where risk was greater than that identified in the County Risk Assessment, and to begin to develop action items.

The outcome of that workshop, and additional outreach and research conducted by the jurisdictions, is documented in the jurisdictional addenda in this Plan.

Public Outreach

The following plans, reports, and studies were reviewed in the development of this addendum:

- Garfield County Risk Assessment
- Census and other demographic and economic data
- Community Wildfire Protection Plans
- County Development Code
- Source Water Protection Plan
- Emergency Operations Plan
- Garfield County Comprehensive Plan 2000 and 2030

Citizens of Garfield County also contributed to the development of this plan. Information about outreach and hearings conducted by each participating jurisdiction is included within the corresponding addendum.

- During plan development:
  - The County developed an on-line survey, which was advertised on its website, and via email in multiple email distribution lists. In addition to community members, a specific audience targeted for this survey was individuals associated with some form of emergency management within the county (police chiefs, engineers, US fish and wildlife, USFS, Utilities, key business owners, hospitals, directors of

key community agencies, fire chiefs, etc.) and key community stakeholders.

- The survey was also distributed to representatives of each jurisdiction for distribution to their constituent groups. A summary of survey results, including geographic distribution of participants, is included in Appendix D.

- Garfield County posted a current topics / news story about the Risk Assessment on the County homepage. Visitors to the webpage were able to access a copy of the Risk Assessment and contact information for more information or with questions.
- Partners from Multi-jurisdication groups were asked to provide comments during all steps of the drafting process and were specifically convened in a work session format on June 28 and June 29, 2011 to provide comments on the draft County Risk Assessment and draft actions.
- Invitations to participate in the County process and to develop an addendum were sent to all special districts, agencies and jurisdictions within Garfield County. The County organized an initial outreach meeting, held in April of 2011, and invited all towns and cities, fire districts, school districts, and other overlapping districts. Colorado Division of Emergency Management and Federal Emergency Management Agency (FEMA) representatives described the mitigation planning process and plan requirements.
- The County then organized an intensive workshop for the jurisdictions developing addendums and invited a broad range of participation from the cities and towns. The purpose of the workshop, which was held on June 27, 2011, was to identify areas in the jurisdictions where risk was greater than that identified in the County Risk Assessment, and to begin to develop action items. As a result of this workshop, Glenwood Springs, Rife, Silt and New Castle decided to develop addendums to the County NHMP
- On October 4, 2011, representatives from the County NHMP Steering Committee held a workshop specifically for the fire protection districts. This meeting was attended by 6 representatives from the Fire Protection Districts, 1 representative from the County Sheriff's Office, and facilitated by a representative from the County NHMP Steering Committee and a representative from the Colorado Department of Emergency Management.

- During the development of the Risk Assessment and during development of the body of this NHMP, the Steering Committee made several presentations to the Board of County Commissioners about the status of the plan. These meeting were public and announcement of the NHMP agenda item was included along with the announcement of the public meeting.

- The public was also given an opportunity to comment on the draft Plan, as follows:
  - The final draft document was posted on the County's website, which clearly included a phone number and email address for those interested in providing comments. The County received X comments, which were reviewed and incorporated, as appropriate, into the final draft of the plan.
  - A work session was held with the Board of County Commissioners to review the draft and take public comment on March 13, 2012.
  - The public was provided an opportunity to comment when the plan was adopted via resolution, in a public meeting, on [DATE - TBD].

Mission

The mission of the Garfield County NHMP is to reduce risk to life and property from natural hazards.

Goals

The NHMP goals describe the overall direction that Garfield County agencies, organizations, and citizens can take to work toward mitigating risk from natural hazards. They were developed by the NHMP Steering Committee and are substantially similar to the goals included in the State of Colorado Natural Hazard Mitigation Plan. The Committee felt that this alignment with the State Plan would improve opportunities for collaboration during implementation.

Goal 1: Reduce the loss of life and personal injuries from natural hazard events.

- Strengthen early notification and warning systems.
- Strengthen communications systems
- Ensure people have safe places to remain and/or appropriate supplies during an event.
- Revise building codes, design standards, and land development regulations, if necessary.
- Develop projects with safety components aimed at preventing loss of life and injuries from hazards.

Goal 2: Reduce damage to county assets.

- Implement projects to protect critical assets in hazard risk areas.
- Implement projects to protect County-owned essential and necessary assets in natural hazard areas.
- Improve monitoring and decision-making tools.

Goal 3: Reduce County costs of disaster response and recovery.

- Support multi-hazard mitigation projects and initiatives to reduce costs for separate projects.

Goal 4: Minimize economic losses

- Reduce down time and losses to the County.
- Reduce revenue losses to the private-sector enterprises.
- Reduce losses to private nonprofit organizations.

Goal 5: Reduce damage to personal property

- Distribute information on and promote involvement in existing programs.
- Continue to partner with local governments on developing projects.
- Reduce losses to residences and businesses.

Section 2: Community Profile Summary

Garfield County developed this NHMP as part of a suite of emergency management plans, including a Continuity of Operations Plan (COOP) and a Local Recovery Plan. These plans all build from a common risk assessment and community profile. A summary is provided here while the full community profile can be found in the Garfield County Comprehensive Plan 2030.

This section provides a brief overview of the factors that make Garfield County unique, with a focus on the assets that the County would want to protect from the effects of natural disasters. They are described here in overview and the risk assessment provides details about how these assets overlap with geographic features within the County.

Exhibit 2.1. Area map, Garfield County, Colorado

Source: Encyclopedia Britannica, Accessed June 3, 2009 <http://student.britannica.com/comptons/art-59713/Colorado-counties>

Environment and geography

Garfield County is located in northwestern Colorado. Rio Blanco County borders Garfield County to the North. Routt and Eagle Counties form the eastern border. Pitkin and Mesa Counties lie to the south and the state of Utah (Grand and Uintah Counties) is the western boundary. The county seat and largest city is Glenwood Springs, Colorado, which is in the southeastern part of the County.

The County encompasses nearly 3,000 square miles, about 60% of which is federally owned. The County is very geographically diverse: mountains, plateaus/mesas, canyons, and the Colorado River are the main geographical features. Mining, timber harvesting and oil/gas extraction have somewhat altered the landscape of the County over time, as well as its vulnerability and risk to natural hazards.

Population

According to the US Census Bureau estimates, the population of Garfield County in 2010 was 56,389. Between 2000 and 2010, the population of Garfield County increased by 28.8%, close to

double the State growth rate of 16.9%. In 2006, the Colorado State Demography Office projected that Garfield County's population would reach 146,271 by the year 2035, with rapid average annual percentage change compared to most other counties in the State. Approximately 48.4% of the population is female and over one third of the County's residents are either under that age of 18 or over 70 (29.4% and 5.5% respectively). The median age in the County is 34.5, making it a relatively young population.

While natural hazards do not discriminate, the impacts -- in terms of loss and the ability to recover -- vary greatly, depending on demographic characteristics. According to Peggy Stahl of FEMA's Preparedness, Training and Exercise Directorate, 80% of the disaster burden falls on the public and women, children, minorities and the poor bear a disproportionate amount of this burden. The 2010 Census estimate noted that 10.2% of the County's residents were living below the poverty line.

Land use and development

One unique characteristic of Garfield County is its urban/rural divide: the western area of the county is sparsely populated while the major population and economic activity centers are in the central section along the Colorado River / I-70 corridor. This development pattern results in an overall low density in the County, 15.1 people per square mile.

The Census Bureau estimates that the County has about 23,309 housing units with a 12.6% vacancy rate and 57.5% owner occupancy rate, putting Garfield County on par with Colorado rates (12.8% and 69.5.%, respectively). The 2006 Land Values Study documented the impact of the 1990's residential development boom in Garfield County - construction became a leading employment sector. The availability and affordability of housing spurred development and attracted residents from nearby Counties (Eagle, Pitkin).

Economy

The top industries in Garfield County are energy development, tourism, ranching, and farming. These economic characteristics of the County demonstrate the County's dependence on the land and natural resources.

The top employment sectors in the County in 2010 were educational service and health care and social services (16.4%), construction (19.3%), retail trade (14.7%) and accommodation and arts, entertainment, recreation, accommodation and food (11.6%).

In 2007, the socio-economic assessment conducted for the County by BBC Research & Consulting noted that steady unemployment between 1997 and 2005, even accounting for workforce growth, reflected a strong local economy. The Land Values Study (2006) by the same firm also identified three economic regions of the County roughly approximated as the eastern half (rural, sparsely populated, mostly public lands), the eastern /midsection of the County (I-70 Corridor through five municipalities supporting the majority of county residents and their needs) and the southeastern corner (geographically and, therefore, economically aligned with the resort and recreation service sector of the region that is anchored by Aspen and Pitkin County.

Impacts of a disaster event should also be considered in terms of their effect on individual income. Median household income in the County in 2010 was $68,300. Garfield County's 2007

median household income was higher than that of the State ($54,046) and national statistics ($50,046).

Mean travel time to work in 2000 was slightly more than 30 minutes, suggesting that many residents travel to other communities for work, or live far from employment centers. The County's road system is critical to its economy.

Infrastructure and critical facilities

Critical facilities and infrastructure are vital to the continued delivery of key governmental and private services as well as recovery efforts. The loss of these services significantly impacts the public's ability to recover from a disaster event. These critical facilities include, but are not limited to:

- 911 call centers
- Emergency operations centers
- Police and fire stations
- Public works facilities and utilities
- Hospitals
- Bridges and roads
- Shelters

Facilities that may cause secondary impacts if damaged, contaminated, or destroyed, such as hazardous material storage sites, are also considered critical facilities. The main critical facilities and infrastructure in Garfield County are summarized below.

I-70 runs through the southern part of the County, creating a population and economic corridor and providing a direct route to Denver (about 3 hours from Glenwood Springs). State Highway 139 runs north/south through the County's western section and State Highway 13 divides the County vertically. State Highway 82 runs from Glenwood springs through Carbondale and the southeastern corner of the County, connecting to Pitkin County and Aspen.

One concern with other, smaller, county roads is that Garfield County does not have set standards for construction practices including protocol for dealing with impacts from erosion, runoff, rutting, debris, and mudslides or other potentially hazardous activity.

Garfield County is a corridor of commerce in western Colorado and hazardous materials are commonly transported through the County by truck and rail transport. Hazardous material travels along Highways 139, 13, and Interstate 70. Additionally, the Union Pacific Railroad operates rail lines along the Colorado River through the County.

Cultural and historic assets

The historic Hotel Colorado has been operating in Glenwood Springs since 1893. The hotel earned the nickname of “the little White House of the West” after extended visits by Presidents Theodore Roosevelt and William Howard Taft. According to legend, the teddy bear was invented during President Roosevelt’s 1905 visit when hotel maids pieced together a stuffed bear for the President after an unsuccessful day of hunting. The Hotel Colorado was listed in the National Register of Historic Places in 1977 in recognition of its colorful past and architectural significance. In April 2007, the National Trust’s Historic Hotels of America added the Hotel Colorado to its list.

Yampah Hot Springs vapor caves are underground steam baths found along the Colorado River. The springs were used by the Ute Indians for rejuvenation and healing properties. Today, the hot springs and mineral caves are prime tourism attractions. Local hotel resorts and spas use the hot springs as a main attractor for visitors.

Sunlight ski area encompasses a summit on Compass Mountain in the White River National Forest. The resort area features 67 trails covering over 470 acres as well as on of the steeper ski runs in the state.

Section 3: Risk Summary

Garfield County developed this NHMP as part of an Integrated Emergency Management and Continuity Framework. In 2010, the County developed a comprehensive risk assessment evaluating hazards, vulnerabilities and developing a method for understanding relative risk. That Risk Assessment provides a foundation for each of the emergency management plans.[2] A summary is provided here while the full risk assessment can be found on the County website. One of the County's action items for mitigation is to migrate the risk assessment to an interactive on-line tool in the future.

Overview

Risk assessments provide information about the geographic areas where the hazards may occur, the value of existing land and property in those areas, and an analysis of the potential risk to life, property, and the environment that may result from natural hazard events. This section identifies and profiles the location, extent, previous occurrences, and future probability of natural hazards that can impact Garfield County, as highlighted in Exhibit 3.1 below.

Methods and Process

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Exhibit 3.1: Risk Assessment summary

Source: USGS - University of Oregon Community Service Center, 2006

The first phase, hazard identification, involves the identification of the geographic extent of a hazard, its intensity, and its probability of occurrence. This level of assessment typically involves producing a map. The outputs from this phase can also be used for land use planning, urban growth management, and regulation; public awareness; and defining areas for further study.

[2] Additional information about the Garfield County Integrated Emergency Management & Continuity Framework is provided in the Overview document that accompanies this NHMP.

In the summer of 2009, Garfield County contracted with ECONorthwest to begin the process of developing this Risk Assessment. The first step of hazard identification was accomplished in a two-day workshop with County department representative.

In workshop discussions, ECO gathered information about the hazards that impact the County, and the vulnerable infrastructure and populations that are likely to be impacted by hazard events. Based on the results of the workshop, the hazards most likely to affect the County are: Fire, Flood (especially flash flood), Hazardous materials spills, and Landslide / rock fall.

Other hazards, which have lower frequency or lower severity, but still might affect the County, include: Snow storms / severe weather, Infectious disease (including agricultural and livestock outbreaks) / pandemic, Terrorism / eco-terrorism / school safety and security, and Airport safety and security. Of these, County staff and the mitigation steering committee identified only snow storms / severe weather as warranting any specific action items in this Plan at this time, though they will be re-evaluated in each update cycle and new hazards may be added to this Plan.

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying changes to building codes or development regulations, identifying properties or structures appropriate for acquisition or relocation, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.

This vulnerability assessment was conducted in the summer of 2009 using a survey form completed during the aforementioned workshop. Participants were given worksheets organized by potentially vulnerable systems (e.g.: population, economy, land use and development, infrastructure and critical facilities, etc) that asked specific questions about how that system might be impacted by natural hazards. An example of the worksheet is Figure 3.2 below.

Exhibit 3.2: Issue Identification Worksheet, Infrastructure & Critical Facilities

Infrastructure & Critical Facilities			
Instructions: Identify specific response and recovery issues your community could face in the event of a disaster in the left hand column below. For each issue, use the columns on the right hand side to check the potential period of time each issue could affect the community. Check all that apply.			
Issues	Community Impacts Felt (Check all that Apply)		
Framing Questions: • What infrastructure and critical facilities are impacted? • What critical facilities will be operational post-disaster? • Will critical facilities be accessible post-disaster? Will certain access roads and bridges be damaged? Will there be significant debris on access roads and bridges? • What critical facilities and infrastructure need to be operational first?	0- 72 hours - Response	72 hours – 1 month – Response/Recovery	1 month – or-going – Recovery

The third phase, risk analysis, involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment, and (2) the likelihood or probability of the harm occurring. An example of a product that can assist communities in completing the risk analysis phase is HAZUS, a risk assessment software

program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard- related damage before, or after a disaster occurs.

In the fall of 2009, Garfield County Emergency Management and ECONorthwest again conducted a survey of department representatives. This time, participants completed a Risk Assessment Matrix like the one pictured below in Exhibit 3.3. The Risk Assessment Matrix asked questions about the relative impact on community systems of various hazards. The result of the compiled responses was a relative ranking of hazards by their severity of impact on the County, its residents, and the economic and physical resilience of the community systems.

In one final step of analysis, ECONorthwest cross-referenced the percent of County characteristics and assets that are at risk from hazards with the relative importance to the County of those characteristics and assets. It should be noted here that the ranking and ordering of hazards and community assets is primarily a qualitative exercise in comparing relative risk of particular places or assets to natural hazards. No direct accounting was made for dollar values of capital investments, revenue or tax generation, replacement costs, or intangible value of County characteristics. As Garfield County moves forward to building a more resilient community, this Risk Assessment will provide a base of knowledge about what areas of the community face higher risk, and from what kinds of threats. The Multihazard Mitigation Council has determined that every $1 spent on mitigation saves $4 in recovery and rebuilding costs[3] For the purposes of taking action to mitigation impact from hazards, this risk assessment will help to prioritize those areas that need immediate attention.

Exhibit 3.3: Risk Assessment Matrix

Probability – likelihood disruptive hazard will occur: 1= none/doubtful, 2= possible, 3= probable, 4= inevitable
Human Impact – deaths, injuries, serious illnesses, or work absences: 1= none, 2= low, 3= moderate, 4= high
Resources Impact –property, facilities, infrastructure, environment: 1 = undamaged, 2 = minor damage, 3 = moderate damage, 4 = extensive damage
County Impact – Damage to operations /or reputation: 1= none/ minor, 2= limited, 3= moderate, 4= extensive
Impact Severity = Average of Human Impact + Facilities Impact + County Impact
Relative Risk – Probability x Impact Severity: 1 = lowest 16 = highest risk

0

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Hazards/Threats	Probability	HUMAN IMPACT: Injuries/Illnesses/Death	HUMAN IMPACT: Work absences	RESOURCES IMPACT: Property/Facilities	RESOURCES IMPACT: Infrastructure/Utilities	RESOURCES IMPACT: Environment	RESOURCES IMPACT: Livability	RESOURCES IMPACT: Economy	RESOURCES IMPACT: Reputation	Impact Severity	Relative Risk
Natural										4 High	16 High
Earthquake										0	0
Tsunami	na	na	na	na	na	na	na	na	na	na	na
Landslide, mudslide, subsidence										0	0
Flood, flash flood, tidal surge										0	0
Fire – forest, wild, urban, urban interface										0	0
Snow, ice										0	0

[3] Multihazard Mitigation Council, 2005 and 2009

History of hazard events

The information that follows is excerpted from the State of Colorado Natural Hazard Mitigation Plan, but was amended with local knowledge of hazard risk.

Flood: Nearly thirty flood events have occurred between 1993 and 2011, resulting in over $1.6 million dollars in damage. The County's high-risk flood drainages are in many areas along the Colorado River and include a number of tributaries to the Colorado, such as Elk, Canyon, Rifle and Beaver Creeks, among others. The Roaring Fork River is listed as a high risk to Glenwood Springs along Highway 82 from the southeast to the point where it joins the Colorado River. Flash flooding occurs in many places within the County, for example, Rifle Creek flooded Rifle several times during the past century including in 1992 during the spring runoff season when a stationary thunderstorm caused flash flooding that destroyed three residences and damaged several more. As a result, a greenbelt was developed in the floodplain. As a result of flash flooding, debris flows are major concern in Garfield County.

Rifle, Silt, unincorporated Garfield County, Carbondale, Glenwood Springs, New Castle and Parachute participate in the National Flood Insurance Program. There are six Class I and seven Class II dams that may significantly impact the County.

Wildland/Grassland Fire: Colorado State Forest Service reports in 1990 there were 103 subdivisions, totaling 7,091 acres, in the interface. Wildfire danger has intensified in recent years as more people move into the urban/wildland interface. Fifteen wildland fires occured between 1998 and 2003 and caused over $6 million dollars in damages. Wildfires in 2002 consumed over 26,000 acres in Garfield County. The county participates in the Emergency Fire Fund.

The most impactful fires have occurred within the last 20 years:

- 1994 South Canyon Fire, also known as the Storm King Fire resulted in 14 deaths and burned over 2,115 acres.
- 2002 Coal Seam Fire burned 12, 209 acres, destroyed 99 structures and 14 outbuildings and caused $6.4 million in insured losses. The fire impacts resulted in $446,199 in funding for post fire mitigation (NRCS Emergency Watershed Protection).
- 2007 New Castle Fire burned 1,420 acres and incuced $89,281 in post fire mitigation (NRCS Emergency Watershed Protection).[4]

Both the Glenwood Springs Fire Protection District and Burning Mountains Fire Protection District have a Community Wildfire Protection Plan and a county-wide plan is being developed with anticipated completion in Spring 2012. The vulnerable areas within the county are included in the county-wide CWPP.

Landslide: Historically, Douglas Pass-Baxter Pass landslide and debris flow areas is one of the most active landslide areas of Colorado. During some years landslides are so active that the entire terrain can change within the period of a year and highways have been closed for months at a time, including the Interstate 70 through Glenwood Canyon. Affected facilities include Hwy

[4] State of Colorado Natural Hazards Mitigation Plan, January 3, 2011 (http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595686517)

139, a Garfield County road and numerous energy related pipe lines. Landslides are a constant risk in Glenwood Springs as the central business district and several residential districts are built on a debris fan. In 1986, the County declared a financial disaster due to damage caused by landslides. Landslides are often a result of wildfire events.

Earthquake: In 1982, 19 small earthquakes were recorded in the Carbondale area. In August 2001, a 4.0 earthquake was recorded 5 miles northwest of Glenwood Springs. And an additional notable earthquake was of 3.8 magnitude and was felt near New Castle and Silt in February 2006.

Exhibit 3.4: Presidentially Declared Disasters Including Garfield County

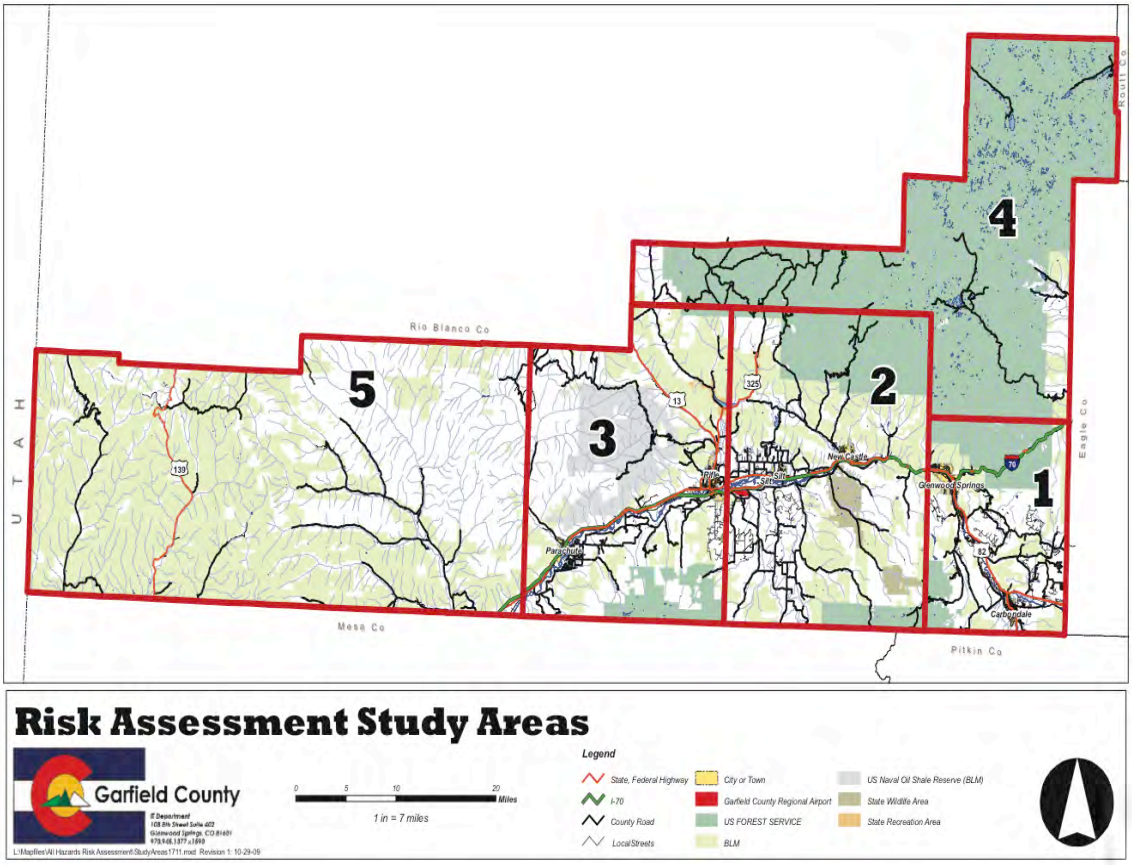
FEMA ID	Incident Name	Period	Individual Assistance	Public Assistance	HMGP
2698	Newcastle Fire	6/19/07 – 6/23/07	None	Category B	None
2672	Red Apple Fire	8/31/06 – 9/3/06	None	Category B	None
3224	Hurricane Katrina Evacuation	8/29/05 – 10/1/05	None	Category B	None
2457	Panorama Fire	7/31/02 – 8/4/02	None	Category B	None
2419	Coal Seam Fire	6/8/02 – 6/29/02	None	Category B:	None
1421	Colorado Wildfires	4/23/2002 – 8/6/02	Yes	None	Yes
719	Severe storms, mudslides, landslides, flooding	7/27/84 – 7/27/84	None	Category A, B, C, D, E, F, G	None

Source: Federal Emergency Management Agency, Disaster Search. (http://www.fema.gov/news/disasters.fema)
Notes: **Individual Assistance** is money or direct assistance to individuals, families and businesses in an area whose property has been damaged or destroyed and whose losses are not covered by insurance. **Public Assistance** is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. Public Assistance Categories: Category A: Debris Removal; Category B: Emergency Protective Work; Category C: Roads and bridges; Category D: Water Control Facilities; Category E: Buildings and Equipment; Category F: Utilities; Category G: Parks, Recreational Facilities, and Other Facilities. Individual Assistance

Areas at risk by hazard

Exhibit 3.5 displays the Study Areas used for the Risk Assessment analysis. Exhibit 3.6 highlights the risk experienced by each Area within each hazard type. The Area that has highest risk of a particular hazard is marked with red and the next highest risk is marked in bold black. Average overall risk for an Area is listed at the bottom of the table. This table illustrates that, overall, Area 1 has the highest hazard risk both in terms of the percent of assets at risk (38%) and in terms of the value – community value – of those assets as noted in the hazard index number (1.4).

Exhibit 3.5: Risk Assessment Study Areas



The risk summary included here discusses the hazards that are quantifiable by the GIS data available to Garfield County. The comprehensive Risk Assessment also addresses earthquakes and severe weather.[5]

Exhibit 3.6: Study Area Risk

	Area 1		Area 2		Area 3		Area 4		Area 5		
	% of asset at risk	Index	% of asset at risk	Index	% of asset at risk	Index	% of asset at risk	Index	% of asset at risk	Index	
Wildfire	24%	0.86	9%	0.34	13%	0.43	40%	1.42	40%	1.29	
Flood	19%	0.81	16%	0.74	8%	0.35	16%	0.79	23%	1.09	
Slope	46%	1.63	24%	0.83	7%	0.21	5%	0.15	31%	1.17	
Soil	48%	1.71	65%	2.36	58%	2.08	.	.	5%	0.18	KEY:
Land-slide	11%	0.37	9%	0.22	2%	0.06	.	.	10%	0.33	Primary
Debris-flow	27%	1.05	6%	0.27	.	.	.	.	1%	0.05	Secondary
Av.	29%	1.07	21%	0.79	18%	0.63	20%	0.79	18%	0.69	

[5] The complete Risk Assessment is available from the Garfield County Manager's office.

The following is a summary description of the highest risk Areas by hazard type. The detailed tables and discussion that accompany each hazard section in the body of this document provide additional information.

Wildfire

- Area 4 and 5 experience the greatest risk of wildfire. In those Areas, the infrastructure most at risk are gas wells, pipelines, and roads.
- Secondarily, it is the economic components of Area 1 (tourist sites, tram), oil and gas infrastructure, water infrastructure, and the highways are most vulnerable to wildfire.

Flood

- Roads (both high traffic asphalt and low traffic gravel) in Area 5 are at a high risk of damage from flood.
- A flood in Area 1 would impact road and rail infrastructure most significantly as well as carry more direct impact for County residents.

The National Flood Insurance Program (NFIP)

The Flood Insurance and Mitigation Administration, a component of the Federal Emergency Management Agency (FEMA), manages the National Flood Insurance Program (NFIP). The three components of the NFIP are: Flood Insurance; Floodplain Management; Flood Hazard Mapping.

Garfield County participates in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. Preliminary Flood Insurance Study (FIS) Flood Insurance and Rate Maps (FIRM) are current and effective as of 08/02/06. There are no repetitive flood loss properties in Garfield County.

Exhibit 3.6: Garfield County NFIP Information

Category	Data		Category	Data
Date joined NFIP	12/15/1977		Policies in Force	126
CRS Class/Discount	NA		Insurance in Force	$35,103,200
Date of current FIRM	08/02/2006		Paid losses	4
			Total Losses Paid	$5,728.46
	Substantial damage claims since 1978			0

Flood Insurance Rate Map (FIRM)

A Flood Insurance Rate Map (FIRM) is the official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community.

- Private citizens and insurance and brokers use the FIRM to locate properties and buildings to determine the amount of flood risk and whether flood insurance is required.

- Community officials use the FIRM to administer floodplain management regulations and to mitigate flood damage.
- Lending institutions and federal agencies use the FIRM to locate properties and buildings in relation to mapped flood hazards, and to determine whether flood insurance is required when making loans or providing grants following a disaster for the purchase or construction of a building.
- Digital Flood Insurance Rate Map (DFIRM): Beginning October 1, 2009, FEMA will provide a single paper flood map and Flood Insurance Study (FIS) to each mapped community. FEMA will convert all other distribution of maps and FIS reports for digital delivery.
  - Garfield County DFIRM Status: Preliminary / In Progress, 10/26/11
  - Garfield County LIDAR Status: No current plans

Geologic

Overall, Area 1 has the greatest quantity and types of assets at risk while at the same time those assets are located on hazardously sloped terrain or have soil types that could amplify hazards.

- **Slope**: A significant number of assets in Area 1 are located in slope hazard zones. This high risk is felt across all community systems: infrastructure (e.g., communication/information sites, federal/municipal buildings, water infrastructure, and highways), population sites (e.g., schools and churches), economic assets (e.g., shopping mall and tourism), and development (residential). Primarily, risk in Area 5 is to the federal FAA facility and the road network (both high traffic and low traffic).
- **Soil**: In Area 1, the soil type may amplify various hazards and put municipal buildings, water infrastructure, roads and information/communication facilities, residential development, some industrial and commercial zones at risk of damage and disruption of service. The airport in Area 2 as well as the road network are at risk of soil-aggravated hazards. Additionally, the landfill is at risk. Residential developments including single family, multi family, and a nursing home, have potentially unstable soil.
- **Landslide**: Communication facilities and the road network in Area 1 incur specific risk from landslides. In Area 5, it is structures (homes, storage facilities, ,man-camps) as well as the road network that is essential to access those structures that is at risk of damage from landslides.
- **Debris Flow**: In Area 1, infrastructure such as the federal and municipal buildings, fire stations and information sites experience greatest risk of debris flows. Additionally, population centers such as churches and schools also experience greater than average risk.

Highest risk areas above a threshold hazard index of 1.00

As a final method to analyze Garfield County risk, Exhibit 3.6 highlights when the risk index is greater than 1. This emphasizes the greatest risk as it exists anywhere across the County, regardless of the hazard or Study Area.

Exhibit 3.7: Relative Ranking of Risk: Hazard Index +1

	Area 1		Area 2		Area 3		Area 4		Area 5	
	% of asset at risk	Index	% of asset at risk	Index	% of asset at risk	Index	% of asset at risk	Index	% of asset at risk	Index
Wildfire	24%	0.86	9%	0.34	13%	0.43	**40%**	**1.42**	**40%**	**1.29**
Flood	19%	0.81	16%	0.74	8%	0.35	16%	0.79	**23%**	**1.09**
Slope	**46%**	**1.63**	24%	0.83	7%	0.21	5%	0.15	**31%**	**1.17**
Soil	**48%**	**1.71**	**65%**	**2.36**	**58%**	**2.08**	.	.	5%	0.18
Land-slide	11%	0.37	9%	0.22	2%	0.06	.	.	10%	0.33
Debris-flow	**27%**	**1.05**	6%	0.27	.	.	.	.	1%	0.05

Above a hazard index of 1

With this method of data analysis, Areas 1 and 5 are found to be at high risk of multiple hazards.

Area 1 experiences the highest risk from geologic hazards – soil, slope, and debris flow. As discussed above, the risk is spread across all community systems including infrastructure, population assets, economic drivers, and development potential.

Geologic hazards can be triggered in various ways, which can complicate mitigation. There may however, be some overlap in terms of the physical assets at risk in Area 1. Mitigation actions can focus on those specific assets, their location and environment. For example, the steeply sloped slope hills around Glenwood Springs are susceptible to landslides at any time during the year. Also, the same hazard zone may be at risk of debris flows after heavy rains.

The assets in Area 5 are threatened by several different hazards – wildfire, flood, and sloped landscapes that can become unstable for any number of reasons. Even though there is very little population in Area 5, it holds the majority of the oil and gas infrastructure. As a central component to the economy of Garfield County, this infrastructure is extremely valuable and mitigation against the impact of a natural hazard can build on the partnerships that already exist between the County and the industries that rely on the resources in Area 5.

Wildfire in Area 5 has the potential to affect the entire county. Air quality is not only important to the health of County residents, but also to the tourism industry. In 2005, tourism and regional services accounted for approximately one half of the Garfield County economic base. The largest sectors of tourism-related employment included jobs in eating and drinking establishments, and largely the amusement and recreation and hotels and lodging.[6] Oil and gas infrastructure may

[6] Garfield County Socio-Economic Impact Study, January 17, 2007. Prepared for Garfield County by BBC Research & Consulting.

also be directly threatened by wildfires. Wells and pipelines are at a serious risk and any interaction of oil and fire would be a deadly mix.

Step ravines and narrow valleys characterize Area 5. In and among that landscape are the wells and pipelines that are the underpinning of the County economy. These assets are at risk of landslide, debris flow, rock falls, and general soil instability due to the steep slopes into which the truck roads and well platforms have been carved. Additionally, because the roads are so delicately woven along the walls of the canyons and ravines, one incident of a road washed out or a slide can cut off entire sections of the Area from road access. Flood in Area 5 would primarily induce landslides and damage the road network, cutting of access to oil and gas sites.

Highway and railroad in the floodplain

Access road carved into a hillside

Landslides and rockfall below an access road

Section 4: Actions and Implementation

The NHMP provides a set of actions that aim to reduce the risks posed by natural hazards. The actions also identify strategies for implementation including education and outreach programs, the development of partnerships, and preventative activities The actions described in the NHMP can be accomplished through existing plans and programs within the County such as the County development code, County's 5-year plan, source water protection plan, community wildfire protection plan, emergency operations plan.

The NHMP actions are summarized here and described in detail in Appendix A: Detailed County Action Item Forms. Data collection and research, together with a public participation process resulted in the development of a comprehensive range of action items. Actions items developed by each jurisdiction are included within that jurisdiction's addendum.

Organization of Actions

Data collection and research, together with a public participation process resulted in the development of a comprehensive range of action items. The following information is provided to support each action item:

- **Coordinating Organization**: The coordinating organization is the public agency with regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.
- **Partner Organizations**: Partner organizations are agencies or public/ private sector organizations that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization. Partner organizations may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.
- The partner organizations listed in the Garfield County NHMP are potential partners recommended by the project steering committee, but not necessarily contacted during the development of the NHMP. Partner organizations should be contacted by the coordinating organization to establish commitment of time and or resources to action items.
- **Timeline**: Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. Short-term action items (ST) are activities which county agencies either deem a high priority for implementation or as achievable with existing resources and authorities within one to two years. Long-term action items (LT) may require new or additional resources or authorities, and may take between one and five years to implement, and are therefore currently a lower priority for implementation. In future plan updates, the County and its partners are likely to increase the priority and timeline for implementation for some long-term action items.

- **Ideas for Implementation**: Each action includes ideas for implementation and potential resources, which may include grant programs or human resources.
- **Plan Goals Addressed**: Actions were developed to achieve one or more of the NHMP goals. By calling out the connection between actions and goals directly, County staff can monitor and evaluate progress towards the goals.

Summary of Actions

Multi-Hazard Mitigation Action Items

- Develop maintenance and update processes, in coordination with the other emergency management related plans, and with multi-jurisdictional partners.
- Conduct ongoing public outreach activities during mitigation plan implementation, and in conjunction with the update and maintenance of other emergency management plans.
- Collaborate with neighboring counties and cities with established GIS services to develop Memoranda of Understanding or Service Agreements for the provision of GIS services in the event of staffing issues.
- Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens and private property owners, owners associations, public agencies, businesses, and schools. Coordinate with participating towns, cities, and fire districts on outreach inside of their jurisdictions. Coordinate implementation efforts with the update of recovery and other emergency management plans, as appropriate.
- Collaborate with regional, state, and federal agencies, and private industry to increase the extent of data available for hazard mapping, e.g., floodplain, landslide and debris flow, fire hazard, hazardous or volatile material.
- Continue to develop and maintain a GIS inventory of hazard risks and vulnerable assets, to include all critical facilities, large employers, public assembly areas, lifelines, and mitigation successes. Reflect results in a continuously updated on-line Risk Assessment.
- Evaluate lifeline and evacuation routes to identify any necessary mitigation actions to ensure that they remain viable in any emergency situation requiring evacuation.
- Establish critical infrastructure protection plans.

Wildfire Mitigation Action Items

- Support existing cross training efforts that coordinate industry and fire district response to fires affecting the oil and gas fields.
- Continue to update the database of the location of industry assets for use by fire responders (industry or fire protection district personnel) in real time. Transfer data for use in Emergency Responders vehicles.

- Increase coordination among mitigation planning efforts and actions with the soon-to-be-developed County-wide Community Wildfire Protection Plan (CWPP). Coordinate future updates of the mitigation plan with the CWPP updates.
- Ensure that all areas of Garfield County are served by a fire protection district.

Flood Mitigation Action Items

- Emphasize critical public infrastructure and facilities located in special flood hazard areas for mitigation and preparedness measures.
- Identify floodway obstructions for all parts of Garfield County. Integrate with Pubworks (GIS software) to map obstructions and track progress toward reducing obstructions.
- Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.
- Continue to incorporate hazard mapping information into development review process to avoid or reduce risk of development in flood hazard areas.

Geologic Hazard Mitigation Action Items

- Review and evaluate development codes to incorporate soil type in addition to slope as a criterion for further environmental studies before permitting.
- Partner with Colorado Geological Survey to enhance mapping of Garfield County landslide, debris flow and soil instability risk areas, especially in areas of more recent residential development (Roaring Fork and Colorado River Valleys; Areas 1 - 3).
- Reduce impacts of landslides on existing developments by developing a tool kit for homeowners regarding resources that are available for risk reduction.
- Conduct engineering studies to identify feasible mitigation actions for high activity landslide or debris flow areas.

Actions to Enhance Response Capabilities

- Continue to implement the Infectious Disease Action Plan.
- Create in-house training for Department Heads and Steering Committee members.
- Develop an ESF-14 Communication Plan.
- Develop a debris management plan with a defined transition team.
- Develop a response and recovery plan specifically for hazardous material spills.
- Update the Airport Emergency Procedures Manual and create 72-hour Emergency Operations List.

Section 5: Plan Maintenance and Update

Plan maintenance is a critical component of the Garfield County Natural Hazards Mitigation Plan. Proper maintenance of the Plan ensures that this Plan will maximize the County's efforts to reduce the risks posed by natural hazards, and that the County's efforts are coordinated with the efforts of participating jurisdictions and other partners. This section describes a process to ensure that a regular review and update of the Plan occurs.

Coordination with other plans and processes

The NHMP includes a range of actions that, when implemented, will reduce loss from hazard events in the County. Within the plan, FEMA requires the identification of existing programs that might be used to implement these actions and, where applicable, the updated actions call out potential connections to existing plans.

Where possible, the County should implement the recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Existing plans that can incorporate mitigation actions include:

- 5-Year Plan
- Comprehensive Plan 2030
- Building permit review
- County Development Code regulations (ULUR)
- Emergency Operations Plan

The State of Colorado and others are important planning partners that can contribute to mitigation planning efforts; their roles are called out in more detail below.

The State of Colorado as a partner

All mitigation is local, and the primary responsibility for development and implementation of risk reduction strategies and policies lies with local jurisdictions. Local jurisdictions, however, are not alone. Partners and resources exist at the state and federal levels. Numerous Colorado state agencies have a role in natural hazards and natural hazard mitigation. Some of the key agencies include:

- Division of Emergency Management (DEM) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration;
- Colorado State Forest Service (CSFS) is responsible for all aspects of wildland fire protection on federal lands.

- Colorado Geologic Survey(CGS) provides information and new knowledge about geologic hazards, mineral and energy resources, water resources, and more to contribute to economic growth and improve the quality of life.
- Colorado Department of Local Affairs (DOLA) provides financial and technical assistance, emergency management services, property tax administration and programs addressing affordable housing and homelessness to local communities
- Colorado Department of Transportation (CDOT) is responsible ofr highways and bridges throughout the state and in Garfield County. CDOT also provides support to local airports.
- The Colorado Water Conservation Board (CWCB) provides policy direction and information resources on water issues. The CWCB's responsibilities range from protecting Colorado's streams and lakes to water conservation, flood mitigation, watershed protection, stream restoration, drought planning, water supply planning and water project financing.
- The Colorado Division of Water Resources (DWR), also known as the Office of the State Engineer, administers water rights, issues water well permits, represents Colorado in interstate water compact proceedings, monitors streamflow and water use, approves construction and repair of dams and performs dam safety inspections, issues licenses for well drillers and assures the safe and proper construction of water wells, and maintains numerous databases of Colorado water information.
- Colorado Division of Housing, Housing Technology and Standards (HTS) Section can provide technical assistance related to manufactured housing to ensure that currently adopted building codes are enforced.

Federal Partners

- National Weather Service provides weather, hydrologic, and climate forecasts and warnings.
- Federal Emergency Management Association (FEMA) supports citizens and first responders to build, sustain, and improve our capabilities to prepare for, protect against, respond to, recover from, and mitigate all hazards.

Other partners

Mitigation actions can be implemented through the ongoing efforts of County partners, many of whom were involved in the process of developing this Plan. The County will actively seek out opportunities to further develop such partnerships, in the furtherance of NHMP objectives.

- County Steering Committee: 5-year plan and other strategic planning that occurs in the future will also contribute to the goals in the NHMP. The County departments develop plans and review them on an annual basis. At the time of annual review, the Hazard Mitigation Steering Committee will work with the departments to integrate the Garfield County NHMP actions into appropriate sections of the 5-year plan.

- Multi-jurisdictional Partners: The NHMP partners will continue to be critical partners for identifying vulnerabilities, identifying risks, and implementing mitigation. Coordination and collaboration of mitigation plans between cities, fire districts and the County will ensure these levels of government achieve their mitigation goals. A process for involving the jurisdictions covered under this Plan is described later in this section, but the County will continue outreach to all jurisdictions throughout the planning process.
- Public Health and Social Service Providers: As organizations that interface with the public on a daily basis, public health and social service providers can be a conduit for direct public information dissemination. They can also provide County Emergency Mangers with critical information about vulnerabilities that exist in the population. These organizations are natural partners in hazard mitigation.
- Utilities and Other Special Districts: essential to contribute identifying vulnerability, identifying risks and helping implementation mitigation measures, when and where appropriate.
- Citizens: There are numerous ways in which citizens and residents of Garfield County are already involved in mitigation actions. For example, including groups such as Community Emergency Response Teams (CERTs), Neighborhood Watch groups, and the Medical Reserve Corps in mitigation activities will not only facilitate implementation but also increase public awareness.

Connections with the activities of other partners are part of the County's strategy for ongoing public involvement. It allows the County to present mitigation actions and ideas more holistically, within the context of existing groups.

Convener

Garfield County Manager's Office will be the convener for the ongoing plan maintenance process including adoption of the plan; ongoing monitoring of plan implementation; yearly steering committee meeting agenda development and facilitation; and prioritizing action items for implementation. Agency will also be responsible for the 2017 formal update of this Plan and continued public involvement. The rest of this section describes these responsibilities in more detail.

Plan adoption

The Garfield County Board of Commissioners will be responsible for adopting the updated Garfield County Natural Hazards Mitigation Plan and providing the support necessary to ensure plan implementation. Once the plan has been adopted, the County Emergency Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Colorado Division of Emergency Management. Colorado Division of Emergency Management will submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA's Flood Mitigation Assistance program and in the October 1, 2002 Mitigation Planning Final Interim Rule amending 44 CFR Part 201.6. Upon acceptance of the plan by FEMA, Garfield County will maintain eligibility for Flood Mitigation Assistance, Hazard Mitigation Grant Program, and Pre-Disaster Mitigation funds.

Ongoing monitoring

As part of the monitoring and maintenance program for the Integrated Emergency Management and Continuity Framework, an Emergency Management Advisory Committee is recommended to meet annually to review all Plans and identify opportunities for collaboration and integration. that meeting, Committee members should be prepared to discuss any expected updates or changes to the plans for which they are responsible and look for opportunities to share funding and other resources to achieve shared outcomes. This agenda encompasses the NHMP. The Emergency Management Advisory Committee would serve as the NHMP Steering Committee.

County Manager will ensure that the Emergency Management Advisory Committee discusses the NHMP on an annual basis and prior to the annual kick-off of the 5-year plan update process. The Committee will be charged with addressing the implementation of County-wide mitigation actions and periodic review of this Plan. The purpose of the annual review meeting will be to determine the effectiveness of programs and to reflect changes in land development or programs that may affect mitigation priorities. In addition, the Emergency Management Advisory Committee will review the Plan goals to determine their relevance to changing situations in the County, as well as changes in state or federal policies, and to ensure they are addressing current and expected conditions. The Committee will also review the risk assessment portion of the Plan to determine if the information should be updated or modified. The designated parties responsible for the various implementation actions will report on the status of their projects and note which implementation processes worked well, any difficulties encountered, how coordination efforts were proceeding, and which strategies should be revised.

Topics that the Emergency Management Advisory Committee could consider when reviewing the Natural Hazard Mitigation Plan and implementation of mitigation include:

- Continued appropriateness of action items
- New, changes to existing, or reallocation of funding
- Prioritization of potential mitigation projects
- Education and outreach on the plan and mitigation in general
- New science or data that changes or updates the risk assessment
- Any additional issues that may not have been identified when the plan was developed
- Lessons learned from drills, exercises, training, or hazard events
- Coordination with other emergency management-related plans and procedures

The County Manager's Office will be responsible for documenting the discussion and outcomes of meetings where this plan and / or the implementation of any identified or potential Action Items are addressed by the Steering for use in future updates of this Plan. The format of this plan allows any pressing or urgent updates to be made at any time – it is designed to be a living document that remains current and relevant to County and the participating jurisdictions.

Yearly Steering Committee meetings

In addition to the annual Emergency Management Advisory Committee meeting convened by the County manager, the following actions will be taken:

- A member of the Emergency Management Advisory Committee will provide an update to the Public Safety Council annually, or as necessary.
- A meeting should be convened between the Emergency Management Advisory Committee and representatives from the multi-jurisdictional partners to determine the effectiveness of the programs and to review any changes necessary to the plan and associated action items.

Depending upon the calendar year, the Emergency Management Advisory Committee should also consider the following agenda:

- Year 1 (2013): Review Actions for implementation progress and prioritization. Document mitigation successes.
- Year 2 (2014): Review Risk Assessment to include new data if applicable. Document mitigation successes.
- Year 3 (2015): Review Actions for implementation progress and prioritization. Document mitigation successes
- Year 4 (2016): Review Risk Assessment to include new data if applicable. Begin formal 5-year update of the Mitigation Plan
- Year 5 (2017): Formal Update of the Hazard Mitigation Update Plan for FEMA review.

Prioritizing plan action items

A prioritized list of action items serves as a starting point for the implementation of mitigation activities. As the Steering Committee developed the list of actions, they estimated the timeline for implementation. Action items include short and long-term activities as well as ongoing efforts. Short-term action items are activities which Steering Committee members either deem a high priority for implementation or as achievable with existing resources and authorities within one to two years. Long-term action items may require new or additional resources or authorities, and may take between one and five years to implement. Ongoing actions are either currently underway or will be implemented on a continuous or cyclical basis.

To achieve the NHMP's goals, the County will remain flexible in its response to available resources. Further prioritization can occur at any point during plan implementation. The steering committee will prioritize action items for implementation by assessing the importance of each item relative to the plan's goals and the hazard(s) each item addressed; in response to changes in community characteristics, vulnerability, or risk; and to take advantage of available resources.

The Emergency Management Advisory Committee and the leadership of Garfield County have the option to implement any of the action items at any time, as opportunities and funding arise. The option to consider any action item for implementation at any given time allows the Committee to alter mitigation strategies as new situations arise, such as funding opportunities that could support pursuit of lower priority action items.

Other prioritization tools may also be useful for federal funding sources. FEMA's methods of identifying the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. Conducting a benefit/cost analysis for a mitigation activity can assist communities in

determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. A cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

The Emergency Management Advisory Committee will use FEMA-approved cost benefit methodologies as a tool for identifying and prioritizing mitigation action items when applying for federal mitigation funding. For other projects and funding sources, the Emergency Management Advisory Committee will use other approaches to understand the costs and benefits of each action item and develop a prioritized list. For more information regarding economic analysis of mitigation action items, see Appendix B of the plan.

Five-year formal review process

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During this plan update, the following questions will be asked to determine what actions are necessary to update the plan. The County Manager's Office will be responsible for engaging in the formal update process to address the questions outlined below.

- Are the plan's goals still applicable?
- Do the plan's priorities align with State priorities?
- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies addressing natural hazards that should be incorporated?
- Has the community successfully implemented any mitigation activities?
- Have new hazard related issues or problems been identified?
- Do existing actions need to be re-prioritized for implementation?
- Are the actions still appropriate, given current resources, community needs, and priorities?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? If yes, did the plan accurately address the impacts of this event?

Continued public involvement

Garfield County is committed to involving the public directly in the maintenance and update of the Hazard Mitigation Plan. Although the Emergency Management Advisory Committee members are responsible for annual review and update of the Plan and represent the public to some extent, the public will have multiple opportunities to provide direct feedback about the Plan.

The plan includes the address and the phone number of Garfield County Manager, which is responsible for tracking public comments about the plan. The County Manager's Office and County's Public Information Office will support public involvement through existing community

organizations, the County Website, and "Updates," via Green Acres, a monthly newsletter distributed internal and external to the county.

Copies of the plan and annual revisions will be posted on the County's website and notification of updates will be sent to the community stakeholders. It is also the intent of the County to conduct an annual survey by distributing it to stakeholders and multi-jurisdictional representatives seeking input on the plan issues and necessary updates.

Summary of Garfield County NHMP Action Items

Proposed Action Title	Coordinating Organization	Internal Partners	External Partners	Timeline	1) Reduce the loss of life and personal injuries from natural hazard events.	2) Reduce damage to County assets	3) Reduce County costs of disaster response and recovery.	4) Minimize economic losses.	5) Reduce damage to personal property.
Multi-Hazard Mitigation Action Items									
Develop maintenance and update processes, in coordination with the other emergency management related plans, and with multi-jurisdictional partners.	County Manager	Public Works Director Sheriff Building and Planning Director Emergency Manager Public Health Director	Municipalities Fire Districts	Ongoing			X		
Conduct ongoing public outreach activities during mitigation plan implementation, and in conjunction with the update and maintenance of other emergency management plans.	County Public Information Officer	County Manager Emergency Manager	Public Information Outlets (radio, newspaper, web, etc); PIO Group	Ongoing	X				X
Collaborate with neighboring counties and cities with established GIS services to develop Memoranda of Understanding or Service Agreements for the provision of GIS services in the event of staffing issues.	Garfield County GIS		GIS staff in other jurisdictions: Carbondale, Glenwood, New Castle, Parachute, and Silt have no GIS staff or capabilities. We have provided emergency GIS services for them in the past without an MOU in place.	Short Term			X		
Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens and private property owners, owner's associations, public agencies, businesses, and schools. Coordinate with participating towns, cities, and fire districts on outreach inside of their jurisdictions. Coordinate implementation efforts with the update of recovery and other emergency management plans, as appropriate.	Public Information Officer	Director of Public Health Director of Human Services Information Technology (website)	Colorado Mountain College Multi-jurisdictional Agencies Public libraries PIO Group	Ongoing	X			X	X
Collaborate with regional, state, and federal agencies, and private industry to increase the extent of data available for hazard mapping, e.g., floodplain, landslide and debris flow, fire hazard, hazardous or volatile material.	Garfield County GIS	Emergency Manager	FEMA, Oil and Gas industry, Bureau of Land Management, University of Colorado	Ongoing		X			X
Continue to develop and maintain a GIS inventory of hazard risks and vulnerable assets, to include all critical facilities, large employers, public assembly areas, lifelines, and mitigation successes. Reflect results in a continuously updated on-line Risk Assessment.	Garfield County GIS	County Engineer		Ongoing	X	X			X
Evaluate lifeline and evacuation routes to identify any necessary mitigation actions to ensure that they remain viable in any emergency situation requiring evacuation.	Emergency Manager	GIS Public Works	CDOT	Short Term	X		X		X
Establish critical infrastructure protection plans.	Emergency Manager	Building and Planning GIS	Municipalities Rubicon Team	Long Term		X			
Flood Mitigation Action Items									
Emphasize critical public infrastructure and facilities located in special flood hazard areas for mitigation and preparedness measures.	Emergency Manager	GIS Public Works	Municipalities	Short Term	X	X			
Identify floodway obstructions for all parts of Garfield County. Integrate with Pubworks (GIS software) to map obstructions and track progress toward reducing obstructions.	Public Works	GIS Emergency Manager Public Works	State Department of Emergency Management FEMA	Long Term		X			X
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Building and Planning	County Manager	State Department of Emergency Management, National Flood Insurance Program, Federal Emergency Management Agency	Ongoing		X	X		X
Continue to incorporate hazard mapping information into development review process to avoid or reduce risk of development in flood hazard areas.	Building and Planning	GIS Emergency Manager Building and Planning	State Department of Emergency Management FEMA	Ongoing		X	X	X	X

Summary of Garfield County NHMP Action Items

Proposed Action Title	Coordinating Organization	Internal Partners	External Partners	Timeline	1) Reduce the loss of life and personal injuries from natural hazard events.	2) Reduce damage to County assets	3) Reduce County costs of disaster response and recovery.	4) Minimize economic losses.	5) Reduce damage to personal property.
Geologic Hazard Mitigation Action Items									
Review and evaluate development codes to incorporate soil type in addition to slope as a criterion for further environmental studies before permitting.	Building and Planning	Chief Building Official	State Geologists	Long Term					X
Partner with Colorado Geological Survey to enhance mapping of Garfield County landslide, debris flow and soil instability risk areas, especially in areas of more recent residential development (Roaring Fork and Colorado River Valleys; Areas 1 - 3).	Emergency Manager	GIS Oil and Gas Liaison	State Geologists	Long Term		X			X
Reduce impacts of landslides on existing developments by developing a tool kit for homeowners regarding resources that are available for risk reduction.	Building and Planning	Public Works Chief Building Official GIS	Division of Housing Colorado Geological Survey	Long Term	X	X			X
Conduct engineering studies to identify feasible mitigation actions for high activity landslide or debris flow areas.	Emergency Manager	Engineering GIS	Colorado Division of Emergency Management	Long Term	X	X			X
Wildfire Mitigation Action Items									
Support existing cross training efforts that coordinate industry and fire district response to fires affecting the oil and gas fields.	Emergency Manager	Oil and Gas Liaison Building and Planning Public Works	Fire Districts State Department of Emergency Preparedness Colorado Oil and Gas Conservation Commission	Ongoing			X		
Continue to update the database of the location of industry assets for use by fire responders (industry or fire protection district personnel) in real time. Transfer data for use in Emergency Responders vehicles.	Emergency Manager	Oil and Gas Liaison Building and Planning GIS	COGCC Fire Departments	Ongoing			X		
Increase coordination among mitigation planning efforts and actions with the soon-to-be-developed County-wide Community Wildfire Protection Plan (CWPP). Coordinate future updates of the mitigation plan with the CWPP updates.	Emergency Manager	GIS	Fire Protection Districts State Forest Service	Ongoing		X		X	X
Ensure that all areas of Garfield County are served by a fire protection district.	Sheriff	GIS Emergency Manager Assessor	Fire Districts	Long Term	X		X		

Summary of Garfield County NHMP Action Items

Proposed Action Title	Coordinating Organization	Internal Partners	External Partners	Timeline	1) Reduce the loss of life and personal injuries from natural hazard events.	2) Reduce damage to County assets	3) Reduce County costs of disaster response and recovery.	4) Minimize economic losses.	5) Reduce damage to personal property.
Actions to Enhance Response Capabilities									
Continue to implement the Infectious Disease Action Plan.	Garfield County Public Health Department	Emergency Manager	Hospital Districts EMS	Ongoing	X		X		
Create in-house training for Department Heads and Steering Committee members.	County Manager	Emergency Manager Human Resources	CMC, FEMA Colorado Division of Emergency Management	Short Term		X	X		
Develop an ESF-14 Communication Plan	Public Information Officer	County Manager Emergency Management Team	Public information outlets PIO Group	Short Term		X	X		
Develop a debris management plan with a defined transition team	Public Works	Emergency Manager Procurement Landfill	Private Contractors CDOT Landowner(s)	Short Term			X		
Develop a response and recovery plan specifically for hazardous material spills	Emergency Manager	Public Health Public Information Officer Sheriff (DERA)	CDPHE Fire Departments Colorado State Patrol (Hazmat Unit)	Long Term	X		X		
Update the Airport Emergency Procedures Manual and create 72 hour Emergency Operations List	Airport Director	County Manager	FAA FBO	Short Term		X	X		

Natural Hazards Mitigation Plan

Garfield County, Colorado

Appendix A: Action Item Forms

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Develop maintenance and update processes, in coordination with the other emergency management related plans, and with multi-jurisdictional partners.	Goal 3 / Multi-Hazard

Rationale for Proposed Action Item:

A comprehensive emergency management program, which includes mitigation as a cornerstone component, is critical to the long-term resilience of Garfield County and its residents. A coordinated update and maintenance process, that considers implications of new data or evolving situations for all of the related emergency management plans (COOP, EOP, etc) reduces staff effort in maintaining all plans and leads to the most effective risk-reduction product possible.

Ideas for Implementation:

Establish a Natural Hazards Mitigation Plan Steering Committee to conduct ongoing monitoring and short-term maintenance tasks of the Natural Hazards Mitigation Plan. The mission of the Steering Committee will be to facilitate ongoing implementation, monitoring, and evaluation of countywide mitigation activities.

Meet in 1st Quarter 2013, lead by the County Manager to establish County Steering Committee and plan for updating

Meet in 2nd Quarter 2013, lead by the County Steering Committee to establish Multi-jurisdictional group and plan for updating

• Identify all organizations within Garfield County that have programs or interests in natural hazards mitigation;

• The Steering Committee will develop partnerships between land use planners, geologists, and multi-jurisdictional partners to implement specific mitigation projects;

• The Steering committee will work to develop collaborative relationships with businesses, through regular outreach to business groups to target businesses which focus on mitigation, response, and / or recovery related activities

Conduct an online survey to inform the annual plan update

Coordinating Organization:	County Manager

Internal Partners:	**External Partners:**
Public Works Director Sheriff Building and Planning Director Emergency Manager Public Health Director	Municipalities Fire Districts

Timeline: (ongoing)		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	N/A
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Conduct ongoing public outreach activities during mitigation plan implementation, and in conjunction with the update and maintenance of other emergency management plans.	Goal 1 & 5 / Multi-hazard

Rationale for Proposed Action Item:

Ongoing interaction with the citizens of Garfield County can lead to increased awareness about potential hazards and can assist in establishing necessary lines of communication when an emergency occurs.

Ideas for Implementation:

The County will use the existing Public Information Officer group that meets once a month to help dissimenate information (print, radio, tv) and use web and appropriate social media outlets to reach the public.

Coordinating Organization:	County Public Information Officer

Internal Partners:	**External Partners:**
County Manager Emergency Manager	Public Information Outlets (radio, newspaper, web, etc) PIO Group

Timeline: (ongoing)		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	N/A
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Collaborate with neighboring counties and cities with established GIS services to develop Memoranda of Understanding or Service Agreements for the provision of GIS services in the event of staffing issues.	Goal 3 / Multi-hazard

Rationale for Proposed Action Item:

GIS services are critical during recovery, and often during response immediately following an event as well. Garfield County has a well-developed GIS dataset and analytic skills, but has limited staffing. Should a disaster impact the ability of the County to access this data and analysis, response and recovery could be affected.

Ideas for Implementation:

Develop and execute a MOU with Pitkin, Eagle, Routt, Mesa, and Rio Blanco Counties and City of Rifle and other Garfield County municipalitiesThe creation of a template MOU would be useful to all of us in the GIS community who typically do not author documents of this type.

Coordinating Organization:	Garfield County GIS

Internal Partners:	**External Partners:**
	GIS staff in other jurisdictions: Carbondale, Glenwood, New Castle, Parachute, and Silt have no GIS staff or capabilities. We have provided emergency GIS services for them in the past without an MOU in place.

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens and private property owners, owner's associations, public agencies, businesses, and schools. Coordinate with participating towns, cities, and fire districts on outreach inside of their jurisdictions. Coordinate implementation efforts with the update of recovery and other emergency management plans, as appropriate.	Goal1, 4, 5 / Multi-hazard

Rationale for Proposed Action Item:

Much of the damage and many injuries that result from natural hazards occur on private property, and could be avoided via mitigation on those properties. Education and outreach to citizens can lead to improved outcomes in hazards events.

Ideas for Implementation:

In general, the County will take the following outreach steps: Make the Garfield County Natural Hazards Mitigation Plan available to the public by publishing the plan electronically on the County websites. Develop Spanish-language education materials. As applicable, use social networking technology such as Facebook and Twitter to provide a forum for discussion of natural hazard risks and risk reduction.

To focus outreach on *citizens and private property* owners, the County can partner with participating jurisdictions to: Conduct workshops for public and private sector organizations to raise awareness of mitigation activities and programs. Partner with Public Health and social service agencies and organizations to conduct outreach to vulnerable populations such as minority groups, immigrant communities, homeless, the young and elderly, individuals dependent on public transit, and low-income families or individuals.

To focus outreach on *businesses,* the County can: Conduct workshops for public and private sector organizations, such as chambers of commerce or other groups, to raise awareness of mitigation activities and programs. Encourage and provide support for the development of business continuity of operations plans.

To focus outreach on *schools,* the County can: Develop a curriculum for school programs and adult education on reducing risk and preventing loss from hazards. Conduct natural hazards awareness programs in schools and community centers.

Coordinating Organization:	Public Information Officer

Internal Partners:	**External Partners:**
Director of Public Health Director of Human Services Information Technology (website)	Colorado Mountain College Multi-jurisdictional Agencies Public libraries PIO Group

Timeline: (ongoing)		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	**N/A**
	ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Collaborate with regional, state, and federal agencies, and private industry to increase the extent of data available for hazard mapping, e.g., floodplain, landslide and debris flow, fire hazard, hazardous or volatile material.	Goals 2, 5 / Multi-hazard

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted [201.6(c)(2)(ii)(A)]. More current and accurate data will provide better estimates of vulnerability allow the County to better identify mitigation strategies that can assist the County in reducing its risk to earthquakes.

Additionally, during the initial development of the County Risk Assessment, several key pieces of data were missing and were included as estimates only. Specifically, the geologic hazard information for the I-70 corridor was included as an estimate. The national, regional, and local significance of the railroad and highway that run through the canyon makes the I-70 a high priority for LIDAR mapping.

Ideas for Implementation:

- Coordinate with the CWPP process to ensure that data layers are available in a format that's useful to future County Risk Assessment updates.
- Prioritize the I-70 corridor for LIDAR mapping
- CWPP will contain the wildfire hazard information and should incorporated

Coordinating Organization:	Garfield County GIS

Internal Partners:	**External Partners:**
Emergency Manager	FEMA, Oil and Gas industry, Bureau of Land Management, University of Colorado

Timeline: (ongoing)		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	**A 1-year commitment of $100/mo for LIDAR (IFSAR) data subscription from Intermap.**
	ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Continue to develop and maintain a GIS inventory of hazard risks and vulnerable assets, to include all critical facilities, large employers, public assembly areas, lifelines, and mitigation successes. Reflect results in a continuously updated on-line Risk Assessment.	Goals 1, 2 , 5 / Multi-hazard

Rationale for Proposed Action Item:

Garfield County GIS has already begun the process of creating an on-line risk assessment database http://www.garfield-county.com/geographic-information-systems/explore-live-maps.aspx , but it requires additional refinement and constant update. The benefits of going to an on-line risk assessment are multiple:

- New data are easily added to the risk assessment, with result immediately available
- Information about risk and vulnerability is easily shared with the general public, partners in other jurisdictions, and business leaders
- Keeping data up-to-date improves the ease with which all emergency management plans (including this mitigation plan) are updated over time.

The data on vulnerable assets that are outlined in this action are particularly important to improve, to better target future action items.

All data should be available for public review and input.

Ideas for Implementation:

- Incorporate vulnerability data into the GIS system instead of just developing one-time or stand alone maps.
- Evaluate the vulnerability of emergency transportation routes by comparing current routes with hazard locations.
- Digitize and consolidate building plans and maps into one readily accessible database.
- Develop a map that visually displays mitigation successes as a method to document actions as they are accomplished and to serve as background information for future mitigation grant proposals.

Coordinating Organization:	Garfield County GIS

Internal Partners:	**External Partners:**
County Engineer	

Timeline: (ongoing)		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Evaluate lifeline and evacuation routes to identify any necessary mitigation actions to ensure that they remain viable in any emergency situation requiring evacuation.	Goals 1, 3, 5 / Multihazard

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted by the [201.6(c)(2)(ii)(A)]. Evaluating lifeline and evacuation routes will help the county identify how these routes may be impacted by natural hazards, assisting the identification of the county's overall vulnerability to natural hazards.

Ideas for Implementation:

Identify evacuation routes and erect necessary signage..
GIS staff has already worked with Emergency Manager to develop primary evacuation routes.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
GIS Public Works	CDOT

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Establish critical infrastructure protection plans.	Goal 2 / Multihazard

Rationale for Proposed Action Item:

Protecting and ensuring the continuity of critical infrastructure is essential to security, public health and safety, economic vitality, and normal daily life for residents.
The Department of Homeland Security defines Critical Infrastructure as "the assets, systems, and networks, whether physical or virtual, so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, public health or safety, or any combination thereof." Homeland Security Presidential Directive 7 (HSPD-7, 2003) established U.S. policy for enhancing critical infrastructure protection by establishing a framework for the Department's partners to identify, prioritize, and protect the critical infrastructure in their communities from terrorist attacks. The directive identified 17 (and later added an 18th) critical infrastructure sectors and, for each sector, designated a federal Sector-Specific Agency (SSA) to lead protection and resilience-building programs and activities.

By cataloguing the infrastructure resources throughout the public and private sectors in the County that align with the 18 federally recognized sectors, Garfield County can better identify strategies and opportunities to protect those infrastructure resources through the development of Critical Infrastructure Protection Plans (CIPP)

Ideas for Implementation:

Identify non-County and County run critical facilities in hazard areas and develop public and private partnerships to implement mitigation actions to protect them.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
Building and Planning GIS	Municipalities Rubicon Team

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	XX	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Emphasize critical public infrastructure and facilities located in special flood hazard areas for mitigation and preparedness measures.	Goals 1 & 2 / Flood Hazard

Rationale for Proposed Action Item:

The Risk Assessment modeled the 100-year flood risk and inundation risk in all five areas of the County. Flooding that damages public infrastructure can impair the ability of the County to respond and recover from a flood event. The table below is a summary of the type of assets and infrastructure vulnerable to flood and inundation in Garfield County.

Area	Flood Risk*	Additional Inundation Risk**
1	Highway Bridges; Municipal Buildings; Pedestrian Bridge; Railroad Bridge; High, Medium, and Low Traffic Roads	Electric Utility Substation; Federal Building; Fire Station; Library; Museum; Pipelines; Railroad miles; Police Stations; School; Shopping Center; Homes and Businesses
2	Highway Bridges; Municipal Building; High, Medium, and Low Traffic Roads; Schools	Cemetery; Churches; Communication Facilities; Fire Station; Library; Museum; Nursing Home; Parks; Police Stations; Railroad Miles; Railroad Bridges; Shopping Center; Homes and Businesses
3	High and Low Traffic Roads	Fire Station; Library; Municipal Building; Museum; Pedestrian Bridge; Police Station; Railroad Miles; Railroad Bridges; School; Shopping Center
4	Medium Traffic Roads	
5	Highway Bridges; High and Low Traffic Roads	
	**Source: 100-year flood plain data, modeled for Garfield County by FEMA using HAZUS-MH, 9/2010*	***Source: Ruedi Dam Inundation Zone, FEMA, 1986*

Ideas for Implementation:

• Use survey, elevation, and use data to Prioritize for mitigation efforts at the County level the buildings / infrastructure evaluated as "High" risk in the Risk Assessment
• Use survey, elevation, and use data to identify additional critical facilities at risk from flood events;
• Develop strategies to mitigate risk to these facilities, or to utilize alternative facilities should flood events cause damages to the facilities in question.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
GIS; Public Works	Municipalities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
XX		

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Identify floodway obstructions for all parts of Garfield County. Integrate with Pubworks (GIS software) to map obstructions and track progress toward reducing obstructions.	Goals 2 & 5 / Flood

Rationale for Proposed Action Item:

This action is a first step towards improved flood capacity and reducing the risk of road washouts and sedimentation damage to habitat and floodway capacity.

Ideas for Implementation:

• Update map of culverts in the County, as necessary
Update map of bridges in the County, as necessary
• Prepare an inventory of bridges and culverts that historically create flooding problems and target them for retrofitting

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
GIS Emergency Manager Public Works	State Department of Emergency Management FEMA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Goals 2, 3, 5 / Flood

Rationale for Proposed Action Item:

The National Flood Insurance Program provides communities federally backed flood insurance to homeowners, renters, business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection.

As of 9/30/11 there are 125 NFIP Policies in force in unincorporated Garfield County with more than 35 million in insurance coverage. There have been four (4) claims with payment in unincorporated Garfield County since 1978.

Ideas for Implementation:

• Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements.

Coordinating Organization:	Building and Planning

Internal Partners:	**External Partners:**
County Manager	State Department of Emergency Management, National Flood Insurance Program, Federal Emergency Management Agency

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Continue to incorporate hazard mapping information into development review process to avoid or reduce risk of development in flood hazard areas.	Goals 2, 3, 4, 5 / Flood

Rationale for Proposed Action Item:

New State requirements (September 2010) include key revisions:
1 – new structures and substantial changesmust be one-foot above base flood elevation or non-residential buildings flood-proofed to that same level.
2 – New floodways, when mapped, will use a ½ fot rise criteria versus a one-footrife.
3 – Critical facilities need to be protected to two-foot above base flood elevation; a higher standard than typical structures.
4 – The 500-year floodplain standards is now a suggestions and not a requirement
5 – Development is not prohibited in the regulatory floodplain
6 – The variance procedure is applicable to all of the floodplain rules and handled at the local level
7 – The rules are not retroactively applied to existing structures, unless they are substantial changes or new additions

Ideas for Implementation:

- Evaluate elevation requirements for new residential and non-residential structures in the floodplain area
- Review and evaluate the County's development code for consistency with new State requirements for floodplain management

Coordinating Organization:	Building and Planning

Internal Partners:	**External Partners:**
GIS Emergency Manager Building and Planning	State Department of Emergency Management FEMA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Review and evaluate development codes to incorporate soil type in addition to slope as a criterion for further environmental studies before permitting.	Goal 5 / Geologic

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings [201.6(c)(3)(ii)]. The evaluation of development codes to include soil type will help to identify when a new development might incur increased risk due to soil and geologic hazards.

Ideas for Implementation:

• Map county landslide and debris flow areas
• Identify the location and extent of hazard areas and establish a factual base to support implementation of future measures
• Adopt landslide ordinances and design standards that require additional site review and/or geotech reports in at risk areas identified on landslide maps

Coordinating Organization:	Building and Planning

Internal Partners:	**External Partners:**
Chief Building Official	State Geologists

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	XX	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Partner with Colorado Geological Survey to enhance mapping of Garfield County landslide, debris flow and soil instability risk areas, especially in areas of more recent residential development (Roaring Fork and Colorado River Valleys; Areas 1 - 3).	Goals 2 & 5 / Geologic

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted [201.6(c)(2)(ii)(A)]. More current and accurate data will provide better estimates of vulnerability allow the County to better identify mitigation strategies that can assist the County in reducing its risk to geologic hazards.

Additionally, during the initial development of the County Risk Assessment, several key pieces of data were missing or not available and were included as estimates only.

Ideas for Implementation:

If and when updated or more complete LIDAR data of landslide, debris flow, and soil instability across the County is made available, develop maps that over lay oil and gas industry assets with this hazard risk.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
GIS Oil and Gas Liaison	State Geologists

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	X	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Reduce impacts of landslides on existing developments by developing a tool kit for homeowners regarding resources that are available for risk reduction.	Goals 1, 2, 5 / Geologic

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings [201.6(c)(3)(ii)]. Providing information to homeowners will encourage them to mitigate their structures and property against landslides thereby reducing risk to life and property.

Additionally, the Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(iii)]. Educating landowners on how to mitigate the affects of landslides helps keep the public informed of what is being done with the plan, how the County is working to mitigate its risk to landslides, and allows for feedback and suggestions from the public for improving, updating, and maintaining the plan.

Ideas for Implementation:

• Use and publicize the National Weather Service's debris flow warning system; and
• Provide information to residents on landslide prevention. Publications such as FEMA's Homeowner's Landslide Guide for Hillside Flooding, Debris Flows, Erosion, and Landslide Control and Hillside Drainage Flyer have some ideas about reducing landslide susceptibility. In some cases residents could consider:
- Where appropriate, reducing the number of building sites and corresponding disruption of the natural contour and vegetation;
- Reducing driveway cuts into the hillside;
- Adjusting the building setback from property lines to minimize building site cuts and fills;
- Maintaining the amount of vegetation on hillside lots; and
- Reducing water input into slopes from building roof drains, storm drains, and surface runoff.

Coordinating Organization:	Building and Planning

Internal Partners:	**External Partners:**
Public Works Chief Building Official GIS	Division of Housing Colorado Geological Survey

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	XX	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Conduct engineering studies to identify feasible mitigation actions for high activity landslide or debris flow areas.	Goals 1, 2, 5 / Geologic

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted [201.6(c)(2)(ii)(A)]. More current and accurate data will provide better estimates of vulnerability allow the County to better identify mitigation strategies that can assist the County in reducing its risk to landslides and debris flows.

Additionally, the Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Identifying mitigation actions for high activity landslide and debris flow areas will reduce the occurrence and severity of these hazards thereby protecting existing buildings and infrastructure.

The State has designated Tier 1 areas in Garfield County as Douglass Pass-Baxter Region, and Highway 215.

• Prioritize mitigation actions for high activity landslide or debris flow areas.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
Engineering GIS	Colorado Division of Emergency Management

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	X	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Support existing cross training efforts that coordinate industry and fire district response to fires affecting the oil and gas fields.	Goal 3 / Wildfire

Rationale for Proposed Action Item:

The Oil and Gas industry is the backbone of the Garfield County economy. It provides jobs for County residents and tax revenue that supports County services. Oil and Gas extraction and processing can be volatile and fires are not uncommon at the well sites. These fires have several characteristics that make appropriate response technically challenging including their remote location and industrial implications.

Through many years of working relationships, the Oil and Gas industry and the local fire districts have established response protocols to ensure the safety of first responders, industry equipment, and the County overall. Formalizing and standardizing response protocol and training will ensure the continuation of this critical partnership between industry, the County and first responders.

Ideas for Implementation:

Develop ways to expand cross training and communication across oil and gas companies and fire protection districts.
Participate in the annual exercise program to test the interoperability of County and oil and gas industry fire response.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
Oil and Gas Liaison Building and Planning Public Works	Fire Districts State Department of Emergency Preparedness Colorado Oil and Gas Conservation Commission

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Continue to update the database of the location of industry assets for use by fire responders (industry or fire protection district personnel) in real time. Transfer data for use in Emergency Responders vehicles.	Goal 3 / Wildfire

Rationale for Proposed Action Item:

The Oil and gas industry is the backbone of the Garfield County economy. It provides jobs for County residents and tax revenue that supports County services. Oil and Gas extraction and processing can be volatile and fires are not uncommon at the well sites. These fires have several characteristics that make appropriate response technically challenging including their remote location and industrial implications. The location of pipelines and wells often change but that information may not be received by the first responders regularly.

Additionally, the Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted [201.6(c)(2)(ii)(A)]. More current and accurate data will provide better tracking of actual risk incurred and lead to better preparedness for and mitigation of fire risk.

Ideas for Implementation:

Continue to receive Tier II reporting (hazmat) be industry.
Ensure that the County maintains accurate and up to date information about the location, type and size of industry assets such as pipelines, compressors, well heads and drill rigs.
COGCC keeps GIS data for wells current. Building & Planning needs to provide GIS staff with data required to map incoming pipeline/compressor station as they are approved, as there is no other source for this information.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
Oil and Gas Liaison Building and Planning GIS	COGCC Fire Departments

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Increase coordination among mitigation planning efforts and actions with the soon-to-be-developed County-wide Community Wildfire Protection Plan (CWPP). Coordinate future updates of the mitigation plan with the CWPP updates.	Goal 2, 4, 5 / Wildfire

Rationale for Proposed Action Item:

The Healthy Forests Restoration Act of 2003 requires at-risk WUI communities to develop CWPPs in order to be eligible to receive certain federal funds for mitigation projects. Being eligible for federal funds can assist the county in funding WUI fire mitigation projects, assisting the county in reducing its overall WUI fire risk.

The CWPP is a targeted planning effort that mitigates against wildfire risk by identifying actions that fire districts can take, in collaboration with the County and its jurisdictions, to reduce the risk to life and property from wildland fires. It will evaluate in detail issues such as access road codes, rural water supplies, and expected development patterns in the wildland urban interface and identify specific actions that will reduce opportunities for ignition and property damage. These actions should be incorporated into the mitigation plan when they are developed, to address wildfire risk.

Ideas for Implementation:

Adopt the completed CWPP and update annually.

Adopt all wild-fire risk reduction activities identified in the CWPP in to the Natural Hazard Mitigation Plan via reference in the CWPP adoption resolution.

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
GIS	Fire Protection Districts State Forest Service

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Ensure that all areas of Garfield County are served by a fire protection district.	Goal 1, 3 / Wildfire

Rationale for Proposed Action Item:

Some areas of unincorporated Garfield County are not included in a fire protection district.

Ideas for Implementation:

Execute an Annual Operation Plan and Mutual Agreements
Modify fire protection district boundaries to include all areas of the county
Expanding FPD boundaries also implies expanding tax district boundaries, creating new tax districts, and imposing new taxes on residents in those areas.

Coordinating Organization:	Sheriff

Internal Partners:	**External Partners:**
GIS Emergency Manager Assessor	Fire Districts

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	X	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Continue to implement the Infectious Disease Action Plan.	Goal 1, 3 / Response

Rationale for Proposed Action Item:

Colorado State law establishes a statutory requirement for disclosure by providers and coroners, of reportable communicable disease cases, as well as unusual deaths, to local and state public health officials (Statutory Citation: C.R.S. 25-1.5-102(1)(a)(II) and 25-1-122). A list of reportable conditions requiring Public Health notification from physicians and labs is available upon request. http://www.cdphe.state.co.us/dc/reportable.html.

The control of infectious diseases depend on a healthy environment-clean water, adequate sanitation, vector control, shelter, population immunization and health care workers trained in early diagnosis and treatment. Disasters compromise the infrastructures that support healthy environments.

Ideas for Implementation:

Public Health Plans are in place for infectious disease surveillance and investigation, mass immunization, environmental surety, quarantine and isolation and mass fatality.
Continue to exercise and modify plans as necessary.
Continue partnerships through ESF8 planning group
Continue partnerships through Public Safety Council

Coordinating Organization:	Garfield County Public Health Department

Internal Partners:	**External Partners:**
Emergency Manager	Hospital Districts EMS

Timeline: Ongoing		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Create in-house training for Department Heads and Steering Committee members.	Goal 2, 3 / Response

Rationale for Proposed Action Item:

The mitigation and recovery process are broad efforts that need multi-disciplinary participation and on-going training across all departments.
More informed staff can incorporate natural hazard mitigation into their daily work activities, make better decisions regarding natural hazard planning, and can assist the Steering Committee in implementing the Plan's identified action items. This can help the county reduce its overall risk to the natural hazards addressed by the NHMP.
Additionally, having County staff members who understand the principles of mitigation will create the understanding needed to better incorporate mitigation into existing programs, which is a key requirement of the Disaster Mitigation Act of 2000.

Ideas for Implementation:

Use Trackstar software as a tool for continuity and training
Conducting an annual exercise and use after action report to evaluate any necessary plan updates

Coordinating Organization:	County Manager

Internal Partners:	**External Partners:**
Emergency Manager Human Resources	CMC, FEMA Colorado Division of Emergency Management

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Develop an ESF-14 Communication Plan	Goal 2, 3 / Response

Rationale for Proposed Action Item:

The county needs to develop policy team guidelines for communication and decision-making and for the transitions between emergency response and recovery.

The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Creating a communications plan will guide public outreach and education to keep the public informed of, and involved in, the County's actions to prepare, mitigate, and respond to hazards.

Ideas for Implementation:

Use the existing PIO group to assist in the dissemination of information.

Coordinating Organization:	Public Information Officer

Internal Partners:	**External Partners:**
County Manager Emergency Management Team	Public information outlets PIO Group

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Develop a debris management plan with a defined transition team	Goal 3 / Response

Rationale for Proposed Action Item:

Debris removing and cleaning is necessary beyond the initial emergency response period. Heavy equipment and labor should be coordinated for transition into a recovery period. Receiving sites for debris need to be coordinated and scheduled, as appropriate.

Ideas for Implementation:

Develop a list of qualified contractors
Develop a general scope of services
Establish feasible alternative locations

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Emergency Manager Procurement Landfill	Private Contractors CDOT Landowner(s)

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Develop a response and recovery plan specifically for hazardous material spills	Goal 1, 3 / Response

Rationale for Proposed Action Item:

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Addressing hazardous materials locations can help minimize secondary hazards following a disaster.

Ideas for Implementation:

Execute multi-agency and jurisdictional mutual aid plans and agreements
Create a Water supply (temporary) plan
Environmental Surety Plan is in place

Coordinating Organization:	Emergency Manager

Internal Partners:	**External Partners:**
Public Health Public Information Officer Sheriff (DERA)	CDPHE Fire Departments Colorado State Patrol (Hazmat Unit)

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	X	

Form Submitted by:	

Action Item Status: New Action (2011)

Proposed Action Item:	**Goal Alignment / Hazards Addressed:**
Update the Airport Emergency Procedures Manual and create 72 hour Emergency Operations List	Goal 2, 3 / Response

Rationale for Proposed Action Item:

The Garfield County Regional Airport is a County-owned public-use airport and is essential for the transportation and economic sectors of Garfield County. In January 2011, a 47-million renovation project was completed that enhanced the runway, capacity, security, utilities, and technical instruments of the facility. To insure the uninterrupted operation of the airfield in an emergency the airport developed the 72 hour emergency operations list. This list identifies essential operating needs of the airport and staff. This list along with the emergency operations manual will assist in keeping the airport operational in the event of an emergency.

Ideas for Implementation:

Annually review the emergency operations manual
Complete purchase of essential items on 72hr list by June 30, 2012

Coordinating Organization:	Airport Director

Internal Partners:	**External Partners:**
County Manager	FAA FBO

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	**$1,200**
X		

Form Submitted by:	**Brian Condie / Airport Director**

Action Item Status: New Action (2011)

Natural Hazards Mitigation Plan

Garfield County, Colorado

Appendix B: Cost Benefit Analysis Methodology

Economic Analysis of Natural Hazard Mitigation Projects

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This appendix outlines several approaches for conducting economic analysis of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, State Hazard Mitigation Plan, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation.

This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating natural hazard mitigation provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster’s social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/cost analysis

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost-effectiveness analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

- Request cost sharing from public agencies;
- Dispose of the building or land either by sale or demolition;

- Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
- Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

How Can An Economic Analysis Be Conducted?

Benefit/cost analysis and cost-effectiveness analysis are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating alternative mitigation activities is outlined below:

Identify the alternatives

Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

Calculate the costs and benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost.*** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits.*** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.
- ***Consider costs and benefits to society and the environment.*** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate.*** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

Analyze and rank the alternatives

Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for

implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.

- ***Internal Rate of Return***. Using the *internal rate of return* method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

How are Benefits of Mitigation Calculated?

Economic returns of natural hazard mitigation

The estimation of economic returns, which accrue to building or landowner as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional costs from natural hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource availability and prices
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates

- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

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Garfield County

Natural Hazards Mitigation Plan

Garfield County, Colorado

Appendix C: 2009 Vulnerability Assessment & Issue Identification

2009 Vulnerability Assessment and Issue Identification

In the summer of 2009, Garfield County contracted with ECONorthwest to begin the process of developing a Risk Assessment. The first step of hazard identification was accomplished in a two-day workshop with County department representative. In workshop discussions, ECO gathered information about the hazards that impact the County, and the vulnerable infrastructure and populations that are likely to be impacted by hazard events.

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying changes to building codes or development regulations, identifying properties or structures appropriate for acquisition or relocation, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.

This vulnerability assessment was conducted in the summer of 2009 using a survey form completed during the aforementioned workshop. Participants were given worksheets organized by potentially vulnerable systems (e.g.: population, economy, land use and development, infrastructure and critical facilities, etc) that asked specific questions about how that system might be impacted by natural hazards.

The results and recommendations report is included in the Garfield County Natural Hazard Mitigation Plan as supporting documentation for the Risk Assessment.

Disaster Recovery & Integrated Emergency Management Workshop: Results and Recommendations

Prepared for Garfield County

ECONorthwest
ECONOMICS • FINANCE • PLANNING

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André Le Duc and Lorelei Juntunen

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Section 1 Background

André Le Duc, Executive Director of the University of Oregon's Partnership for Disaster Resilience, together with Lorelei Juntunen of ECONorthwest (ECO), led a workshop on long-term recovery in Garfield County, Colorado. The purpose of the training, which was held May 28 and 29, 2009, was to:

(1) Provide an overview to key County staff on the disaster recovery, risk assessment, and national standards process including:

a. National Response Plan: Emergency Support Function(ESF)-14: Long-term community recovery and mitigation

b. Disaster Mitigation Act of 2000 and the Pre-Disaster Mitigation Program

(2) Gather information about recovery-planning issues and risk in the County to begin the process of recovery planning

(3) Provide an overview of National Fire Protection Association 1600 standard on Disaster/Emergency Management and Business Continuity Programs and the Emergency Management Accreditation Program(EMAP)

(4) Provide vision for comprehensive planning to reduce County vulnerability, and work with the County to identify appropriate next steps to move toward a more holistic approach to County resilience

This report provides the results of the workshop process, in a format that will be useful for a future recovery or other plan document. It summarizes the outputs of the discussion portions of the training, which identified key risks and vulnerabilities, as well as the important County assets that would be the crucial focus of recovery efforts. Some of the report sections could easily be amended for insertion directly into a strategic plan document. The report also includes recommendations about next steps and an organizational framework for the County to move toward a more comprehensive approach to hazard management that includes a recovery plan.

Training participants from Garfield County were:

- Bob Prendergast, Senior Financial Analyst
- Charles Zelenka, I.T. Director
- Matt Anderson, Senior Contract Administrator
- Diane Watkins, Services Administration

- Lynn Renick, Human Services Director
- Wyatt Keesbery, District Foreman, Roads and Bridges
- Fred Jarman, Building and Planning Director
- Marvin Stephens, Roads and Bridges Director
- Katherine Ross, Director of Human Resources
- Kraig Kuberry, Roads and Bridges Assistant Director
- Brian Condie, Airport Director
- Randy Withee, County Engineer
- Dale Hancock, General Services Agencies Director
- Jim Rada, Environmental Health Manager, Public Health
- Paul Reaser, Environmental Health Specialist, Public Health
- Marjorie Widmer, Accountant II, Recovery Team Co-Leader
- Ed Green, County Manager
- Lisa Dawson, County Finance Director
- Judy Jordon, Oil and Gas.

1.1 WHAT IS LONG-TERM POST-DISASTER RECOVERY PLANNING?

Post-disaster recovery planning provides a blueprint for restorations of a community after a disaster occurs. This can be done through long and short-term strategies, that might include planning, policy changes, programs, projects, and other activities such as business continuity planning. Post-disaster recovery planning is a shared responsibility between individuals, private businesses and industries, state and local governments, and the federal government.

Post-disaster recovery planning defines a community's vision of how it would like to rebuild in the aftermath of a disaster. If a community engages in post-disaster recovery planning prior to the event, it can more effectively direct outside redevelopment resources from federal, state, or other regional authorities once the disaster occurs. This way, community redevelopment and recovery takes place in a manner that is consistent with community values.

1.2 WHY PLAN FOR POST-DISASTER RECOVERY?

It is impossible to predict exactly when natural disasters will occur, or the extent to which they will affect a community. However, with careful planning, coordination, and collaboration, public agencies, private-sector organizations, and citizens within the community can efficiently respond to the issues that result from natural disasters. Post-disaster recovery planning that takes place before a disaster can help a community more effectively respond to and recover from natural disasters. Establishing recovery strategies prior to the event helps ensure that communities are rebuilt according to the vision that is shared by and benefits all community members.

Research has shown that reducing risk from natural disasters requires the integration of land use planning, coordination by government, and extensive public participation. An integrated approach is most effectively achieved through a collaborative planning process that includes a full range of decision-makers with a stake in the issues (stakeholders). These stakeholders include local government staff, elected officials, business interests, property owners, and interest groups. D.S. Mileti notes that it takes time and money to involve stakeholders, but the long-term savings compensate for this investment because the resulting mitigation options are more likely to be accepted. Similarly, R.J. Burby emphasizes that the involvement of a broad base of stakeholders builds partnerships and constituencies. The Federal Emergency Management Agency (FEMA) points out that this more collaborative approach "goes well beyond the scope of traditional emergency management and touches areas of planning, development, economics, education, critical care, and cultural facilities." FEMA's how-to guide suggests that putting this concept into operation depends upon the participation of the entire community. Public participation can supply valuable information to planners as well as help maintain a positive relationship with the public. The exchange of information and common interests can create a significant sense of ownership in the community.

Section 2 Community Profile

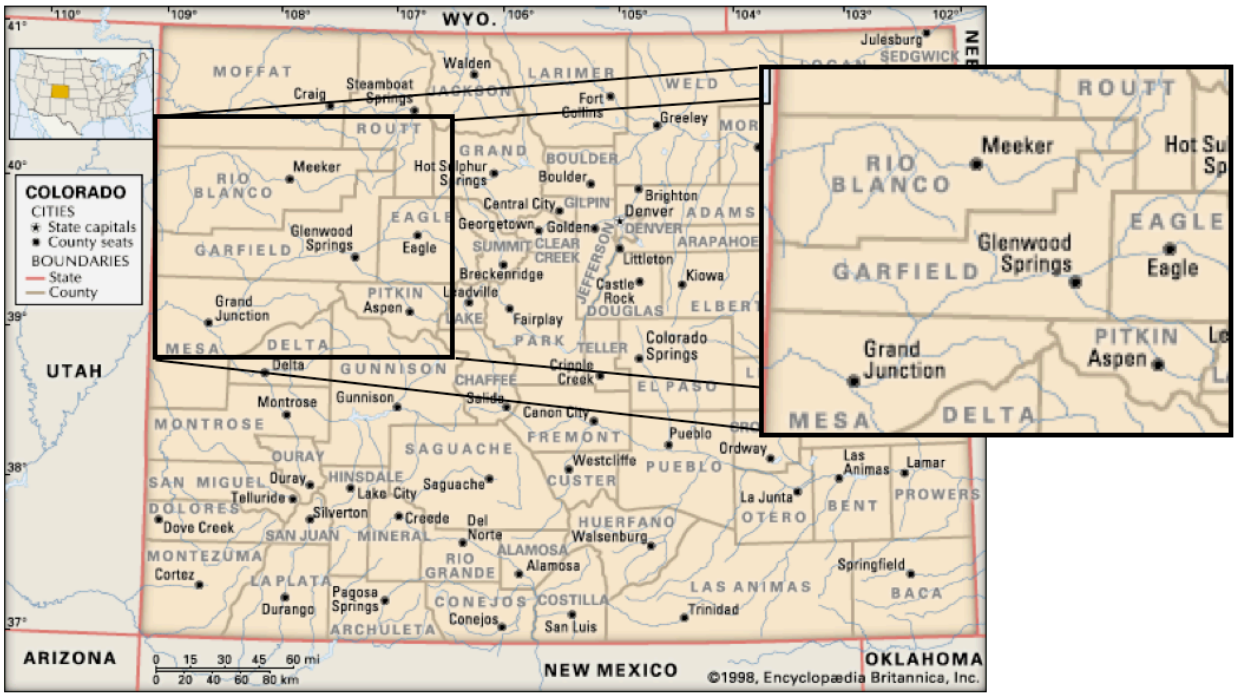
A community's population, economy, development trends, and facilities and infrastructure all play a role in the impact that natural disasters have and how communities plan for reducing risk and recovering from a disaster. This section describes Garfield County in terms of its geography, population, economy, land and development, and critical facilities and infrastructure, as it relates to risk and recovery issues. It is based on a review of previous studies that have documented the County's physical and economic diversity, and the output from the training session process conducted with County staff.

This report will assess the trends and characteristics because considering these community attributes during the planning process is crucial in the identification of appropriate strategies for post-disaster recovery.

2.1 GEOGRAPHY

Garfield County is located in northwestern Colorado. Rio Blanco County borders Garfield County to the North. Routt and Eagle Counties form the eastern border. Pitkin and Mesa Counties lie to the south and the state of Utah (Grand and Uintah Counties) is the western boundary. The county seat and largest city is Glenwood Springs, Colorado, which is in the southeastern part of the County. Figure 1 provides a map.

Figure 1. Area map, Garfield County, Colorado



Source: Encyclopedia Britannica, Accessed June 3, 2009 <http://student.britannica.com/comptons/art-59713/Colorado-counties>

The County encompasses nearly 3 thousand square miles, about 60% of which is federally owned[1]. The County is very geographically diverse: mountains, plateaus/mesas, canyons, and the Colorado River are the main geographical features. Mining and timber harvesting have somewhat altered the landscape of the County over time, as well as its vulnerability and risk to natural hazards.

2.2 POPULATION

According to the US Census Bureau estimates, the population of Garfield County in 2008 was 55,426. Between 2000 and 2008, the population of Garfield County increased by 26.6%, almost double the State growth rate of 14.8%. In 2006, the Colorado State Demography Office projected that Garfield County's population would reach 146,271 by the year 2035, with rapid average annual percentage change compared to most other counties in the State. Approximately 48.7% of the population is female and nearly 2/3rds of the County's residents are either under that age of 18 or over 65

[1] Garfield County website << http://www.garfield-county.com/Index.aspx?page=698>>, accessed May 26, 2009

(26.9% and 8.8% respectively). The median age in the County is 34, making it a relatively young population.

While natural hazards do not discriminate, the impacts -- in terms of loss and the ability to recover -- vary greatly, depending on demographic characteristics. According to Peggy Stahl of FEMA's Preparedness, Training and Exercise Directorate, 80% of the disaster burden falls on the public and women, children, minorities and the poor bear a disproportionate amount of this burden. The 2007 Census estimate noted that 7.8% of the County's residents were living below the poverty line. Additionally, 15.5% of households in Garfield County speak a language other than English in the home[2].

2.3 ECONOMY

The top industries in Garfield County are energy development, tourism, ranching, and farming. These economic characteristics of the County demonstrate the County's dependence on the land and natural resources.

The top employment sectors in the County in 2005 were government (17.2%), construction (15%), retail trade (13.6%) and accommodation and food (11.2%)[3].

In 2007, the socio-economic assessment conducted for the County by BBC Research & Consulting noted that steady unemployment between 1997 and 2005, even accounting for workforce growth, reflected a strong local economy. The Land Values Study (2006) by the same firm also identified three economic regions of the County roughly approximated as the eastern half (rural, sparsely populated, mostly public lands), the eastern /midsection of the County (I-70 Corridor through five municipalities supporting the majority of county residents and their needs) and the southeastern corner (geographically and, therefore, economically aligned with the resort and recreation service sector of the region that is anchored by Aspen and Pitkin County.

Impacts of a disaster event should also be considered in terms of their effect on individual income. Median household income in the County in

[2] U.S. Census Bureau, State and County QuickFacts <<http://quickfacts.census.gov/qfd/states/08/08045.html>> accessed May26, 2009

[3] Garfield County Socio-Economic Impact Study, 2007

2007 was $64,173. Garfield County's 2007 median household income was higher than that of the State ($55,517) and national statistics ($50,740)[4].

Mean travel time to work in 2000 was slightly more than 30 minutes, suggesting that many residents travel to other communities for work, or live far from employment centers. The County's road system is critical to its economy.

2.4 LAND AND DEVELOPMENT

One unique characteristic of Garfield County is its urban/rural divide: the western area of the county is sparsely populated while the major population and economic activity centers are in the central section along the Colorado River / I-70 corridor[5]. This development pattern results in an overall low density in the County, 14.9 people per square mile[6].

The Census Bureau estimates that the County has about 20,700 housing units with a 9.3% vacancy rate and 67.1% owner occupancy rate, putting Garfield County on par with national rates (11.6% and 67.3%, respectively)[7].

The 2006 Land Values Study documented the impact of the 1990's residential development boom in Garfield County - construction became a leading employment sector. The availability, and affordability of housing spurred development and attracted residents from nearby Counties (Eagle, Pitkin).

2.5 CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities and infrastructure are vital to the continued delivery of key governmental and private services as well as recovery efforts. The loss of these services significantly impacts the public's ability to recover from a disaster event. These critical facilities include, but are not limited to:

- 911 call centers

[4] U.S. Census Bureau, State and County QuickFacts <<http://quickfacts.census.gov/qfd/states/00000.html>> accessed May26, 2009

[5] Garfield County Socio-Economic Impact Study, 2007

[6] U.S. Census Bureau, State and County QuickFacts <<http://quickfacts.census.gov/qfd/states/08/08045.html>> accessed May26, 2009

[7] U.S. Census Bureau, 2005-2007 American Community Survey 3-Year Estimates. <<http://factfinder.census.gov/servlet/ACSSAFFFacts>>

- Emergency operations centers
- Police and fire stations
- Public works facilities and utilities
- Hospitals
- Bridges and roads
- Shelters

Facilities that may cause secondary impacts if damaged, contaminated, or destroyed, such as hazardous material storage sites, are also considered critical facilities. The main critical facilities and infrastructure in Garfield County are summarized below.

I-70 runs through the southern part of the County, creating a population and economic corridor and providing a direct route to Denver (about 3 hours from Glenwood Springs). State Highway 139 runs north/south through the County's western section and State Highway 13 divides the County vertically. State Highway 82 runs from Glenwood springs through Carbondale and the southeastern corner of the County, connecting to Pitkin County and Aspen.

One concern with other, smaller, county roads is that Garfield County does not have set standards for construction practices including protocol for dealing with impacts from erosion, runoff, rutting, debris, and mudslides or other potentially hazardous activity.[8]

Garfield County is a corridor of commerce in western Colorado and hazardous materials are commonly transported through the County by truck and rail transport. Hazardous material travels along Highways 139, 13, and Interstate 70. Additionally, the Union Pacific Railroad operates rail lines along the Colorado River through the County.

2.6 CONCLUSIONS

Garfield County has grown rapidly over the last decade and the population has remained relatively young thanks to this influx. Natural resources, recreation opportunities, and easy access to population and employment centers in neighboring counties make Garfield County the ideal home for those seeking the active and mobile or quiet and secluded lifestyle. Residents commute time reveals the interdepdency of

[8] 2000 Garfield County Comprehensive Plan; from the section discussing Roan Creek and west.

municipalities – resident may live and work in different town or even cross the County line on daily or weekly basis.

Mobility is a key part of life in Garfield County as it is not only situated in the middle of a triangle connecting Steamboat Spring in the North, Aspen to its southeast, and Grand Junction to the south west but also the Colorado River, Highway I-70, and Union Pacific Railroad all take approximately the same path through the County. The concurrency of these major transportation pipelines has resulted in the concentration of population and economic activity along the route and created a marked urban/rural divide in the County.

Section 3 Workshop Outcomes

3.1 PRIMARY HAZARD RISKS

In workshop discussions, ECO gathered information about the hazards that impact the County, and the vulnerable infrastructure and populations that are likely to be impacted by hazard events. This section presents the results. The assessment of risk outlined in this document should be viewed as a starting point for more detailed conversations about risk and vulnerabilities. For ideas about how to build on this foundation for a better understanding of County-wide risk, please see the recommendations section of this report.

Based on the results of the workshop, the hazards most likely to affect the County are:

- Fire
- Flood (especially flash flood)
- Hazardous materials spills
- Landslide / rock fall

Other hazards, which have lower frequency or lower severity, but still might affect the County, include:

- Snow storms / severe weather
- Infectious disease (including agricultural and livestock outbreaks) / pandemic
- Terrorism / eco-terrorism / school safety and security
- Airport safety and security

WILDFIRE

Garfield County has significant wildland-urban interface areas and is subject to seasonal wildfire hazard (April – October). The major cause of ignitions is natural (lightning). Secondary (and much less frequent) causes are agricultural burns and other human-caused ignitions. Fuel sources are trees, ladder brush, and underbrush. Cheat grass and beetle-killed trees are geographically-specific fuel sources.

Garfield County does not current have a Community Wildfire Protection Plan (CWPP), but the State of Colorado has mandated that it complete one by 2011.

FLOOD

Flash floods are an annual concern for the waterways in Garfield County. Major causes include rain-on-snow and any severe weather event with major precipitation. They are often more severe following a fire event, when the vegetation that normally slows the flow of water into waterways is burned.

Vulnerabilities include road systems (bridges; County roads, State Highways, and I-70; culverts), County drinking water supplies, railroads, and repetitive loss properties and mobile homes in the floodplain.

Standing water is a more minor flooding concern, which affects geographically-specific portions of the County but has not caused major property damage.

County flood maps are incomplete and have not been updated in decades. Because flood maps are the foundation for flood insurance and development standards in flood planning, complete and updated mapping is an important part of a flood mitigation strategy.

HAZARDOUS MATERIALS SPILLS

Hazardous materials spills occur frequently (as often as annually) in Garfield County. The major sources are trains and trucks on hazardous materials routes (1-70 and SH 13). These hazardous materials routes run near the County's major population centers and adjacent to the rivers that serve as the County's drinking water sources. Additionally, I-70 runs through a steep canyon; egress can be an issue. A second source is natural gas and industrial accidents.

Workshop participants identified communications as an issue around hazardous materials. Reporting among private industry representatives, railroads, the Sheriff, the State, and the County could be improved to provide a more comprehensive approach to addressing hazardous materials spill. Some drinking water protection plans are in place; these can improve coordination among jurisdictions when hazardous materials spills occur in waterways.

LANDSLIDES / ROCK FALL

Landslides and rock fall events that affect transportation occur at least annually in the County. Landslides or rock falls that cause the greatest impact are those that occur along I-70. Because this route is critical to the County economy and serves as a lifeline for some isolated communities, rock falls or landslides that block this route can cause major disruption.

OTHER HAZARDS

Other hazards that have a lower impact or lower frequency include:

- While **snow and ice storms** occur annually (sometimes weekly) in Garfield County, major events that close roads, schools, and cause electrical power outages are less frequently.
- County public health officials have been planning for **infectious disease outbreaks and/or pandemic events** for some time. The County may have greater exposure to these events than other low-density communities because of the regular influx of tourists traveling from destinations across the globe. Agricultural and animal diseases are also a concern because of the importance of this sector to the County economy. Public health planning should be integrated into other emergency planning, response, and recovery efforts.
- Workshop participants mentioned the need to plan for **terrorism** (especially domestic or **eco-terrorism**) events, as well as **threats to safety in the schools**. While these are lower-frequency events, the impact to the community can be quite dramatic.
- Workshop participants also mentioned **airport safety** as an important issue for the County. Because the community is relatively remote and airports are located is in high-elevation and mountainous areas, airport access is critical and (relative to other airports) dangerous.

3.2 FINDINGS BY THEME

In addition to identifying the hazard risks that the County faces, ECO asked the workshop participants to identify and prioritize the key hazard-related issues that should be considered in recovery planning efforts. Participants were asked to use a series of worksheets, organized by themes, to brainstorm these issues. In discussion and using a dot prioritization exercise, ECO worked with participants to determine which themes and issues are most critical to consider and plan to protect before and recover after a disaster.

The following provides an overview of the themes and prompting questions that define them. They are organized *in the order in which participants prioritized them* (ie, the first theme listed has the most priority issues in it). More detailed results (including the issues in each theme) are contained in the sections that follow:

(1) **Infrastructure and critical facilities**: What infrastructure and critical facilities are impacted? Which will be accessible and operational post-disaster? Which need to be operational?

(2) **Population**: Where are the high population densities for residents? Are any in high hazard zones? Are there special-needs populations elderly, disabled, non-English speakers) in the high hazard zones? Where are these significant non-residential populations (employees, tourists)?

(3) **Economy**: Are businesses affected? What types of businesses? What businesses represent significant components of your community's economy? Are alternate commercial spaces available if current stock is damaged?

(4) **Environmental resources**: What are the key environmental assets? How important are they to quality of life and the economy? Are hazardous materials located near environmental assets?

(5) **Land and development**: Do current development patterns or land use plans minimize development in high hazard zones? Is your community growing or projected to grow in hazard zones? Is the community capable of providing temporary shelter and housing?

(6) **Cultural resources**: What are the key cultural or historic resources in the County? Are these also significant economic assets?

The remainder of this section provides the results of the issue identification and prioritization process.

INFRASTRUCTURE AND CRITICAL FACILITIES

Workshop participants clearly felt that maintaining the function of infrastructure and critical facilities should be a key focus of recovery planning efforts. Specifically:

- **Access and mobility** were the single most frequently mentioned issues throughout the entire process, across all issues. For infrastructure and critical facilities, this means:
  - **Keep I-70 open and functional**. This interstate highway is critical to the successful functioning of the County economy both because it moves good and services and because County residents use it to access their jobs. It is also vulnerable to landslides and rockslides, hazardous materials spills, flash floods, and severe weather events. Participants mentioned that creating redundancy in this route might be difficult or impossible due to the terrain that surrounds it.

- **Maintain SH 13 and County roads**. While less critical for commerce, these routes are also critical to the County's economy and are vulnerable to flash floods, landslides, and other hazards.
- **Maintain rail lines, bus routes, and airport service**. Participants did not rank these issues as highly as roads-related infrastructure, but they were nonetheless clear priorities.

- Also high on the list of priorities were issues related to **waste and debris disposal** and maintaining **water and sewage lines.**
- Several participants prioritized maintenance of **electrical power** and **communications infrastructure**. Many of these critical utility lines are located in high-hazard zones along I-70 and other transportation routes.
- **Facilities to house evacuees** were the final key issue to be considered in planning for critical facilities.

POPULATION

Close behind critical facilities and infrastructure in priority was population. Priority issues were:

- The highest priority issue related to population was planning to **provide supplies during recovery**, including food, water, and medical equipment and pharmaceuticals. This priority issue is related to the access issue described above, and requires roads and airports to remain open and functional.
- Participants were also prioritized planning for the needs of **vulnerable and special-needs populations**, including isolated residents, tourists, non-English speaking populations, and mobile home residents (who are most vulnerable to flooding because of the location of their homes). Each of these populations has unique needs when preparing for, responding to, and recovering from a hazard event.
- The third priority related to **keeping finance, business, and government functional** during the response and recovery phases of a disaster. This means assuring that employees can get to and from work, that paychecks can be processed, that banks have the resources they need to continue to function, and that government continues to provide critical functions such as garbage disposal, sewage and water treatment, social services provision, and etc.
- A final concern related to **employees prioritizing family over job duties.** Related to the issue in the bullet above, this issue emphasizes the fact that, in a hazard event, individual priorities often shift toward caring for loved ones rather than their job responsibilities.

Business and government cannot continue to function without employees.

ECONOMY

As has been reflected in the issues described above, the economy was of central concern to many workshop participants. Specifically, participants pointed to the **critical function of I-70** for (1) getting people to their jobs and to tourist destinations, and (2) shipping the goods and services that underpin the Garfield County economy. This is made especially urgent by the fact that the freeway is vulnerable to several hazards that occur on a regular basis. The **railroad**, which in some places runs parallel to the freeway and has similar vulnerabilities, was also sited as a critical priority for the economic function of the County.

Other issues that were also mentioned (but were not key priority issues from the perspective of workshop participants):

- The **oil and gas industry** is an important sector of the County economy. Planning to keep it functional post recovery could improve the overall recovery efforts of the County.
- Wildfire can devastate the aesthetic qualities that draw tourists, as well as the wildlife and fish habitats that draw hunters. **Tourists and hunters** are both important to the Garfield County economy.
- Recovery efforts can draw on **volunteerism** and the **expertise of industry** representatives to improve its success.

ENVIRONMENT

Environmental assets are critical to the County because of their intrinsic as well as economic value for the tourism economy. Prioritized resources were:

- **Rivers.** In Garfield County, rivers are the main source of drinking water. Major rivers are located near hazardous materials transportation routes as well as industry and mining efforts, which makes them vulnerable not just to turbidity and other effects of flooding, but also to hazardous materials spills and pollution.
- **Clean air and sunshine.** Both are important for health as well as for the aesthetic qualities that make Garfield County a draw for new residents and tourists.
- **Wildlife.** Important to residents and tourists alike, workshop participants prioritized recovery efforts targeted at maintain an ecosystem that supports wildlife.

- **Trees.** Specifically, workshop participants were concerned about beetle infestations that are destroying trees in the County and creating additional fuel for wildfires.

LAND AND DEVELOPMENT

The severity of damage from a natural disaster depends upon the types of land use and the patterns of development in a community. Planning for the recovery process can be expedited and redevelopment can be systematic rather than random. Prioritized issues in this category included:

- Participants found it important to have the **best available data about land use patterns** to support decisions about where and how the County should grow. This is especially true of **floodplain maps**, which are incomplete and have not been updated for decades. Accurate, current floodplain maps are important because they determine where flood insurance requirements apply.
- Participants pointed out that much of the expected **population growth** in the County is expected to occur in wildland-urban interface areas, which could increase the vulnerability to that hazard. Much of the existing population is already located in hazard-prone areas in the interface and along rivers and hazardous materials routes.
- Implementing programs that educate residents about and assist them with creating **defensible space around homes in the wildland-urban interface** to reduce the risk of wildfires.

CULTURAL AND HISTORIC RESOURCES

Cultural and historic resources are important to recovery processes because they are the parts of the County that define the County's identity. Workshop participants prioritized:

- **Hunting and fishing**, along with all other outdoor activities, are important parts of the culture in Garfield County.
- The **Hotel Colorado and hot springs** bring tourist and are also enjoyed by County residents. Both are historic sites that are known broadly beyond the region.
- The **Downtown District in Glenwood Springs** is a critical retail center with historic mixed-use buildings that is appreciated by residents and by tourists alike.

OVERALL FINDINGS

Across all themes, the issues with the highest priorities all related to access and multi-modal transportation issues. In particular, I-70 is important when considered from the perspective of any of the themes. It is important for moving people, for moving goods and services, creates risks for natural resources (because it is a hazardous materials route), for supporting and contributing to growth patterns, and for accessing historic and cultural resources. Other key access routes include SH 13, County roads, railroads, bus lines and airports.

Secondary priorities include supporting and planning for vulnerable populations, planning to keep business and government functioning, and maintaining the natural environment.

Section 4 Post-Disaster Recovery Framework

Current events as well as research continue to demonstrate the importance of pre-disaster planning and the crucial connection between preparing for, responding to, recovering from, and mitigating the effects of disasters. Historically there has been a focus on emergency response and preparedness and limited attention and resources given to holistic risk reduction (e.g. mitigation, continuity of operations, and recovery).

The global and national disaster events of the last several years have more than proven that disasters strain the ability of individuals, communities, states, and the national governments to pay for losses, and the capability of governmental and nonprofit relief agencies to respond. The 2004 and 2005 hurricanes affecting the Florida and Gulf Coast have highlighted what has long been known by researchers that many costs associated with disaster events—including social and economic disruption—are difficult to quantify but have profound, long-term impacts on communities. Disaster events have the ability to weaken and erode the core of any community, its businesses, social establishments, and its population.

The purpose of this section is to present the proposed framework and draft recommended actions that can be implemented to address post-disaster recovery planning in Garfield County, Colorado. The following framework and recommendations do not constitute a post-disaster recovery plan, but they do outline the initial steps the County can take towards addressing catastrophic, long-term post-disaster recovery based on national research and forum findings.

4.1 COUNTY DISASTER RESILIENCE FRAMEWORK

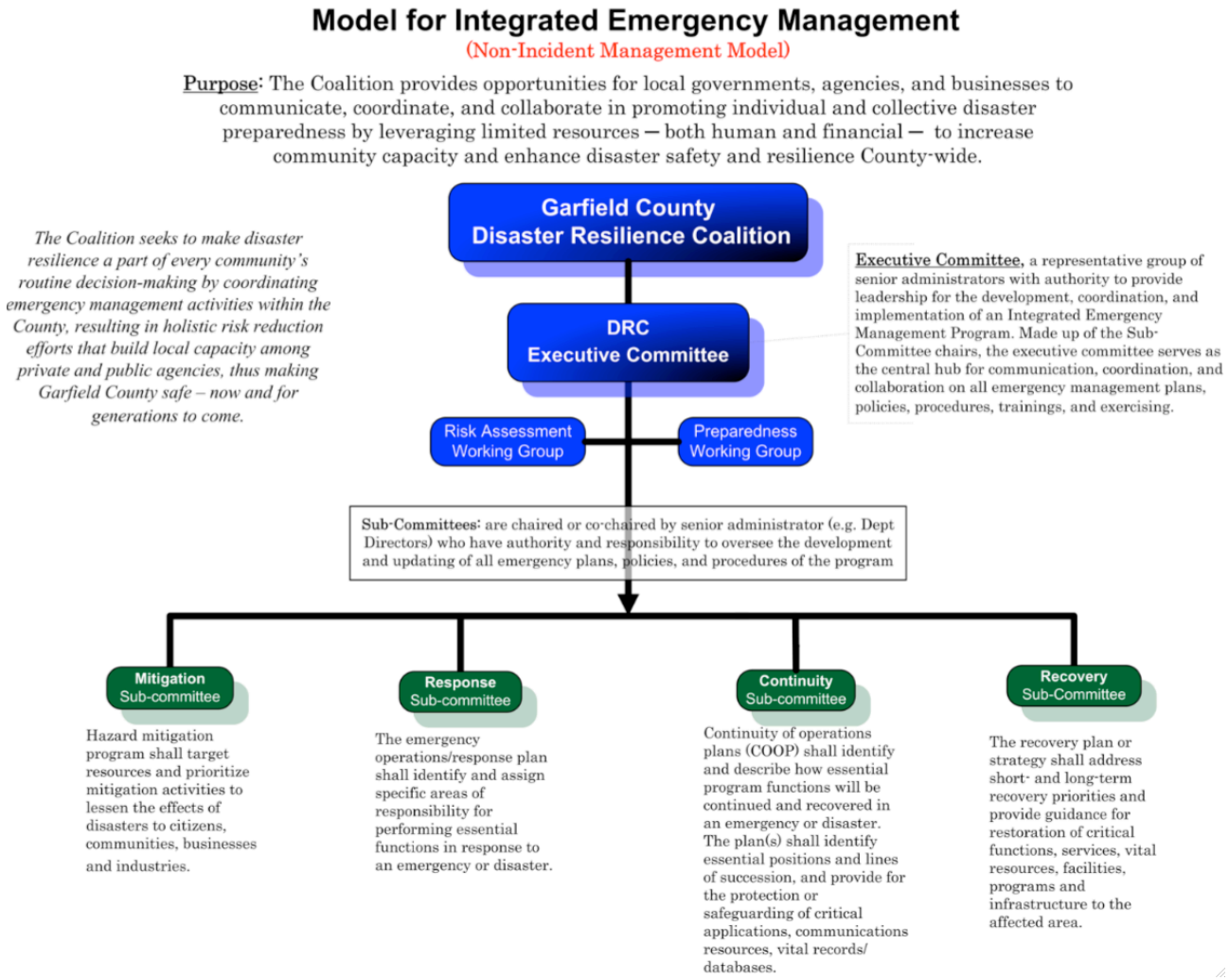
To be successful, emergency management practices must be integrated into current and future County plans, policies, procedures, as well as the daily decision-making processes of County staff and leadership. This integrated approach offers a model for increased communication, coordination, and collaboration between diverse partners – both internal and external to the County – that can be used to increase capacity to prepare, respond, and ultimately reduce risk to all types of crises and disasters.

The integrated systems approach to emergency management and continuity of operations will assist the County not only in preparing to respond to crises and disasters, but in identifying opportunities to mitigate risk and prevent loss. Further, it will assist with establishing continuity of operations and recovery strategies for all types of events–regardless of their size and complexity. Engaging in an integrated and coordinated emergency management program provides the County with a number of benefits, including:

- Reduced vulnerability and exposure to future crisis and disaster events
- Protection of life, property, the environment, essential services, and critical facilities
- Diminished post-disaster economic hardship for the County's residents and businesses
- Reduced short-term and long-term recovery and reconstruction costs
- Quicker resumption of County functions
- Increased cooperation and communication within the community through the planning process, training, and exercising

An integrated emergency management approach provides a comprehensive, cost-effective method for a County to bring together resources – both human and financial – to enhance safety and disaster resilience. Figure 2 on the next page provides an overview of this systems approach.

Figure 2: An Integrated Systems Approach to Emergency Management



Source: Andre LeDuc, University of Oregon, 2009

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4.2 RECOMMENDATIONS

The sections that follow present specific recommendations or actions that Garfield County should consider as it strives to achieve disaster resilience. Many of these activities cross multiple phases of the disaster cycle and involve a wide range of interests. The information gathered at the workshop allowed the recommendations in this section to be tailored to the local context of Garfield County. The combination of place-specific data with background research into disaster planning theory and case studies on post-disaster recovery successes and failures forms the rationale for all the suggested actions in this section.

The actions are intended to be a starting place. Each action will need additional research and consideration before implementation. The County may choose to not to implement some of these actions, and may have other ideas that are not included here. As a starting place, the Disaster Resilience Coalition (recommended in Action 1.1) should develop a strategic plan that determines which of the actions should be implemented, and in what priority order. Local staff should make decisions about which actions should be implemented first.

The recommended actions are summarized in Figure 3; more detail follows the Figure.

Figure 3: Garfield County Recommendation Summary

Action	Summary
Disaster Resilience Committee Recommendations	
1.1	Establish a Disaster Resilience Coalition (DRC)
1.2	Develop multi-year strategic plan for the DRC
1.3	Develop a County hazard identification, risk assessment, and consequence analysis
1.4	Develop a Continuity of Operations Plan for County functions
1.5	Develop a Pre-Disaster Mitigation Plan
Disaster Recovery Recommendations	
2.1	Develop post-disaster recovery ordinance for Garfield County
2.2	Develop funding matrix for recovery and mitigation
2.3	Establish comprehensive disaster communications strategy
2.4	Determine priorities for utility restoration
2.5	Develop strategies for transportation network restoration
2.6	Establish a debris management plan
2.7	Assist businesses with continuity planning
2.8	Create a list of qualified local contractors for post-disaster recovery work
2.9	Create a post-disaster housing plan (including a vacant home database)
2.10	Increase communication and outreach to special-needs populations

Source: Oregon Partnership for Disaster Resilience and ECONorthwest, 2009

Disaster Resilience Coalition Recommendations

The following recommendations assist the County in developing an interdisciplinary approach to emergency management that leverages the human resources and partnerships to provide planning and technical assistance to help solve complex vulnerability issues, and improve overall safety and quality of life in Garfield County. Again, the County will need to determine the priority for implementing these actions, but beginning by establishing a Disaster Resilience Coalition will provide a forum for discussions about a more integrated approach. The bullets that follow each action describe the rationale for implementing it and provide additional information about the action.

Action 1.1: Establish a Disaster Resilience Coalition (DRC)

- Provides the executive leadership for a comprehensive collaborative emergency management program in the county and coordination with program stakeholders that defines the mission, goals,

objectives, and milestones for the emergency management program and includes a method for implementation.

- "An interdisciplinary reconstruction planning task force is the best way to guide the process of constructing a plan."[9]
- Coordinated planning allows communities to access resources that are unavailable to communities without coordinated planning efforts, such as support for Local Mitigation Plans, as described in the Disaster Mitigation Act of 2000.
- Required by national standards and accreditation programs.
- May include representatives from cities or other partners if appropriate.
- The DRC would be responsible for assessing the need for and then overseeing the implementation of the remainder of the actions recommended in this document.

Action 1.2: Develop a multi-year strategic plan for the DRC

- The County and the DRC both need a guiding document that clearly defines the DRC's vision for an integrated and collaborative emergency management program.
- "A multi-year strategic plan, developed in coordination with program stakeholders defines the mission, goals, objectives, and milestones for the emergency management program" (EMAP).
- A multi-year strategic plan clearly defined roles and authorities for all stakeholders to support enhanced coordination in planning efforts while still allowing for appropriate specialization from experts.
- The strategic planning process should begin by considering the organizational structure outlined in Figure 2 to determine (1) if it is should be modified, and (2) the membership of each of the working groups and subcommittees. The strategic plan process should also consider the remainder of the actions recommended in this document, add to them as necessary, and prioritize them for implementation.

9 American Planning Association. 1998. Planning for Post-Disaster Recovery and Reconstruction. Planning Advisory Service Report Number 483/484

Action 1.3: Develop a County hazard identification, risk assessment and consequence analysis

- Provides the all hazard data set that can be use to produce its jurisdiction-wide assessment of risk and plans (e.g. response, recovery, continuity and mitigation). The risk assessment is a foundational document.
- Provides detailed data and loss estimation projections, business impact and post-event assessments.
- "Consider the impact on the public; responders; continuity of operations including continued delivery of services; property, facilities and infrastructure; the environment; the economic condition of the jurisdiction and public confidence in the jurisdiction's governance." (EMAP)

Action 1.4: Develop a Continuity of Operations Plan (COOP) for County functions

- Workshop participants highlighted the need for ongoing functioning in government services, including road maintenance and debris removal, sewage and water treatment, and temporary housing and other social service provision.
- Continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communications, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization's most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility.[10]
- Research has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. Preventing turnover is also important so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure.[11]

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10 Florida Division of Emergency Management. 2002. Internet Library – Continuity of Operations Plans. http://floridadisaster.org/internet_library.htm Accessed on 21 June 2006.

11 Wilson, Richard. 1991. The Loma Prieta Quake: What One City Learned. Washington, DC: International Association of City Managers.

Action 1.5: Develop a Pre-Disaster Mitigation Plan

- Mitigation results in cost savings to County "For every dollar spent on mitigation society can expect an average savings of $ 4"[12].
- Plans are required to comply with the Disaster Mitigation Act 2000.
- Become eligible for Pre-Disaster Mitigation (PDM) and Post-Disaster Hazard Mitigation grants. FEMA provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. A FEMA-approved mitigation plan is required to receive funds.
- Connects to other plans (e.g. land use, transportation, capital improvements, COOPs and risk assessments, etc.) for comprehensive approach to implementation of mitigation actions.

Disaster Recovery Recommendations

The following preliminary recommendations are broad actions that cut across all six of the issue themes – population, economy, critical facilities and infrastructure, land and development, environmental resources, and cultural and historic resources. These actions should be seen as a starting point for the development of a post-disaster recovery plan. Each action will need additional research and consideration before implementation.

Action 2.1: Develop post-disaster recovery ordinance for Garfield County

- Ordinances will help to define and give legal authority to take necessary actions in a post-disaster environment.[13]
- There will be a surge in building permits post-disaster. This can cause a backlog of applications resulting in "…poor oversight in the permitting process, inadequate and hurried inspections, and public disgruntlement at the slow pace of recovery."[14]

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[12] Multihazard Mitigation Council (MMC). 2005. Natural Hazard Mitigation Saves: An independent Study to Assess the Future Savings from Mitigation Activities. Washington, D.C.: National Institute of Building Sciences

13 Ibid.

14 Ibid.

Action 2.2: Develop a funding matrix that provides a list of potential funding mechanisms for disaster recovery and mitigation activities

- "Resources that may not be available on a routine basis for certain improvements may become available from various disaster relief sources, particularly where careful planning has allowed the community to identify certain needs in advance, saving critical time in the aftermath of a disaster."[15]
- If a community has a plan, control over recovery issues remains local.[16] Knowing what funding sources might be available in advance, and establishing partnerships with funding agencies, can reduce research and outreach time when the resources are most needed.

Action 2.3: Establish comprehensive disaster communications strategies to address response and long-term recovery needs

- Investing time and effort in creating an effective communication system for natural disasters requires active interaction between many different organizations.[17] This is achieved through effective, operating communication channels pre- and post-disaster.
- Some critical communications infrastructure is located in high-risk corridors in the County (along the I-70 corridor) and is subject to potential impact. Workshop participants expressed some concerns about the resilience of this system.
- Once a communication system is formed for different levels of transferring messages during an emergency, public education for residents and visitors should be provided so that the community can use system.

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15 American Planning Association. 1998. Planning for Post-Disaster Recovery and Reconstruction. Planning Advisory Service Report Number 483/484

16 Ibid.

17 Wilson, Richard. 1991. The Loma Prieta Quake: What One City Learned. Washington, DC: International Association of City Managers.

Action 2.4: Determine priorities for post-disaster utility restoration

- Protecting utilities from damage can minimize the economic and social disruption caused by natural disasters.[18]
- Restoring utility services is an essential prerequisite for beginning other recovery efforts (i.e. economic recovery, hospital services, and public facilities) to put a community back online.[19]
- The demand for utilities immediately after the disaster includes clean drinking water and proper sanitation. The restoration of utilities will guide recovery efforts. Workshop participants prioritized these, along with electricity, as key issues that should be considered in ongoing planning efforts.

Action 2.5: Develop post-disaster strategies for restoring local transportation networks

- As has been highlighted throughout this report, workshop participants felt that transportation networks are central to the County's efforts to improve its overall resilience.
- "The condition of bridges and streets is a very important component of post-disaster data assessment."[20] A list of actions related to bridge and street protection can be used to mitigate problems today.
- Damaged transportation systems may delay the arrival of goods, services, and resources vital to response and recovery efforts.

Action 2.6: Establish a debris management plan

- "Debris clearance is often traffic clearance as well, to the extent that roadways are blocked by felled trees or flood muck and thus impede other recovery functions."[21]
- "Ensuring the smooth function of this service also speeds the clearance of debris-ridden sites so that properties may be repaired

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18 Natural Hazard Research and Application Information Center. 2001. Holistic Disaster Recovery: Ideas for Building Local Sustainability After a Natural Disaster. Fairfax, VA: Public Entity Risk Institute.

19 American Planning Association. 1998. Planning for Post-Disaster Recovery and Reconstruction. Planning Advisory Service Report Number 483/484

20 Ibid.

21 American Planning Association. 1998. Planning for Post-Disaster Recovery and Reconstruction. Planning Advisory Service Report Number 483/484

and rebuilt, and enhances the prospects for economic recovery by eliminating potential eyesores."[22]

- Debris management needs to be determined prior to a hazard to ensure a coordinated response.
- Often, debris management is one of the largest local expenditures following a disaster. Having a plan ahead of time may assist the community in curbing excess spending post-disaster.

Action 2.7: Assist businesses in developing business continuity plans

- Business continuity plans assist businesses in determining appropriate insurance coverage, review lease stipulations, mitigate against potential risks, and plan for future recovery efforts.[23]
- Research has shown that most small businesses are unable to recover after a disaster. Many businesses will face significant damage in the event of a disaster. Workshop participants prioritized issues around maintaining business functions following a hazard event.
- Business continuity plans allow businesses and their employees to be better prepared for a disaster. Having plans in place may reduce the impact on the business, allowing employees to continue to work or get back to work faster.

Action 2.8: Create a list of qualified local and regional contractors to perform recovery work post-disaster

- Historically, local contractors are not awarded post-disaster contracts. For instance, after Hurricane Katrina FEMA awarded no-bid contracts to four large national firms.[24] (National Public Radio, 2006). If contracts had been awarded to local firms, businesses would have been able to provide local jobs and revenue would have stayed in the community.

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22 Ibid.

23 Alesch, Daniel J. et al. 2001. "Organizations at Risk: What Happens When Small Businesses and Not-for-Profits Encounter Natural Disasters," The Public Entity Risk Institute.

24 National Public Radio. 2006. "Gulf Coast Firms Question Government Contracts." http://www.npr.org/templates/story/story.php?storyId=5382000 Accessed on 21 June 2006.

- Keeping jobs local adds to a community's overall economic sustainability by adding to the local tax base and providing job opportunities to residents.[25]

Action 2.9: Create a post-disaster housing plan that includes a vacant home database

- Workshop participants in Garfield County described a need to identify appropriate locations for temporary housing, and to plan for the ongoing provision of County housing services during the recovery phase.
- National databases were created after hurricane Katrina that allowed individuals to donate or find shelter. A good example is www.hurricanehousing.org. A similar framework could be used in Garfield County.
- Research has shown that post-disaster temporary housing often becomes permanent because regulations about non-conforming uses have not been passed.[26]

Action 2.10: Increase communication and outreach through citizen-to-citizen networks for special-needs populations

- Workshop participants identified a need for plans and processed that target vulnerable and special-needs populations, especially residents of isolated areas, non-English speaking residents, and tourists.
- Research has shown that these populations may lack the resources to prepare for and respond to disaster events, and that they have special needs during recovery. Planning for and outreach to these populations in advance of a disaster can help to reduce the impact.
- Neighbor-to-neighbor programs can provide a system for assisting the elderly, sick, disabled, and other populations to evacuate or recover from a disaster. These programs target vulnerable populations with culturally-specific outreach and planning efforts.

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25 Natural Hazards Research and Applications Information Center. 2002. "Building Back Better: Creating a Sustainable Community After Disaster" Natural Hazards Informer.

26 American Planning Association. 1998. Planning for Post-Disaster Recovery and Reconstruction. Planning Advisory Service Report Number 483/484

Section 5 References

The major documents referenced include:

- Alesch, Daniel J. et al. 2001. "Organizations at Risk: What Happens When Small Businesses and Not-for-Profits Encounter Natural Disasters," The Public Entity Risk Institute.
- American Planning Association. 1998. *Planning for Post-Disaster Recovery and Reconstruction.* Planning Advisory Service Report Number 483/484
- Federal Emergency Management Agency Disaster Mitigation Act of 2000
- Federal Emergency Management Agency ESF 14 Disaster Recovery and Mitigation Self Help Guide 2005
- Florida Division of Emergency Management. 2002. Internet Library – Continuity of Operations Plans. http://floridadisaster.org/internet_library.htm Accessed on 21 June 2006.
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- Multihazard Mitigation Council (MMC). 2002. Parameters for an Independent Study To Assess the Future Benefits of Hazard Mitigation Activities. Washington, D.C.: National Institute of Building Sciences
- Multihazard Mitigation Council (MMC). 2005. Natural Hazard Mitigation Saves: An independent Study to Assess the Future

Savings from Mitigation Activities. Washington, D.C.: National Institute of Building Sciences

- National Fire Protection Association 1600 standard on Disaster/Emergency Management and Business Continuity Programs and the
- Emergency Management Accreditation Program(EMAP)

Natural Hazards Mitigation Plan

Garfield County, Colorado

Appendix D: Public Participation

The County developed an on-line survey, which was advertised on its website, and via email in multiple email distribution lists. In addition to community members, a specific audience targeted for this survey was individuals associated with some form of emergency management within the county (police chiefs, engineers, US fish and wildlife, USFS, Utilities, key business owners, hospitals, directors of key community agencies, fire chiefs, etc.) and key community stakeholders.

The survey was also distributed to representatives from each jurisdiction for distribution to their constituent groups. A summary of survey results, including geographic distribution of participants, is included in Appendix D.

Respondent Profile

Residence of Respondents	Percent of Respondents	Number of Respondents
Study Area 1	24.8%	25
Study Area 2	20.8%	21
Study Area 3	37.6%	38
Study Area 4	1.0%	1
Study Area 5	0%	0
I don't live in the County	15.8%	16

Area of familiarity	Percent of Respondents	Number of Respondents
Study Area 1	37.5%	39
Study Area 2	17.3%	18
Study Area 3	40.4%	42
Study Area 4	0.0%	0
Study Area 5	2.9%	2
Not familiar with any area	2.9%	3

Location of Employment	Percent of Respondents	Number of Respondents
Study Area 1	37%	37
Study Area 2	11%	11
Study Area 3	25%	25
Study Area 4	0%	0
Study Area 5	14%	14
I don't work in the County	12%	12

Study Area Risk Assessments

Study Area 1

According to the Risk Assessment, Area 1 experiences the highest risk from geologic hazards – unstable soil and landslide. A significant number of assets in Area 1 are located on hazardous slopes. The soil type found on these slopes and across Area 1 may amplify various hazards and put municipal buildings, water infrastructure, roads and information / communication facilities, residential development, some industrial and commercial zones at risk of damage and disruption of service. Communication facilities and the road network in Area 1 incur specific risk from landslides and debris flows. Population centers such as churches and schools also experience greater than average risk. Additionally, the highway and tunnels along I-70 through the Glenwood Canyon are at risk and could become unusable during a fire incident. The Glenwood Springs viaduct, which is a primary source of water for the community, is at high risk of damage from fire.

	Very Accurate				Not Accurate
Based on your understanding of Area 1, how accurate are these results for the Area 1 section of Garfield County?	50.0%	35.3%	11.8%	2.9%	0.0%

Responses

- In the case of fire, air is/could be a problem. It was during the previous fires because the smoke lingered over the City.
- Shoshone dam and Hydro-electric plant. Transport of Hazardous chemicals I-70 & RR hot springs, faults, earthquakes
- Wildland fires occur with significant frequency in eastern Garfield County
- Rock fall along Hwy 82 is a concern. Not having a alternate way of reaching Hwy 82 from South Glenwood Springs (near four mile road) is also a concern.
- I disagree that a significant number of assets are located on hazardous slopes. I also disagree with paragraph 3 which starts "Communication..."
- Doesnt the City of Glenwood have an emergency Roaring Fork River intake, does that mitigate the risk to the viaduct, or at least allow drinking water to be delivered to the GWS customer during damage and repair of that damage? I would add something about South Canyon as well. Perhaps the risk of both directions of the I-70 closed simultaneously is small; but if we are taking about a fire event it could be that folks who work in GWS and live elsewhere along the I-70 corridor would be cut-off, and vice versa. Also, I imagine the majority of goods is supplied through the I-70 corridor; could shortages of food, supplies, etc be possible due to a disaster impacting both canyons?
- Also susceptible to chemical spills by train derailment, truck tankers, etc.
- I believe that the transportation of hazardous materials on Interstate 70 & State Hwy 82 within populated areas also poses a risk.
- Fire risk affects more than I-70 and Glenwood Canyon. Not sure how high this area goes but if it goes up to Sunlight then avalanche risk might be considered.

Study Area 2

According to the Risk Assessment, the airport, landfill, and road network in Area 2 are at risk of soil aggravated hazards. Additionally, residential developments including single-family, multi-family, and a nursing home, have potentially unstable soil. In each of the Study Areas, a wildfire could potentially impact the suburban, rural, and isolated developments of single houses or farms more quickly and severely than the development in the urban communities. The city of Silt experiences fire risk due to the location of the coal seam that runs east-west just to the north of the town.

	Very Accurate				Not Accurate
Based on your experience in Area 2, how accurate are these results for the Area 2 section of Garfield County?	11.8%	52.9%	11.8%	11.8%	11.8%

Responses

- Coal seam poses very little risk to Silt. There is much more risk of fire or explosion related to natural gas wells, pipelines, and compressor stations. The risk to county residents is much higher than to the town of Silt.
- I would suggest a wildfire (i.e. lightning-sparked anywhere north of the Hogback) would be extremely hazardous to the heavily populated Castle Valley/Lakota areas. Heavy rains several years ago resulted in mudslides within New Castle. Egress from the neighborhood, resulting from either one of these types of natural disasters, would be a challenge as the area has dramatically increased in the last several years.
- Potential flash flood from streams tributary to Colorado River. Potential Dillon Dam failure resulting in flooding of Colorado River.
- All surrounding areas with oil and gas development in and around public and private lands increase the chance of catastrophic wildfire to communities and suburban properties. Volatile cheat grass and typically dry wildland fuels create a constant threat due to the constant potential ignition source.
- Flood, Colorado river basin. Gas Well Fire near the Town of Silt that could result in air quality issues or contamination of water shed in the immediate area. Coal seam fire north of town is unlikely due to the terrain and lack of vegetation.
- I thought the coal seam ran along the south side of I-70 in New Castle. I have never heard about coal seam in Silt.
- add lightning started wildfires which occur several times annually. Coal seam exists but is of small concern
- The coal seam you identify runs through New Castle not Silt

Study Area 3

According to the Risk Assessment, Area 3 faces risk from potentially unstable soil around the cities of Rifle and Parachute. Areas where the Colorado River flows through Area 3 are likely to experience the most risk from flooding. Additionally, steep slopes around the river have funneled development, in some cases, dangerously close to the flood zone.

	Very Accurate				Not Accurate
Based on your experience in Area 3, how accurate are these results for the Area 3 section of Garfield County?	31.6%	34.2%	23.7%	7.9%	2.6%

Responses

- Air pollution
- Most of the area that are at risk of flooding are along the toe of the slopes on the North side of the Colorado River. Very little vegetation and shallow soils are the problem. Rock fall is a concern along County Road 309 at about the 1 mile mark, just below the old KOA house. The hill side is comprised of cobbles and always sloughing off. Other areas of concern are up County Road 215 and the drainages into Parachute Creek. These areaas have caused large mud flows across the county road.
- I always worry about Parachute creek flooding. We live on the creek
- Damage to bridge entering Battlement Mesa from I70 Wild fire in the area
- Flooding areas along Government Creek
- The river basin is very broad in area three. At its highest level the CO river does not threaten to leave its banks and flood.
- Please consider the risks that could be posed by the presence of drilling for natural gas-pipeline failure and drilling into radioactive material at the Rulison Test Site concern me the most.
- hillsides where vegetation hasn't taken hold after a fire
- Given the number of natural gas wells and drilling activity, there stands a risk for an above and/or below ground hazard situation that could affect public health, life, property, availability of water, and the environment
- Garfield County should be aware that Green Mountain Reservoir is being operated historically different and different than originally intended; the reservoir drawdown (late summer) is now limited (to mitigate hazard of landslides within the reservoir area) and this operation is likely to make worse the flooding we experience downstream during conditions of high runoff (spring periods); therefore, a historic local hazard may be made worse by this operation. In the spring of 1984 flood water in the Colorado River impinged on the side of the Rulison River Bridge seriously threatening it; if the same weather conditions occurred today the bridge may not survive the resulting flood flow. That was the only Colorado River bridge I saw at the time threatened seriously in study area 3. A large area landslide occurred within our community (one mile south of Exit 81) about 15 years back. The community spring fed irrigation water at the time was allowed to flow on the surface all winter down a steep hill, practiced for at least 4 decades; late winter about 1000 feet of the hill moved suddenly creating an escarpment at the top and bottom with a 10-foot vertical dimension (no serious injuries); therefore, care in dealing

with wintertime wasting of irrigation water should be scrutinized; even more care for land stability is warranted when the gas industry impounds water that may be contaminated; the fact that a practice is old or well established is little consolation and not a reliable gauge of safety. Large areas of the high country (now accessible by haul roads within Study Area 3) are on sloping ground and move almost constantly; great efforts are expended by the gas industry to build stable pads (where the vertical pipes are subject to shearing forces); however, not much can be done to protect long gathering lines against differential movement and the stress that can build over time. This may not be much of a current concern for the County; however, pressure for development with housing within some of these areas may occur in years future and if this happens the County should be very very cautious (best to require a Colorado PE engineer's seal on hazard assessment for such development).

Study Area 4

According to the Risk Assessment, Area 4 experiences the greatest risk of wildfire. Although it is mostly uninhabited, the heavily wooded landscape of Area 4 increases the potential for large and hard to control fires. The infrastructure most at risk are gas wells, pipelines, and roads. Additionally, even though the Colorado River does not flow through this study area, the roads are at risk of flooding. The highest risk in these areas come from flash floods that overwhelm culverts and roadside detention ponds, as small streams through canyons and ravines reach and exceed their carrying capacity.

Responses: ***No responses were submitted for Area 4***

Study Area 5

According to the Risk Assessment, the assets in Area 5 are threatened by several different hazards – wildfire, flood, and sloped landscapes that can become unstable for any number of reasons. Even though there is very little population in Area 5, it holds the majority of the oil and gas infrastructure. Wildfire in Area 5 has the potential to affect the air quality of the entire county. Oil and gas infrastructure may also be directly threatened by wildfires. Wells and pipelines face a high fire risk profile and any interaction of that infrastructure with wildfire could have serious consequences. These assets are at risk of landslide, debris flow, rock falls, and general soil instability due to the steep slopes into which the haul routes and well platforms have been carved. Additionally, because the roads are so delicately woven along the walls of the canyons and ravines, one incident of a road washed out or a slide can cut off entire sections of the Area from road access. Structures (homes, storage facilities, man-camps) that rely on the road networks are also at risk of damage from flood and landslides. Flood in Area 5 would primarily induce landslides and damage the road network, cutting of access to oil and gas sites.

	Very Accurate				Not Accurate
Based on your experience in Area 5, how accurate are these results for the Area 5 section of Garfield County?	100%	0%	0%	0%	0%

Goal Prioritization

How would you prioritize these goals by their importance to Garfield County? (Note: you may select only one goal as "most important" or "least important.")

	Most important				Least important
1: Reduce the loss of life and personal injuries from natural hazard events.	93.1%	2.3%	3.4%	1.1%	0.0%
2: Reduce damage to County critical, essential, and necessary assets.	2.7%	56.0%	22.7%	10.7%	8.0%
3: Reduce County and city costs of disaster response and recovery.	2.6%	3.9%	26.3%	31.6%	35.5%
4: Minimize economic losses.	1.3%	15.4%	23.1%	33.3%	26.9%
5: Reduce damage to personal property.	6.3%	22.5%	22.5%	18.8%	30.0%

Responses

- open & invited people to discussions
- Reduce flooding potential on Government Creek in urban areas (Rifle)
- Mitigation of Drilling
- A goal should be to mitigate or reduce the potential for these activities to occur as a first priority.
- Ya, don't overkill on the regulations you promulgate as a result of this study. You can plan and regulate for any contingency if cost is not an object, but it is.
- I assume emergency services (medical/critical care) are part of the reduction of loss of life, etc. If anything affects the ability to travel I-70 and/or Hwy 6/50, residents of Silt/New Castle are isolated from key medical/emergency services in the event of a disaster.
- Inspire and assist through building codes requiring fuels hazard mitigation around structures on private and public lands. Wildfire threats to improvements and people are high and fuels hazard mitigation gives first responders a chance to be successful.
- Once written and reviewed by agencies, a planned table top exercise could incorporate may players. It may be beneficial to have two exercises, a west end and an east end.
- Increase awareness of search and rescue issues
- I would like the other goals be to mitigate the hazards from the oil and gas drilling and fracturing chemicals.
- Protect water table from industrial pollution from fracking practices
- Due to potential drilling near homes, demand at least 1000 ft. from homes for wells.
- Reduce environmental impacts
- Maintain list of emergency responders in case of disaster
- Limit housing sprawl in areas identified as high risk fire danger. Limit lot sizes to no smaller then 30 acres in these areas. Limit density to one ADU and one PDU.

- Contract for contingent emergency services and reduce annual taxes to the maximum extent.

Assets

Population and places where people congregate

	Most Important				Least Important
Churches	9.6%	31.5%	32.9%	16.4%	9.6%
Mixed Use developmen t	11.3%	33.8%	39.4%	9.9%	5.6%
Multi-family Residential	37.8%	37.8%	18.9%	2.7%	2.7%
Nursing Homes	60.8%	27.0%	12.2%	0.0%	0.0%
Public Buildings	30.3%	40.8%	23.7%	5.3%	0.0%
Schools	62.2%	25.7%	9.5%	2.7%	0.0%
Single Family Residential	39.5%	32.9%	19.7%	1.3%	6.6%

Responses

- It is difficult to answer this question without know what your definition of "protect" is. Does it mean spending huge amounts of money protecting from any conceivable risk or just making people aware of the risks and letting them make informed judgments on dealing with those risks
- Private property owners should be required to protect their own assets
- Don't forget the ranch lands.
- All health care facilities not just nursing homes
- Public buildings and schools should be located out of hazard areas; if in hazard then divest and relocate. For this reason I have not checked box here for these facilities.

Infrastructure

	Most Important				Least Important
Airport	8.0%	40.0%	28.0%	10.7%	13.3%
Bridges	74.7%	18.7%	6.7%	0.0%	0.0%
Communication facilities	72.2%	22.8%	5.1%	0.0%	0.0%
Dam	57.3%	22.7%	16.0%	4.0%	0.0%
Electric Utility Lines and Substations	62.3%	35.1%	1.3%	1.3%	0.0%
Federal Building	6.8%	28.4%	33.8%	18.9%	12.2%
Fire Stations and Police Facilities	60.8%	32.9%	5.1%	0.0%	1.3%
Highways	50.7%	32.9%	16.4%	0.0%	0.0%
Hospital	83.3%	11.5%	5.1%	0.0%	0.0%
Landfill	4.0%	9.3%	24.0%	33.3%	29.3%
Municipal Building	13.2%	28.9%	39.5%	13.2%	5.3%
Natural Gas Facility	31.0%	32.4%	33.8%	1.4%	1.4%
Pedestrian Bridge	10.5%	11.8%	27.6%	28.9%	21.1%
Railroad Station	11.0%	11.0%	30.1%	28.8%	19.2%
Railroad Bridges and Tunnels	18.4%	28.9%	25.0%	22.4% (	5.3%
Roads	48.1%	41.6%	9.1%	1.3%	0.0%
Water Tanks and Viaducts	63.5%	28.4%	6.8%	0.0%	1.4%

Responses

- Very difficult to choose - Communications, medical, safety and police to keep order. Second would be those facilities/infrastructure to keep commerce moving.
- Well they're all intertwined - you can't have a communication network without electricity
- If the church or other building has no workers in it at the time, then it would not be so important on the list.
- All public infrastructure comes first!
- A single county person unprepared to rely on others in an emergency can do much harm. Many of these assets are complicated and involve elaborately prepared emergency response plans. Many such assets and people involved can be harmed more by someone acting with scant or outdated knowledge than the harm of no action at all. Therefore, I am not checking certain boxes I believe to be sensitive in this way.

Economy

	Most Important				Least Important
Agriculture and Natural Resource	35.9%	35.9%	25.6%	1.3%	1.3%
Commercial and Retail	39.0%	36.4%	16.9%	3.9%	3.9%
Gas Wells	12.0%	33.3%	26.7%	13.3%	14.7%
Industrial	17.6%	44.6%	21.6%	13.5%	2.7%
Pipeline	14.5%	39.5%	26.3%	9.2%	10.5%
Shopping Mall	8.2%	27.4%	26.0%	26.0%	12.3%
Tram	4.0%	14.7%	34.7%	18.7%	28.0%
Tourism Site	6.8%	20.3%	36.5%	18.9%	17.6%

Responses

- In the Parachute area, at this time. Natural gas and the related industries are is the predominate source of economy for most residents. Another large group of local residence work up valley in the construction trades.
- The school district is a major contributor to our local economy and should be added to this list. I am not sure why 'tram' is included here, unless you are referencing the tram in Glenwood and this part of the survey is not restricted to section 3.
- Everything that is replaceable is replaceable - and insured - everything that cannot be replaced is invaluable
- Again, it depends on which particular tourist site & if people are there. The gas facilities need protection in order to protect the people from a blowout or fire, etc.
- Why is shopping mall separated from commercial/retail?
- Gas Wells should never be the county's responsibility; the county and fire departments have received no detailed mapping of these facilities and the county has been instructed by this industry to take no interest in these affairs; sounds rude but probably good advise. Best approach is to protect the industries that support gas.

Cultural and Historical Assets

	Most Important				Least Important
Cemetery	10.4%	14.3%	40.3%	20.8%	14.3%
Library	28.2%	33.3%	20.5%	11.5%	6.4%
Museum	18.4%	42.1%	23.7%	11.8%	3.9%
Park	11.8%	27.6%	25.0%	17.1%	18.4%

Responses

- Our river corridor is a cultural asset and should be included.

Risk Reduction Strategies

Do you have any specific suggestions for how the County can reduce risk of natural hazards? Examples might be increasing the capacity of culverts, providing outreach and education materials in other languages, or riparian or wetlands restoration to improve flood storage capacity.

- All of the above--just remember that residents in cities are still part of GARCO
- Communicate Communicate Communicated
- Public education & outreach, wildland fire mitigation prior to sale of subdivision lots, compliance with the comprehensive plan & land use regulations.
- Don't let people build in the floodplain or on slopes subject to movement. Make sure culverts and bridges are capable of passing severe flood events.
- ya you should first put a price tag on each proposed risk reduction determine how many people are going to benefit from it and then determine if we can afford it.
- Annual or bi-annual emergency response open houses - multi-lingual resources. Brochures outlining emergency preparedness resources in County. Review of flood mitigation culverts/holding retention ponds capacity, condition, etc. Look at health of feeder streams to the Colorado - can they be improved with wetlands, retention ponds, etc to reduce intensity of floods? Look at bridges that cross Colorado River - is the debris cleared regularly?
- Providing education and outreach in Spanish and English and keeping the current drainage systems clear and functional.
- Many rural area lack "escape routes" for people to follow in an emergency and lack "Safety Zones" that are marked for people to go to. Many roads are one way in and out with virtually no defensible space. Many houes are tucked away with no road marker that denotes there is a residence. Most homes are not built with fire resistant composition and have vegetation surrounding the homes. These threats can be prevented.
- Getting your Environmental Health Department involved in land use, emergency planning, etc. from the beginning
- No, we as a Fire District have tried to make citizens aware of mitigation funds that are available through the Colorado State Forest Service and it's either the time, cost to the participant or the paperwork that turns people off. It is however easier to get people excited about change immediately after an emergency, but then our short term memory kicks in and communities forget and go back to complacency.
- Prevention and planning
- Establish better communication system when natural disasters occur.
- Regulate industries prone to fires and explosions
- Focus on the most likely type of disaster. flood, fire, man made.
- Decrease road building into pristine areas.
- Limit drilling near the Rulison Test Site Monitor construction of pipelines for distribution of natural gas

- Add stringent safety monitoring and mitigation to the Oil and Gas industry. They cause more damage than 'Acts of God' ever can.
- I believe wildfires to be the most serious risk - with arid conditions, water in short supply and high winds. Removal of wildfire fuel, increased local training and periodic preparedness exercises would help.
- how or what to do in case of a disaster relating to the natural gas industry....emissions, aquifer/river contamination, spills, fires, etc.?
- Provide educational materials in other languages. Assess the new Comprehensive Plan 2030 for consistency with best practices and work hand in hand with all Garfield County municipalities and federal agencies. Work with local nonprofits such as the Sonoran Institute.
- Inform residents and visitors of a common radio and/or TV channel they can/should tune in to in case of an emergency.
- Ensure the county govt is working with all of the cities, towns and special districts on the development of this plan.
- Adopt appropriate codes that REQUIRE landowners to mitigate/provide defensible space for wildfire control
- Be mindful of hazards to mothers and children that spend more time in parks (many in flood hazard areas) than most people; consider providing system of warning in the event of a storm or flood upslope. In some cases a PA system may warranted that messages in both English and Spanish (initiated through a 24-hour dispatch office).
- Capacity of culverts particularly in the Canyon Creek Drainage is needed. Individual homeowner education and understanding of risks and ways to mitigate these risks are important
- These are all good ideas. What about wildfire mitigation?