Uintah Basin Association of Governments

Comprising:

Daggett, Duchesne, and Uintah Counties

Pre-Disaster Mitigation Plan (PDM)

Prepared By:

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Part I. Pre-requisite Adoption by the local jurisdiction

The Uintah Basin Executive Board, as well as the counties and communities participated in and promulgated this plan:

Daggett County
- Town of Manila

Duchesne County
- Town of Altamont, City of Duchense, Myton City, Roosevelt City, Town of Tabiona.

Uintah County
- Ballard Town, City of Naples, Vernal City.

  Promulgation letter copies have been included in *Appendix K* of this plan.

Acknowledgements

Uintah Basin Association of Governments would like to extend their appreciation to the following agencies, which assisted in the development of this plan.

- Division of Emergency Services and Homeland Security
- Utah Geologic Survey
- Automated Geographic Reference Center
- United States Army Corps of Engineers
- Division of Water Rights Dam Safety Section
- Federal Emergency Management Agency Region VIII
- National Weather Service
- Utah Division of Forestry Fire, and State Lands
- Councils of Governments (Tribal and local)
- Daggett County Emergency Management
- Duchesne County Emergency Management
- Uintah County Emergency Management
- Uintah Basin Mayors and Commissioners
- Uintah Basin Emergency Managers and city personnel
- Utah Division of Water Resources
- Wasatch Front Regional Council

In addition we offer a sincere thanks to Clackamas County, Dunn County, Salt Lake City, Kidder County, Jefferson County for allowing review of their mitigation plans.

Preface

Hazard mitigation is any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural and technological hazards. It is an essential element of emergency management, along with preparedness, response, and recovery. There is a cyclical relationship between the four phases of emergency management. A community prepares for a disaster, and then responds when it occurs. Following the response, there is a transition into the recovery process, during which mitigation measures are evaluated and adopted. This, in turn, improves the preparedness posture of the community for the next incident, and so on. When successful, mitigation will lessen the impacts to such a degree that succeeding incidents will remain incidents and not become disasters.

Hazard mitigation strives to reduce the impact of hazards on people and property through the coordination of resources, programs, and authorities so that, at the very least, communities do not contribute to the increasing severity of the problem by allowing repairs and reconstruction to be completed in such a way as to simply restore damaged property as quickly as possible to pre-disaster conditions. Such efforts expedite a return to “normalcy”; however, replication of pre-disaster conditions results in a cycle of damage, reconstruction, and damage again.

Hazard mitigation is needed to ensure that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. Hazard mitigation provides the mechanism by which communities and individuals can break the cycle of damage, reconstruction, and damage again.

Recognizing the importance of reducing community vulnerability to natural and technological hazards, the Counties of Daggett, Duchesne, and Uintah are actively addressing the issue through the development of this plan in conjunction with Uintah Basin Association of Governments. Implementing this plan is the responsibility of the cities and counties with the Uintah Basin planning district. The many benefits to be realized from this effort include protection of the public health and safety, preservation of essential services, prevention of property damage, and prevention of the local economic base, to mention just a few - will help ensure that the Uintah Basin and all of it’s communities remain vibrant, safe, and enjoyable places in which to live, raise a family, and conduct business. *For information regarding economic and demographic data in the Uintah Basin Region see Appendix J.*

Executive Summary

Plan Mission

The mission of the Uintah Basin Association of Governments (UBAOG) Pre-Disaster Mitigation Plan is to substantially and permanently reduce, communities within the UBAOG, vulnerability to natural hazards. The plan is intended to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the natural environment. This can be achieved by increasing public awareness, documenting resources for risk reduction and loss-prevention, and identifying activities to guide the community towards the development of a safer more sustainable community.

Plan Organization

The Uintah Basin Association of Governments plan was developed and organized within the rules and regulations established under 44 CRF 201.6. The plan contains a discussion on the purpose and methodology used to develop the plan, a profile on communities within UBAOG, as well as a hazard identification study and a vulnerability analysis of eight hazards. To assist in the explanation of the above-identified contents there are several appendices included which provide more detail on specific subjects. This is intended to improve the ability of community within the UBAOG planning district to handle disasters and will document valuable local knowledge on the most efficient and effective ways to reduce loss.

Plan Financing

The UBAOG Pre-Disaster Mitigation Plan has been financed and developed under the Pre-Disaster Mitigation Program provided by the Federal Emergency Management Agency (FEMA) and the Department of Public Safety Division of Emergency Services and Homeland Security. The UBAOG aided in funding, providing in-kind assistance to local governments.

Plan Participation

The UBAOG Pre-Disaster Mitigation Plan has been completed as a result of a collaborative effort between Uintah Basin Association of Governments, Department of Public Safety Division of Emergency Services and Homeland Security, public agencies, and the citizens, elected officials, and public employees of the cities and towns within Daggett, Duchesne, and Uintah Counties. Interviews were conducted with stakeholders from the communities, and a workshop was conducted during the plan developments. Additionally, through public hearings, workshops, and draft plan displays; ample opportunity was provided for public participation. Any comments, questions, and discussions resulting from these activities were given strong consideration in the development of this plan. Completion of this multi-jurisdiction mitigation plan was completed with assistance and input from:

Daggett County

- Emergency Manager; Roads Department; GIS Department, and Town of Manila

Duchesne County

- Emergency Manager, Roads Department, Sheriff's Department, Town of Altamont, City of Duchesne, Myton City, Roosevelt City, and the Town of Tabiona.

Uintah County

- Emergency Manager, Roads Department, Sheriff's Department, Town of Ballard, City of Naples, and Vernal City.

Hazards Identified

It was suggested by the Division of Emergency Services and Homeland Security, at a minimum, Uintah Basin Association of Governments address the hazards of: earthquake, flood, landslide, problem soils, wildfire, dam failure, severe weather, and drought. However, there are other hazards that were identified which are not in the minimum criteria established by DESHS that were added to the discussion.

The hazard identification study recognized the following hazards as being the most prevalent and posing the most potential risk to the counties and towns within the UBAOG planning district.

- Dam Failure, Drought, Earthquake, Flood, Insect Infestation, Landslide, Wildfire, and Severe Weather.

Plan Goals

In an effort to ensure that the mission of the Uintah Basin Association of Governments Pre-Disaster Mitigation Plan is met, the participants in the development of this plan defined and established a list of goals, which are directly relevant to meeting the mission of the plan.
The following is a list of the goals identified by the participants of this plan:

- Protection of life before, during, and after the occurrence of a disaster.
- Preventing loss of life and reducing the impact of damage where problems cannot be eliminated.
- Protection of emergency response capabilities (critical infrastructure)
- Communication and warning systems
- Emergency medical services and medical facilities
- Mobile resources
- Critical facilities
- Government continuity
- Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by

combining hazard loss reduction with the community's environmental, social and economic needs.

- Protection of natural resources and the environment, when considering mitigation measures.
- Promoting public awareness through education of community hazards and mitigation measures.
- Preserving and/or restoring natural features that provide mitigation such as floodplains.
- Minimize the impacts of flooding
- Minimize the impacts of drought
- Minimize the impacts of severe weather
- Minimize the risk of wildfire

Introduction

The State of Utah is vulnerable to natural, technological, and man-made hazards that have the possibility of causing serious threat to the health, welfare, and security of our citizens. The cost of response to and recovery from potential disasters can be lessened when attention is turned to mitigating their impacts and effects before they occur or re-occur.

Hazard mitigation actions must be practical, cost effective, and environmentally and politically acceptable. Actions taken to limit the vulnerability of society to hazards must not in themselves be more costly than the value of anticipated damages.

The primary focus of hazard mitigation actions must be at the point at which capital investment decisions are made and based on vulnerability. Capital investments, whether for homes, roads public utilities, pipelines, power plants, chemical plants or warehouses, or public works, determine to a large extent the nature and degree of hazard vulnerability of a community. Once a capital facility is in place, very few opportunities will present themselves over the useful life of the facility to correct any errors in location or construction with respect to hazard vulnerability. It is for these reasons that zoning ordinances, which restrict development in high vulnerability areas, and building codes, which insure that new buildings are built to withstand the damaging forces of hazards, are the most useful mitigation approaches a city can implement.

What is Hazard Mitigation

Hazard mitigation is defined as any cost-effective action(s) that have the effect of reducing, limiting, or preventing vulnerability of people, property, and the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation measures, which can be used to eliminate or minimize the risk to life and property, fall into three categories. First; are those that keep the hazard away from people, property, and structures. Second; are those that keep people, property, and structures away from the hazard. Third; are those that do not address the hazard at all, but rather reduce the impact of the hazard on the victims such as insurance. This mitigation plan has strategies that fall into all three categories.

Previously, mitigation measures have been the most neglected programs within emergency management. Since the priority to implement mitigation activities is generally low in comparison to the perceived threat, some important mitigation measures take time to implement. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is the key to eliminating long-term risk to people and property living in Utah from hazards and their effects. Preparedness for all hazards includes response and recovery plans, training, development, management of resources, and the need to mitigate each jurisdictional hazard.

The State Division of Emergency Management and Homeland Security (DESHS) have identified the following hazards to be analyzed by each county. These hazards include avalanche, dam failure, debris flow, drought, earthquake, flood, flash flooding, infestation, landslide, problem soils, summer storm, tornado, urban and rural fires, and winter storm.

This regional/multi-jurisdictional plan evaluates the impacts, risks and vulnerabilities of natural hazards in a jurisdictional area affected by a disaster. The plan supports, provides assistance, identifies and describes mitigation projects for each annex. The suggestive actions and plan implementation for local and tribal governments could reduce the impact of future disasters. Only through the coordinated partnership with emergency managers, political entities, public works officials, community planners and other dedicated individuals working to implement this program was it accomplished.

To develop the mitigation plan, The Utah DESHS, based on the Governor's Office of Planning and Budget, the Utah League of Cities and Towns, and the U.S. Department of Housing and Urban Development, chose to use the planning services of the Utah Associations of Governments.

Seven regional Associations of Governments:

1. Bear River Association of Governments
2. Wasatch Front Association of Governments / Wasatch Front Regional Council
3. Mountainland Association of Governments
4. Six County Association of Governments
5. Southeast Utah Association of Local Governments
6. Southwestern / Five County Association of Governments
7. Uintah Basin Association of Governments

Scope

Uintah Basin Association of Governments, which encompasses all of Northeastern Utah, including the counties of Daggett, Duchesne, and Uintah, was placed under contract by the Utah Division of Emergency Services to complete a Pre-Disaster Mitigation Plan, which meets the requirements of the Disaster Mitigation Act of 2000, for the areas they serve.

This plan is applicable not only to the three counties served by the Association but also for the cities, towns, and municipalities within each county. The scope of this plan only includes natural hazards defined as a concern to local counties and jurisdictions. These natural hazards identified by stack holders include: earthquakes, floods, landslides, wildfires, problem soils, dam failures, sever weather, and drought. Although there were the only hazards considered much of the data is applicable to other federally funded planning currently taking place.

Planning included local level data for each incorporated area within the Uintah Basin Region.

Purpose

The purpose of the Uintah Basin Association of Government Natural Hazard Mitigation Plan is to fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre and post disaster mitigation measures, short/long range strategies that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the state are exposed; and to eliminate or minimize conditions which would have an undesirable impact on our citizens, the economy, environment, and the well-being of the state of Utah. This plan is to aid in enhancing city and state officials, agencies, and public awareness to the threat hazards pose to property and life and what can be done to help prevent or reduce the vulnerability and risk to jurisdiction with in the Uintah Basin planning area.

Authority

Federal:

Public Law 93-288 as amended, established the basis for federal hazard mitigation activity in 1974. A section of this Act requires the identification, evaluation, and mitigation of hazards as a prerequisite for state receipt of future disaster assistance outlays. Since 1974, many additional programs, regulations, and laws have expanded on the original legislation to establish hazard mitigation as a priority at all levels of government. When PL 93-288 was amended by the Stafford Act, several additional provisions were also added that provide for the availability of significant mitigation measures in the aftermath of Presidential declared disasters. Civil Preparedness Guide 1-3, Chapter 6- Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed toward hazards with a high impact and threat potential.

President Clinton signed the Disaster Mitigation Act of 2000 into Law on October 30, 2000. Section 322, defines mitigation planning requirements for state, local, and tribal governments. Under Section 322 States are eligible for an increase in the Federal share of hazard mitigation (HMGP), if they submit for approval a mitigation plan, which is a summary of local and/or regional mitigation plans, that identifies natural hazards, risks, vulnerabilities, and describes actions to mitigate the hazards risks and vulnerabilities in that plan.

State:

- The Governor’s Emergency Operation Directive
- The Robert T. Stafford Disaster Relief and Emergency Assistance Act, amendments to Public Law 93-288, as amended.
- Title 44, CFR, Federal Emergency Management Agency Regulations, as amended.
- State Emergency Management Act of 1981, Utah Code 53-2, 63-5.
- Disaster Response Recovery Act, 63-5A.
- Executive Order of the Governor, Executive Order 11
- Emergency Interim Succession Act, 63-5B.

Uintah Basin Association of Governments:

The Associations of Governments have been duly constituted under the authority of Title XI, Chapter13, Utah Code Annotated, 1953, as amended (The Inter-local Cooperation Act) and pursuant to Section 3 of the Executive Order of the Governor of the State of Utah, dated May 27, 1970, with the authority to conduct planning studies and to provide services to its constituent jurisdictions.

Local:

Local governments play an essential role in implementing effective mitigation, both before and after disaster events. Each local government will review all damages, losses, and related impacts to determine the need or requirement for mitigation action and planning whenever seriously effected by a disaster, or when applying for state or federal recovery assistance. In the counties and cities making up the Uintah Basin Association of Governments the local executive responsible for carrying out plans and policies are the County Commissioners and City Mayors. Local governments must be prepared to participate in the post disaster Hazard Mitigation Team process and the pre-mitigation planning as outlined in this document.

Goals

To coordinate with each participating local government to develop a regional planning process meeting each plan component identified in the FEMA Region VIII Crosswalk document and any additional State planning expectation, both regionally and specifically, as needed, by gathering local input. Also, to reduce risk from natural hazards in North Eastern Utah, through the implementation and updating of regional plans.

Short Term Goals

These goals form the basis for the development of the PDM Plan and are shown from highest priority, at the top of the list, to those of lesser importance nearer the bottom.

- Protection of life before, during, and after the occurrence of a disaster.
- Preventing loss of life and reducing the impact of damage where problems cannot be eliminated.
- Protection of emergency response capabilities (critical infrastructure)
- Communication and warning systems
- Emergency medical services and medical facilities
- Mobile resources
- Critical facilities
- Government continuity
    - Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social and economic needs.
    - Protection of natural resources and the environment, when considering mitigation measures.
    - Promoting public awareness through education of community hazards and mitigation measures.
    - Preserving and/or restoring natural features that provide mitigation such as floodplains.

Long Term Goals

- Eliminate or reduce the long-term risk to human life and property from identified natural and technologic hazards.
- Aid both the private and public sectors in understanding the risks they may be exposed to and finding mitigation strategies to reduce those risks.
- Avoid risk of exposure to identified hazards.
- Minimize the impacts of those risks when they can not be avoided
- Mitigate the impacts of damage as a result or identified hazards.
- Accomplish mitigation strategies in such away that negative environmental impacts are minimized.
- Provide a basis for funding of projects outlined as hazard mitigation strategies.
- Establish a regional platform to enable the community to take advantage of shared goals, resources, and the availability of outside resources. If an earthquake occurs outside of the county seat it will still affect the county seat. This is similar to many natural hazards.
- Establish a framework and data base for the county seat to use to apply for aid.

Objectives

The following objectives are meant to serve as a measure upon which individual hazard mitigation projects can be evaluated. These criteria become especially important when two or more projects are competing for limited resources.

- Identification of persons, agency or organization responsible for implementation.
- Projecting a time frame for implementation.
- Explanation of how the project will be financed including the conditions for financing and implementing as information is available.
- Identifying alternative measures, should financing not be available.
- Be consistent with, support, and help implement the goals and objectives or hazard mitigation plans already in place for surrounding counties.
- Be based on the county seat Vulnerability Analysis.
- Have significant potential to reduce damages to public and/or private property and/or reduce the cost of, state, and federal recovery for future disasters.
- Be the most practical, cost-effective, and environmentally sound alternative after consideration of the options.
- Address a repetitive problem, or one that has the potential to have a major impact on an area, reducing the potential for loss of life, loss of essential services and personal.
- Property, damage to critical facilities, economic loss, and hardship or human suffering.
- Meet applicable permit requirements.
- Not encourage development in hazardous areas.
- Contribute to both the short and long term solutions to the hazard vulnerability risk problem.
- Assuring the benefits of a mitigation measure is equal to or exceeds the cost of implementation.
- Have manageable maintenance and modification costs.
- When possible, be designed to accomplish multiple objectives including improvement of life-safety risk, damage reduction, restoration of essential services, protection or critical facilities, security or economic development, recovery, and environmental enhancement.
- Whenever possible, use existing resources, agencies and programs to implement the project.

Environmental Considerations

Natural hazards are naturally occurring phenomena, only becoming natural disasters when humans and there structures become involved. The events themselves play an integral part in maintaining balance in our world. Meteorological, geological, and hydrological processes have shaped Utah for millions of years and will continue to shape the state for millions more years. Modern engineering has made it possible to prevent damage from natural hazards; however, the economic and environmental costs can be rather high. Tampering with natural systems can also create an imbalance in the natural environment. The effects of many of these imbalances are still unknown. It is better to live will a small amount of risk, respecting the natural process where appropriate, than to construct mitigation at every chance. Nature provides its own mitigation measures that need to be identified, protected and/or strengthened. To ensure that our environment is not harmed through mitigation projects all applicable city codes; county codes, state and federal laws pertaining to the environment will and must be followed. A description of all federal laws can be found in *Appendix C*.

Part II. Planning Process

Documentation of the Planning Process

This plan was prepared in the offices of the Uintah Basin Association of Governments by appointed staff members Planning Coordinator, Yankton Johnson, and was supported by Ryan Pietramali of DES. Other local agencies that have aided in the process include the city and county GIS departments of the Uintah Basin region. Elected officials including tribal leaders, local officials, emergency managers, police and fire staff members, planning departments, and local governmental agencies have all aided in the planning and implementation process. The planning process was based on Section 322 requirements of the Disaster Mitigation Act of 2000 and supporting guidance documents developed by FEMA and the Utah Division of Emergency Services and Homeland Security. The planning process included the following steps.

1. Organize Resources
2. Public Officials Out Reach
3. Establish Continuity in Planning Process
4. Data Acquisition
5. Hazard Risk Identification and Analysis
6. County Vulnerability Assessment
7. Community Goals Assessment
8. Contact Regional Mitigation Emergency Managers (County & Tribal)
9. Mitigation Strategy Development
10. Prioritization of Identified Mitigation Strategies
11. State Plan Review
12. Adoption

Step 1: Organize Resources

The seven regional Associations of Governments (AOG) were recommended to conduct the planning efforts by the Utah League of Cities and Towns and the Governors office of Planning and Budget to ensure coordination with elected officials, emergency managers, planners, public works departments, and information technology specialists. Utah Division of Emergency Services and Homeland Security contracted the seven AOGs as sub-grantees to coordinate, develop, and write the seven multi-regional hazard mitigation plans under he planning guidelines included in the Disaster Mitigation Act of 2000.

Uintah Basin Association of Governments contracted with by the Division of Emergency Services and Homeland Security (DESHS) to conduct the planning for the Uintah Basin region. The association worked closely with local jurisdictions to ensure their input, was incorporated into the plan.

Uintah Basin Association of Governments designated a core planning team. The core planning team made up of members outlined in Table 1 were the main constituents of the planning process from the initiation of the plan to the development and coordination to the resolution of the plan’s adoption. Adjunct to the core planning team a technical team committee was created on a technical level that is identified in Table 2. Table 3 identifies the Uintah Basin Association of Governments regional Disaster Mitigation Planning committee that was formed to assure that the Natural Disasters were covered region wide. The Executive Board (Table 4) was utilized to assure and affirm their respective county local inputs.

Table 1. Core Planning Team

Name	Organization
Yankton Johnson	Uintah Basin Association of Government
Mike Brennan	Uintah Basin Association of Government
Ryan Pietramali	Division of Emergency Services and Homeland Security

Table 2. Technical Team Committee

Name	Organization
Ryan Pietramali	Utah Division of Emergency Services and Homeland Security
Lane Nielson	Wasatch Front Regional Council
LaNiece Dustman	Wasatch Front Regional Council
Jeff Adams	Southeastern Utah Association of Governments
Jim Boes	Wasatch Front Regional Council
Jeff Gilbert	Bear River Association of Governments
Ken Sizemore	Five County Association of Governments
Curt Hutchings	Five County Association of Governments
Andrew Jackson	Mountainland Association of Governments
Emery Polelonema	Six County Association of Governments
Edwin Benson	Six County Association of Governments
Yankton Johnson	Uintah Basin Association of Governments

Table 3. Region-wide Planning Committee

Name	Organization
Melba Markham	Altamont Town employee
Maris Secrest	Ballard City Manager
Shirley Slaugh	Daggett County Emergency Manager
Stewart Leith	Daggett County Commissioner
Winston Slaugh	Daggett County Emergency Manager
Clint Park	Duchesne City Mayor
Georg Adams	Duchesne County Emergency Manager
Lorna Stradinger	Duchesne County Commissioner
Chuck Dickison	Manila Town Mayor
Kathleen Cooper	Myton Town Mayor
Craig Blunt	Naples City Manager
Brad Hancock	Roosevelt City Manager

Name	Organization
Jerry Turnbow	Tabiona Town Mayor
Dale Peterson	Uintah County Emergency Manager
Jim Abegglen	Uintah County Commissioner
Mechelle Miller	Uintah County employee
Russ Pearson	Vernal City Planner

Table 4. Executive Board

Name	Organization
Chuck Dickison	Mayor, Chairman
Kathleen Cooper	Mayor, 1st Vice Chairperson
Mike McKee	Uintah County Commissioner, 2nd Vice Chairman
Stewart Leith	Daggett County Commissioner
Craig Collett	Daggett County Commissioner
Chad Reed	Daggett County Commissioner
Kent Peatross	Duchesne County Commissioner
Lorna Stradinger	Duchesne County Commissioner
Larry Ross	Duchesne County Commissioner
Dave Haslem	Uintah County Commissioner
Jim Abegglen	Uintah County Commissioner
Loyd Burton	Roosevelt City Mayor
Clint Park	Duchesne City Mayor
Travis Mitchell	Altamont Town Mayor
Jerry Turnbow	Tabiona Town Mayor
Niles Mott	Naples City Mayor
William Kremin, Jr.	Vernal City Mayor
Vaughn Parrish	Ballard City Mayor

Step 2: Public Officials Outreach

To ensure the planning process had backing from the elected officials a representative from Uintah Basin Association of Government met with each County Commission and each city mayor to inform them of the need for the plan and how it can better help the communities. With local support in place the plan was introduced to commissioners and other elected officials along with public entities by means of an informational brochure that was created by the Wasatch Front AOG *(refer to Appendix L).*

Step 3: Establish Continuity in the Planning Process

Mitigation planning within Uintah Basin Association of Governments was part of a Pre-Disaster Mitigation Planning initiative to meet the requirements of the Disaster Mitigation Act of 2000. To meet this requirement the seven Associations of Government were contracted by the Division of Emergency Services and Homeland Security to assist the 29 counties with completion of a mitigation plan, which meets the requirements of sections 322. The Seven Associations of Government formed a Technical Team Planning committee to share ideas and ensure the plans were similar and that there was little duplication of effort. Planners from the Uintah Basin Association of Governments were involved with this committee. Please refer to Table 2 above.

Step 4: Data Acquisition

Contact was made with designated personnel in each city and county to assess what data was available on the local level. Agreements were put in place, where needed, to allow the Association of Governments planning staff use of county and city data. Data layers obtained included some or all of the following: local roads, plot maps, county tax assessor’s data, hazard data, flood maps, topographic data, aerial photographs, and land development data.

Step 5: Hazard Risk Identification and Analysis

This step was conducted by gathering data on the hazards that occurred in the planning area. This information was gathered from local, state, and federal agencies and organizations, as well as, from newspaper and other local media accounts, state and local weather records, conversations, surveys, interviews, and meetings with key informants within the planning area. Mitigation discussions were held during this process and are explained in further detail in Table 4 below. During these meeting attendees had the opportunity to review the general information on previous hazards and comment on them in a more specific manner. These meeting also provided a forum for discussion on the background information that was needed to gain a general understanding of the geography, geology, recreation, natural resources, and water resources of the Planning Area. These initial contacts with local entities also provided visual understanding of the planning area for planners of the Core Planning Team.

Table 4. Uintah Basin Association Governments Pre-Disaster Mitigation Planning Process Timeline

Date	Activity	Purpose
March 29, 2002	Letter of Intent that identifies the seven Associations of Governments as sub-grantees of the state to write the PDM plans. The AOGs were chosen by the Utah Interagency Technical Team who are part of Nature-Safe Utah (Utah's Pre-Disaster Mitigation Program).	Continue the relationship with local council members and municipalities.
May 15-16, 2002	Utah's first regional mitigation planning training piloted toward the seven AOGs	Establish a guideline and timeframe.
June 18, 2002	LEPC meeting on DMP	Introduction of Plan and public comment.
July 12,2002	News Release from Governor Michael Leavitt announcing the new program to develop local hazard mitigation plans statewide.	Conduct public awareness and involvement.
August, 2002	Gather information.	Data Collection.
September 10, 2002	Meeting. Met with all AOGs and DESHS to discuss the planning process.	Identify planning team and available resources.
September 30, 2002	Contacted Emergency Managers in the Uintah Basin Region.	Identify level of involvement.
October-November, 2002	Met with all three counties commissions and 9 mayors in the Uintah Basin region to identify hazards.	Hazard Identification. Went over questionnaires with mayors and commissioners.
October 2, 2002	Met with the Tri-County LEPC in Duchesne to identify regional hazards.	Data Collection
October 17, 2002	Met with UBAOG board of directors and public	Introduction of plan and public comment.
November 2002	Gathered community data for regional data section of the plan.	Data Collection.
November 6, 2002	Public Meeting. Met with Uintah Basin Association of Governments Executive Board.	Obtain Approval to conduct mitigation planning.

Date	Activity	Purpose
November 12, 2002	DMP training mtg with State	Purpose of the DMP
November 22, 2002	Meeting. Met with technical team members.	Solicit public involvement, Army Corps proposal for flood study, GIS training, timeline, review the regional plans
December 19, 2002	Gathering data.	Data Collection and public input.
January 10, 2003	Gathering data.	Data Collection.
January 22, 2003	Public Meeting. AOG executive director's meeting.	Signed contracts for Army Corps flood proposal.
January 27, 2003	Met with all 3 County Emergency Managers.	Chose to start with Uintah Counties Annex first.
February 2, 2003	Met with Uintah County, Naples City, and Vernal City.	Data Collection and discussion of progress reviewed the crosswalk.
February 6, 2003	Met with Uintah County, Naples City, and Vernal City.	Data Collection and discussion of progress.
February 27, 2003	Meeting. Met with technical team members in St. George.	Review of plans, mapping.
March, 2003	Information gathering	Data Collection, plan
April, 2003	Drafting of the plan.	For review.
April 9, 2003	Partners Mtg.	Data Collection and discussion of progress.
May 14, 2003	Meeting. UBAOG Executive Board meeting.	Discussion of progress; plans to DESHS by December with additional money.
May 22, 2003	Meeting. Met with technical team members at DESHS.	Progress report, deadlines, mapping, mitigation actions, internal webpage.
May, 2003	Gather mapping data.	Complete hazard identification and profile.
June, 2003	Website addressing Natural Hazards.	Public involvement and comment.
July 17, 2003	Meeting. Met with technical team members in Orem City.	Discussed mapping and plan review.
September 2, 2003	Meeting. Met with Duchesne County Commissioner and Emergency Manager	Vulnerability Assessment
September 11, 2003	Discussed Draft of PDM Plan with Duchesne County	Commissioners and Emergency Manager

Date	Activity	Purpose
October 6, 2003	Met with Daggett County Commissioners and Emergency Manager	Hazard Identification. Reviewed draft plan with emergency manger and commissioners.
October 10, 2003	Discussed Draft of PDM Plan with Executive Board.	Public Involvement
November 20, 2003	Discussed Draft corrections from the state with the Duchesne County Commissioner and planner	Reviewed corrections to be made and the crosswalk.
November 24, 2003	Discussed recommended changes for State Review with Daggett County	Public Involvement; Local LEPC members, Mayor of Manila, Emergency Managers and County Commissioner
December 5, 2003	Discussed Revised Draft of PDM with the Executive Board	Public Involvement
December 11, 2003	Discussed Mitigation Strategies with Daggett County.	Local LEPC, Mayor of Manila, Emergency Manager, Commissioners
December 17, 2003	Discussed Revised changes from the Mitigation Strategies	Local LEPC, Mayor of Manila, Emergency Manager in attendance
January 9, 2004	Discussed Revised changes from the State.	Public involvement and input.

Step 6: County Vulnerability Assessment

This step was conducted through a review of local base maps, topographical maps, floodplain maps, and other data. A detailed vulnerability analysis was completed with the use of Geographic Information Systems for each county within the Uintah Basin Association of Governments. HAZUS MH was used to determine vulnerability to earthquakes, for the hazards such as floods, landslides, and wildfire of loss estimation methodology was developed by the core planning team, with assistance from the technical team, to determine vulnerability to hazards. Each county section explains the data sources and the methodology used can be found in *Appendix H*. During these meetings attendees had the opportunity to review the specific information on all GIS products and to review areas of vulnerability in association with specific hazards.

Step 7: Community Goals Assessment

This step was conducted through a review of the governing documents of the planning area, as well as, conversations, interviews, and meetings with key responsible individuals within the planning area. This step identified what goals are already established and adopted for the planning area and whether or not they promote or deter mitigation activities.

Step 8: Contact Regional Mitigation Emergency Managers (County & Tribal)
Daggett, Duchesne, and Uintah counties along with their respective communities were contacted to ascertain mitigation strategies. These counties and communities have volunteers and individuals with an interest in mitigation and public employees with technical expertise pertinent to mitigation. They include elected officials, county/city planners, county staff, and emergency managers. County emergency managers and their assistants were tasked with completing the Mitigation Strategies Workbook issued by the State Division of Emergency Services and Homeland Security.

Step 9: Mitigation Strategy Development
Developing the mitigation strategies was a process in which all of the previous steps were taken into account. Each County that participated in the County Pre-Disaster Mitigation Planning Grant was asked to evaluate the vulnerability assessment completed by Uintah Basin Association of Governments and complete a Mitigation Strategies Workbook that can be found in Appendix N.

Step 10: Prioritization of Identified Mitigation Strategies
The Disaster Mitigation Act of 2000 requires state, tribal, and local governments show how mitigation actions were evaluated and prioritized. This was completed by the AOGs with assistance from each county and city. Prioritization was done using the STAPLEE method explained in the FEMA How to Guide, 386-3, April 2003 (available online at http://www.fema.gov/fima/planning_howto3.shtm).

Step 11: State Review
The Division of Emergency Services and Homeland Security pulled together a formal PDM plan review committee to insure local plans met the requirements of DMA 2000. This committee reviewed the plans from October 15 through November 1, 2003 and again from January 1 to January 15, 2004 subsequent to submission to FEMA for final review and acceptance.

Step 12: Adoption
The plan went through a public hearing process on July 9, 2004 and was adopted by:

Daggett County
- Town of Manila

Duchesne County
- Town of Altamont, City of Duchense, Myton City, Roosevelt City, Town of Tabiona.

Uintah County
- Ballard Town, City of Naples, Vernal City.

A. Public Involvement

Public involvement opportunities were available throughout the design and completion of this plan. Such opportunities included a public website for comment and review and public meetings. Emergency managers, the Fire Department, Sheriff Department, State and Local Agencies, all community members that could be affected by a natural disaster within the region, business leaders, educators, non-profit organizations, private organizations, and other interested members were all a part of the planning process.

The Uintah Basin Association of Governments (UBAOG) has developed a local Disaster Mitigation Plan. UBAOG was responsible for development of the plan. The UBAOG Planning Coordinator formed a planning team comprised of representatives form Altamont Town, Ballard City, Daggett County, Duchesne City, Duchesne County, Manila Town, Myton City, Naples City, Roosevelt City, Tabiona Town, Uintah County, Vernal City, and the State government. Community groups were also involved in the planning process, such as, but not limited to the Partners Committee, the Local Emergency Preparedness Committee, the Tri-County Local Emergency Preparedness Committee, Forest Service, Bureau of Land Management, and the Tri-County Health Department, which are located in the Uintah Basin region. This team met once a week for the first three months, and twice a month for the next six months, and once a month thereafter. The plan was developed over one year.

An effort was made to solicit public input during the planning process and seven public meetings were held during the formation of the plan. Three at the beginning, two after the first draft was produced, and two after the final draft was produced. Feedback received from the public proved valuable in the development of the plan. Listed below are the dates, location, attendance, and discussions that took place during the meetings.

June 18, 2002, The Tri-County LEPC meeting held in Duchesne. The Uintah Basin Association of Governments Planning Coordinator discussed the Disaster Mitigation Planning Process. Questionnaire's were handed out to all those who were in attendance to provide input on possible natural disasters within the Tri-County Region. *(See Appendix L)* Those agencies in attendance were; Tri-County emergency managers, Uintah County LEPC, DES & Homeland Security, NRCS, Farm Service Agency, Water Rights, Uintah Water Conservancy, Forest Service, Ballard Water, UBAOG Planning Coordinator, and Tridell/Lapoint Water, Tri-County Health Department, Representatives from the Oil and Gas producers, and several local citizens representing the Tri-County region.

October 17, 2002, UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. UBAOG Planning Coordinator discussed the Disaster Mitigation Planning Process. Questionnaire's were handed out to all those in attendance to provide input on possible natural hazards within the Tri-County Region. *(Appendix L)* Those in attendance were; Duchesne County Citizens, Uintah County Citizens, two Duchesne County Commissioner's, two Uintah County Commissioner's, Myton City Mayor, Vernal City Mayor, Roosevelt City Citizens, Vernal City Citizens, Daggett County Commissioner, Uintah County Public Lands Specialist, Representation from Senator Bennett's office, Consultant for Public Lands, UBAOG Planning Coordinator, Altamont Town citizen, UBAOG Executive Director, and the Uintah County Building Inspector.

December 19, 2002, UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. UBAOG Planning Coordinator explained that letters have been sent out to each city, town, and county to designate an individual to act in behalf of their jurisdiction. The information will be collected and compiled as a rough draft for public comments and input. Individuals were appointed for each jurisdiction to be a part of the Disaster Mitigation Planning Committee. UBAOG Planning Coordinator explained that the Director of DESHS met with them on November 12, 2002 regarding the Plan. Those in attendance were; All three Duchesne County Commissioner's, Ballard City Mayor, Myton City Mayor, all three Uintah County Commissioner's, Roosevelt City Mayor, two Daggett County Commissioner's, Duchesne County citizens, Uintah County citizens, Uintah County public lands specialist, Representation from Senator Bennett's office, Duchesne County Water Conservancy District, Representation from Congressman Cannon's office, Public lands Consultant, Representation of the local radio station, UBAOG Planning Coordinator, UBAOG Executive Director, and Engineering Services, Inc.

April 9, 2003, Partners meeting held at the Vernal BLM office. Notices were emailed to those in attendance two weeks prior to the meeting. UBAOG Planning Coordinator explained the purpose the Disaster Mitigation plan. The Planning Coordinator explained how they would like to get more involvement from the BLM offices and the Forest Service regarding Wildfire, Drought, and Insect Infestation issues. Questionnaire's were handed out to all those who were in attendance to provide input on possible natural disasters within the Tri-County Region. *(See Appendix L)* The Planning Coordinator explained the importance of obtaining information regarding past natural hazards that have occurred for documentation in the plan. The planning Coordinator mentioned that he would like to sit down with the Bureau of Indian Affairs (BIA) and get their involvement and input into the plan. The planning Coordinator mentioned that he is currently meeting once a week with the Disaster Mitigation Planning Committee every Friday at the Uintah County Building Conference room and extended an invitation to the all those who wanted to attend. Those in attendance were; Dave Howell Vernal Bureau of Land Management (BLM), Walt Donaldson, Division of Wildlife Resources (DWR), Chester D. Mills, Bureau of Indian Affairs (BIA), George Weldon, Forest Service, Larry Ross and Kent Peatross, Duchesne County Commissioners, Heather Hoyt, Uintah County Grants administrator, Howard

Cleavinger, BLM, Dave Moore, BLM, Laura West, Forest Service, Rhonda Ayala, Dinosaurland Resource Conservation Development, Craig Collett, Daggett County Commissioner, Robert Specht, BLM, Yankton Johnson, UBAOG Planning Coordinator, and Kirt Higgins, State Institution Trust Lands Association.

October 10, 2003, UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. The UBAOG Planning Coordinator handed out a copy of the Disaster Mitigation rough draft to each of the elected officials for all 12 entities in which the plan will represent. He explained that the portion he was handing out covered each of the 12 entities. He explained, that the portion he was handing out was put together with the help of each Counties Emergency Managers, GIS people, County Commissioner's, City Planner's, and public involvement. The UBAOG Planning Coordinator explained that the plan would be sent back to the state by October 15, 2003 for the first review. Those in attendance included; Myton City Mayor, two Duchesne County Commissioner's, two Daggett County Commissioner's, one Uintah County Commissioner, Ballard City Mayor, Naples City Mayor, Altamont Town citizen, Tabiona Town citizen, Daggett County citizens, Duchesne County citizens, Uintah County citizens, Representative from Senator Bennett's office, Hanna Water and Sewer District, Ballard City citizens, Roosevelt City citizens, UBAOG Executive Director, and Myton City citizen.

December 5, 2003, UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. The UBAOG Planning Coordinator handed out a copy of the Disaster Mitigation rough draft to each of the elected officials for all 12 entities in which the plan will represent. He explained that the portion he was handing out covered each of the 12 entities. He explained, that the portion he was handing out was put together with the help of each Counties Emergency Managers, GIS people, County Commissioner's, City Planner's, and public involvement. The UBAOG Planning Coordinator explained that the plan would be sent back to the state by December 30 for a second review. After which, the following motion was made. **UBAOG MOTION: Commissioner Ross made the motion to move to the second report, Mayor Burton seconded, motion carried.** The Capital Improvements Plan rating and ranking was also discussed and how the Capital Improvements Planning that occurs in the future will contribute and be a reflection of the goals in the Disaster Mitigation Plan. Those in attendance included; Manila Town Mayor, Myton City Mayor, all three Uintah County Commissioner's, two Duchesne County Commissioner's, two Daggett County Commissioner's, Ballard City Mayor, Roosevelt City Mayor, Duchesne City Mayor, Naples City Planner, Small Business Development Center Representative, Vernal Area Chamber of Commerce, Duchesne County Chamber of Commerce, Uintah County Economic Development, Department of Workforce Services, Executive Assistant to Daggett County, Altamont Town Citizen, Roosevelt City citizens, Ballard City citizens, Uintah County citizens, Daggett County citizens, UBAOG Planning Coordinator, UBAOG Executive Director, and Duchesne County citizens.

January 9, 2003, UBAOG Board of Directors Meeting held in Uintah County at the Uintah County Courthouse. Notices were posted two days prior to the meeting to allow public involvement. The UBAOG Planning Coordinator explained that the plan was submitted to the State for review with them responding that it looked really good and only a minimal changes needed to be made. He said, that once he makes the changes he will send it back to the State and if it meets State approval they will forward the plan on to FEMA for final approval. He reminded the Board that between March and June of 2004 he will be requesting signatures from each of the 12 jurisdictions covered in the plan stating that they agree with the contents in the plan and that they will sign a resolution to that affect. The Capital Improvements Plan rating and ranking was also discussed and how the Capital Improvements Planning that occurs in the future will contribute and be a reflection of the goals in the Disaster Mitigation Plan. Those in attendance included; Myton City Mayor, two Uintah County Commissioner's, two Duchesne County Commissioner's, Roosevelt City Mayor, Ballard City Mayor, Naples City Planner, Vernal City Mayor, Daggett County Administrator, Johnson Water District, Sunrise Engineering, Inc., Department of Workforce Services, Duchesne County Chamber of Commerce, Uintah County Economic Development, Duchesne County Economic Development, Vernal City residents, Roosevelt City residents, Altamont Town residents, Uintah County residents, UBAOG Planning Coordinator, and UBAOG Executive Director.

B. Information Sources

- Federal Emergency Management Agency (How-to Guides).
- National Weather Service (Hazard profile).
- National Climate Data Center (Drought, Severe Weather)
- Army Corps of Engineers (Flood data).
- Utah Division of Emergency Services and Homeland Security (Salt Lake City Mitigation Plan, GIS data, Flood data, HAZUS data for flood and earthquake).
- Utah Geologic Survey (GIS data, Geologic information).
- Utah Division of Forestry, Fire and State Lands (Fire data).
- Utah Avalanche Center, Snow and Avalanches in Utah Annual Report 2001-2002 Forest Service.
- Utah Automated Geographic Resource Center (GIS data).
- University of Utah (drought climate charts from internship students).
- University of Utah Seismic Station (Earthquake data).
- Utah State University (climate data).
- Councils or Government
- Association of Governments

- Daggett County and municipalities (Water Master Plan, Emergency Operations Plans, Histories, mitigation actions, public input, GIS data, Assessor data, Transportation data, Property and Infrastructure data).
- Duchesne County and municipalities (Water Master Plan, Emergency Operations Plans, Histories, mitigation actions, public input, GIS data, Assessor data, Transportation data, Property and Infrastructure data).
- Uintah County and municipalities (Municipal Water Plans, Greenwich Water Plan, Emergency Operations Plans, Histories, mitigation actions, public input, GIS data, Assessor data, Transportation data, Property and Infrastructure data).

Other Plans:
- Earthquake Safety in Utah
- Utah Natural Hazard Handbook
- Utah Statewide Fire Risk Assessment Project
- A Strategic Plan for Earthquake Safety in Utah
- Natural Disaster Analysis, State of Utah Office of Emergency Services 1976
- State of Utah Mitigation Plan 1999 and 2001
- State of Utah Wildfire Plan 2002
- State of Utah Drought Plan
- State of Utah Water Plan
- Salt Lake City Mitigation Plan 2002
- Planning for a Sustainable Future
- Town of Merrimack, NH Hazard Mitigation Plan 2002
- Clackamas County Mitigation Plan 2002
- Hazard Mitigation Plan Dunkerton, Iowa
- Dunn County North Dakota Multi-Hazard Mitigation Plan 2001
- Jefferson County West Virginia All Hazard Mitigation Plan 2003

Plan Methodology

The information in this mitigation plan is based on research from a variety of sources. UBAOG/DES conducted data research and analysis, facilitated steering committee meetings and public workshops, developed the final mitigation plan, and presented the plan for formal adoption with participating jurisdictions. The research methods and various contributions to the plan include:

State and federal guidelines and requirements for mitigation plans:
During the completion of this plan UBAOG examined and followed state and federal guidelines and requirements. These guidelines included FEMA planning standards, National Flood Insurance Program's Community Rating system, FEMA Flood Mitigation Assistance Program and various State reference material. A list of guidelines and requirements is as follows:

  - FEMA 386-1,2,3,4,5,6,7,8,9

- FEMA Post Disaster Hazard Mitigation Planning Guidance DAP-12
- Disaster Mitigation Act of 2000
- 44 CRF parts 201 and 206, Interim Final Rule
- FEMA Region VIII "crosswalk"

Previous plans and studies:
UBAOG examined existing mitigation plans from around the country and incorporated numerous plans and studies from within the jurisdictions they serve. These plans include:

- City of Naples Storm Water Master Plan
- State Water Plan
- Utah State Water Plan Uintah Basin (December, 1999)
- Utah Statewide Fire Risk Assessment Project
- Natural Disaster Hazard Analysis, State of Utah Office of Emergency Services 1976
- Salt Lake City Mitigation Plan 2002
- State of Utah Mitigation Plan 1984, 1985, 1999 and 2001
- State of Utah Wildfire Plan 2002
- State of Utah Drought Plan
- State of Utah Water Plan
- Uintah Basin Flood Hazard Identification Study
- Emergency Operations Plans for Daggett, Duchesne, and Uintah Counties.
- University of Utah Seismograph Stations History of Utah Earthquakes
- National Weather Service "Flood and Flash Flood Deaths in Utah"
- Snow and Avalanches in Utah Annual Report 2001-2002 Forest Service Utah Avalanche Center.
- Town of Merrimack, New Hampshire Hazard Mitigation Plan 2002
- Clackamas County Mitigation Plan 2002
- Dunn County North Dakota Multi-Hazard Mitigation Plan 2001

Hazard specific research and Vulnerability Methodology
UBAOG collected data and compiled research on nine hazards: dam failure, drought, earthquake, flooding, infestation, slope failure, problem soils, severe weather, and wildfire. Research materials came from a variety of agencies including DES, AGRC, USGS, USACE, UGS, UFFSL, county GIS, city GIS, County Assessors, and County Emergency Managers. Historical data used to define historic disasters was researched through local newspapers, interviewing residents, local knowledge derived through committee meetings, historic state publications, Utah Museum of Natural History, and recent and historic scientific documents and studies.

Vulnerability Methodology

Geographic Information Systems (GIS) were used as the basic analysis tool to complete the hazard analysis for the Uintah Basin Association of Governments

Pre-disaster Mitigation Plan. For most hazards a comparison was made between digital hazard data and census 2000 demographic information. Fortunately digital data exist statewide for landslides, quaternary faults, wildfire, dam locations, and epicenter locations. The goal of the vulnerability study is to estimate the number of homes, and infrastructure vulnerable to each hazard and assign a dollar value to this built environment. To this end, census data and natural hazard maps are the basic information used in the analysis. All the analysis takes place within the spatial context of a GIS. With the information available in spatial form, it is a simple task to overlay the natural hazards with census data to extract the desired information.

Earthquakes

HAZUS MH shorthand for Hazards United States Multi-Hazard was used to determine vulnerability as it relates to seismic hazards for the study area. The HAZUS-MH Earthquake Model is designed to produce loss estimates for use by federal, state, regional and local governments in planning for earthquake risk mitigation, emergency preparedness, response and recovery. The methodology deals with nearly all aspects of the built environment, and a wide range of different types of losses. Extensive national databases are embedded within HAZUS-MH, containing information such as demographic aspects of the population in a study region, square footage for different occupancies of buildings, and numbers and locations of bridges. Embedded parameters have been included as needed. Using this information, users can carry out general loss estimates for a region. The HAZUS-MH methodology and software are flexible enough so that locally developed inventories and other data that more accurately reflect the local environment can be substituted, resulting in increased accuracy.

Uncertainties are inherent in any loss estimation methodology. They arise in part from incomplete scientific knowledge concerning earthquakes and their effects upon buildings and facilities. They also result from the approximations and simplifications that are necessary for comprehensive analyses. Incomplete or inaccurate inventories of the built environment, demographics and economic parameters add to the uncertainty. These factors can result in a range of uncertainty in loss estimates produced by the HAZUS-MH Earthquake Model, possibly *at best* a factor of two or more.

The methodology has been tested against the judgment of experts and, to the extent possible, against records from several past earthquakes. However, limited and incomplete data about actual earthquake damage precludes complete calibration of the methodology. Nevertheless, when used with embedded inventories and parameters, the HAZUS-MH Earthquake Model has provided a credible estimate of such aggregated losses as the total cost of damage and numbers of casualties. The Earthquake Model has done less well in estimating more detailed results - such as the number of buildings or bridges experiencing different degrees of damage.

Such results depend heavily upon accurate inventories. The Earthquake Model assumes the same soil condition for all locations, and this has proved satisfactory for estimating regional losses. Of course, the geographic distribution of damage may be influenced markedly by local soil conditions. In the few instances where the Earthquake Model has been partially tested using actual inventories of structures plus correct soils maps, it has performed reasonably well.

Landslides and Wildfire

The methodology used to determined vulnerability for landslides and wildfire within the study area was almost identical. Demographic information from census 2000 was manipulated to obtain vulnerability numbers. The methodology used, assumes and even distribution of built housing across the county and each city within the county. Assuming even distribution a housing density was determined by dividing the total number of homes (census 2000) by the total number of acres. For example the Town of Maeser in Uintah County is 4,153 acres in size and contains 954 housing units. Thus the housing density is .229 i.e. each acre contains .229 housing units.

From this point the number of acres of extreme, high, and moderate wildfire along with acres of historically active landslides were determined for each city and the unincorporated county. Once and acre total was know it was multiplied by the density value for each particular city or county to determine the total number of homes. This new figure was then multiplied by the average housing value as reported by the County assessors office, to determine the total value of potential loss residents. The County assessor gave an average value of $80,000.00 for both Uintah and Duchesne Counties, and $75,000 for Daggett County. In the case of wildfire the value of the land (20% of total) was subtracted from the totals reported in the vulnerability tables. This was done because wildfires do not render the land useless as landslides often do. Additionally content values are not included, which would raise the potential loss numbers for housing by approximately 50%.

Transportation and utilities information was determined using the Geoprocessing Wizard an extension in ArcView 3.2. This extension allows the GIS user to clip one theme based on another. For example the roads theme was clipped by the landslide theme, resulting in a new shape file containing all of the roads within a historically active landslide area. The new database was then queried through several simple equations to determine the length in miles of each linear feature (pipelines, electric lines, and roads). Once the length of vulnerable infrastructure was determined it was multiplied by cost estimate information from HAZUS MH and the Utah Department of Transportation. These cost include:

Item	Cost per Mile
Local Roads	2,000,000
State Highways	2,413,500
US Highways	2,413,500
US Interstates	3,600,000
Power Lines	48,280
Gas Lines	241,390

In addition to the linear features point data such as critical facilities, dams, care facilities, schools, power generation facilities, and substations were analyzed to determine if the feature was within a hazard area. Where point data was determined to be within a hazard area the following values from HAZUS MH were assigned:

Item	Cost
Small Power Plant	100,000,000
Large Power Plant	500,000,000
Low Voltage Substation 115 KV	10,000,000
Medium Voltage Substation 230 KV	20,000,000
Large Voltage Substation 500 KV	50,000,000
Facility value was assigned based on Square footage.	

Limited availability of digital data represented a problem in completing the vulnerability assessment. Potential loss numbers were only determined for earthquakes, landslides, and wildfires in this plan. Additional limitations to the above described analysis method includes:

- Assuming random distribution
- Limited data sets for water, gas, electrical, resulting in, incomplete numbers for these features.

- Lack of digital parcels data from the county assessors office.
- HASUZ MH is not designed for small population counties.
- No digital data for dam failure inundation, flood plains, or infestation.
- Relied on state wide data not intended for manipulation at the scale it was used.
- Data was not field checked, resulting in an analysis wholly dependent on accuracy of data.
- Meta data was lacking on some of the used data sets.

In terms of hazard mapping presentation in this document, simple maps were created to provide a graphical illustration of location. These maps are done at a scale, which allows them to fit on a standard letter sized page rendering the useless. Larger maps can be plotted out upon request. Data manipulation and maps were created as a planning tool, to be used, by interested persons within the Uintah Basin Association of Governments and the jurisdictions the AOG serves. This information should not take the place of accurate field verified mapping from which ordinances need to be based off of.

Effort to analyze hazards related to potential future development areas was also addressed where applicable. This proved to be a very difficult exercise and at best can only identify areas, which need additional research before development should be allowed. No viable source of data exists for this study area to facilitate analysis of future development. Limited zoning data was available but this data does not necessarily indicate which, areas will be developed and which will not.

Part III. General Regional Data

Geographic background

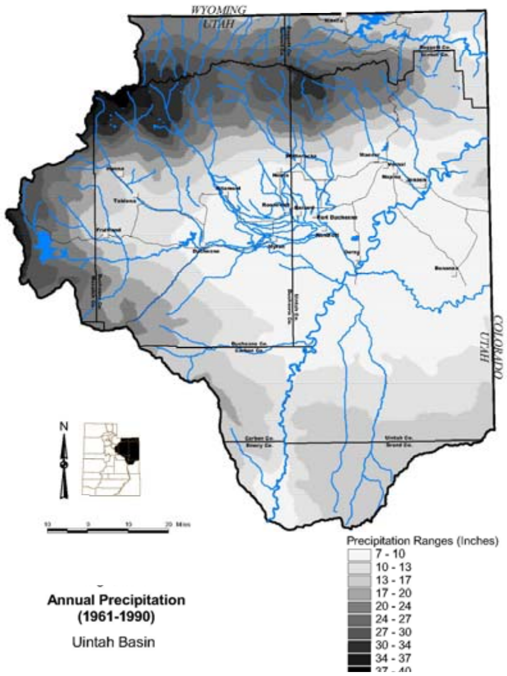
Uintah Basin Association of Government UBAG serves the following counties and municipalities with this counties: Daggett, Duchesne, and Uintah. The three counties in the study area are very rural, with the total population of the Uintah Basin being only 40,516. Each counties population is: Daggett 921, Duchesne 14,371, and Uintah 25,244. The principle draining in the area is the Green River with the Duchesne and White Rivers as major tributaries. The Uintah basin is divided into two drainages—the North Slope and the south slope of the Uinta Mountains. Elevations in the basin range from 13,528 feet and Kings Peak in the Uinta Mountains to 4,600 feet along the green river near it's excite from Uintah County. *For more information regarding the Demographics, population, and future growth see Appendix J.*

The Uinta Mountain range is unique, being the only major range of mountains in North America running east and west. The Uintah Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, arêtes, cirques, and glacial troughs. Lateral and terminal moraines often form natural dams, creating over a thousand small lakes that dot the region.

Numerous small streams exit the north and south slope of the Uinta range. These include such streams as the Sheep Creek, Carter Creek, Currant Creek, Red Creek, Rock Creek, Yellowstone, Whiterocks, and Strawberry River.

Climate

Mean annual temperatures in the valleys range from 44° to 47° F. Mean monthly maximum temperatures reach 94.6° F in July, and the mean monthly minimum falls as low as 2.5° F in January. The number of frost-free days ranges from 134 at Roosevelt to 57 near Flaming Gorge. Mean annual precipitation ranges from 7.1 inches at Roosevelt to 12.5 inches at Flaming Gorge Reservoir. The Uinta Mountains receive about 40 inches.



Annual Precipitation (1961-1990)

Uintah Basin

Geology

The Uinta Mountain range is Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, aretes, cirques and glacial troughs. Deposition by the ice and glacial-melt water has partially filled the many U-shaped valleys with ground moraine and valley trains. It has also lined them with lateral and terminal moraines that have often formed natural dams, creating over a thousand small lakes that dot the region.

Uintah Basin Generalized Geologic Units

Quaternary

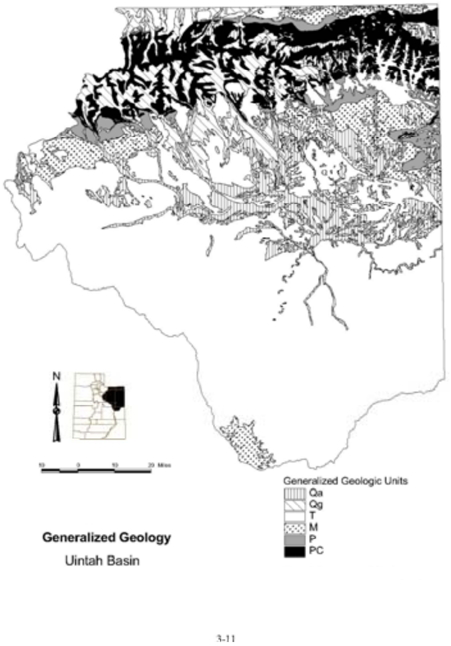
Qa	Unconsolidated deposits of alluvium, colluvium, windblown and landslide origin.
Qg	Unconsolidated deposits of glacial origin.

Tertiary

Weakly to semi-consolidated sedimentary basin-filling rocks of the Browns Park, Bishop Conglomerate, Duchesne River, Uinta, Bridger, Green River and Flagstaff formations.

Mesozoic

M Consolidated sedimentary rocks locally include the North Horn, Current Creek, Mesa Verde Group, Mancos Shale, Frontier Sandstone, Mowry Shale, Dakota, Cedar Mountain, Morrison, Curtis, Entrada, Carmel, Nugget (Navajo), Chinle, Moenkopi and Dinwoody Formations.



Paleozoic

P Consolidated sedimentary rocks locally include the following formations: Park City, Weber Sandstone, Morgan, Round Valley Limestone, Doughnut Shale, Humbug, Deseret Limestone, Madison Limestone, Maxfield Limestone and Lodore Sandstone.

Precambrian

Pc Consolidated sedimentary and metamorphic rocks locally include the following: Red Pine Shale, Uinta Mountain Group and Red Creek Quartzite.

DAGGETT COUNTY

Daggett County identified six natural hazards they wanted addressed in the Daggett County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Daggett County PDM planning committee consisted of one County Commissioner, the Mayor of Manila, the County Emergency Managers, the TRI-County Health Department, the County Planning and Zoning, the Executive Assistant to the County Commissioners, several local citizens and the Uintah Basin Association of Governments planning coordinator.

DUCHESNE COUNTY

Duchesne County identified six natural hazards they wanted addressed in the Duchesne County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Duchesne County Disaster Mitigation Planning committee consisted of one County Commissioner, the Mayor of Duchesne, the Mayor of Altamont, the Mayor of Tabiona, the Roosevelt City Manager, the Mayor of Myton, the County Emergency Manager and the Uintah Basin Association of Governments planning Coordinator.

UINTAH COUNTY

Uintah County identified six natural hazards they wanted addressed in the Uintah County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the Uintah County PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for there Pre-Disaster Mitigation Plan.

The Uintah County Disaster Mitigation Planning committee consisted of one County Commissioner, the County Emergency Manager, the Vernal City Planner, the Naples City Manager, and Ballard City in and the Uintah Basin Association of Governments planning coordinator.

Natural Hazards

Natural hazards differ throughout the state and throughout the UBAOG study area, based on variables such as underlying geology, topography, hydrology, development patterns, and climate. For this reason a risk assessment was conducted by the Uintah Basin Association of Governments to determine what natural hazards might affect the Pre-Disaster Mitigation planning. Table 2 illustrates the results of UBAOG risk assessment and how and why each hazard with the potential of affecting areas within the Uintah Basin Association of Governments was identified. In the annexes of this plan identified hazards are planned for on a county-by-county basis, with the exception of drought and severe weather, these hazards are planned for on a region wide (Daggett, Duchesne, and Uintah Counties) basis. It is understood hazards don't recognized political boundaries, politics and the availability of GIS data dictated the planning scope for this mitigation plan.

Natural Hazard Identification Table 2.

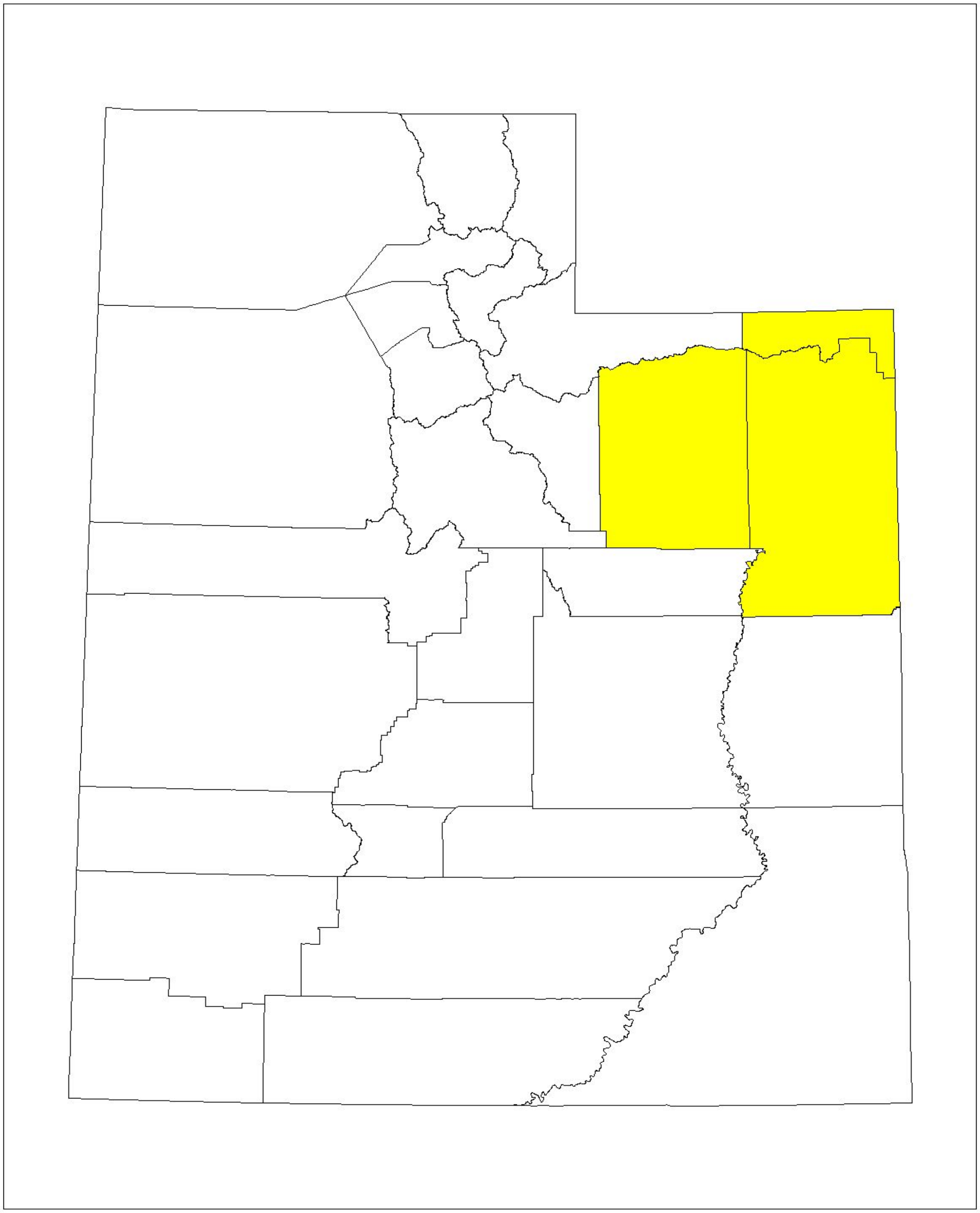
Hazard	**How Identified**	**Why Identified**
Dam Failure	• Review of County Emergency Operations Plans • Assistance from Utah Division of Water Rights, Dam Safety Section • Community's profile	• Can cause serious damage to life and property and have subsequent effects such as flooding, fire, debris flow, etc.
Drought	• Review of County Emergency Operations Plans • Community's profile • National Climate Data Center • Palmer Drought Severity Index readings	• Affects local economy, water reservoirs, soil • Previous experiences
Earthquake	• Review of County Emergency Operations Plans • Input from City and County Emergency Operations Managers • United States Geological Survey • Utah Geological Survey • HAZUS analysis	• Utah is predicted, 1/5 chance, to experience a large earthquake within the next fifty years. • Numerous faults throughout Utah • Utah experiences approximately 13 earthquakes a year with a magnitude over 3.0. • Can create fire, flooding, hazardous materials incident, transportation and communication limitations
Flooding	• Review of County Emergency Operations Plans • Review of past disaster declarations • Input from City and County Emergency Operations Managers • Utah Division of Water Resources • Utah Geological Survey • Flood Insurance Studies • Army Corps of Engineers • Review of County Emergency Operations Plans • Review of past disaster declarations • Input from City and County Emergency Operations Managers • Utah Division of Water Resources • Utah Geological Survey • Army Corps of Engineers	• Associated with drought and dry soils • Several previous incidents have caused severe damage and loss of life • Many of the rivers and streams are located near neighborhoods • Many neighborhoods are located on floodplains, alluvial fans • Associated with drought and dry soils that the State is frequented with • Previous incidents have caused severe damage and loss of life • Many neighborhoods are located near canyon mouths and on floodplains
Infestation	• Review of County Emergency Operations Plans • Input from County Emergency Managers	• Affects local economy and vegetation

Hazard	How Identified	Why Identified
Sever Weather (Winter storms, Avalanches, tornados, lightening)	• Review of County Emergency Operations Plans • Community's profile • Review of County Emergency Operations Plans • Review of past disaster declarations • Input from City and County Emergency Operations Managers • Utah Avalanche Forecast Center • Utah Department of Transportation • Review of County Emergency Operations Plans • National Climate Data Center • National Weather Service Special Publication	• Communities, homes, infrastructure, roads, ski areas, and people can be affected by an Avalanche • Avalanches have caused property damage and loss of life in the past • Have caused property damage and loss of life
Wildland Fire	• Past Wildfire Occurrences • Review of County Emergency Operations Plans	• Potential structure damage • Watershed damage
Slope Failure (landslide, debris flow and slide)	• Review of County Emergency Operations Plans • Utah Geological Survey • Input from County Emergency Managers • Community's profile • Community's profile • National Climate Data Center • GIS analysis • Past State Mitigation Plans	• Past incidents have caused loss of life property damage, disruption of power lines and communication • Have caused damage in the past

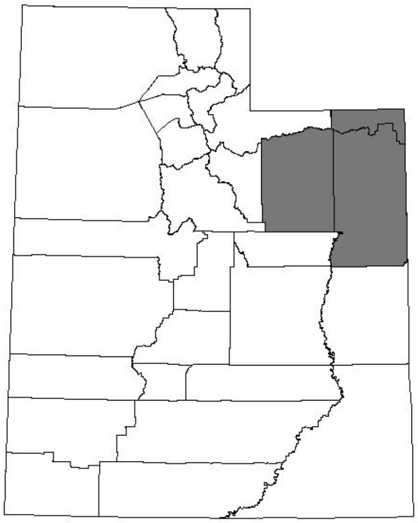
Annex 1-Uintah Basin Natural Hazard Mitigation Plan Regional Annex

Tri-County Regional Annex

Figure 1: Tri-County Map



Description of the Study Area



Uintah Basin Association of Government UBAG serves the following counties and municipalities with this counties: Daggett, Duchesne, and Uintah. The three counties in the study area are very rural, with the total population of the Uintah Basin being only 40,516. Each counties population is: Daggett 921, Duchesne 14,371, and Uintah 25,244. The principle draining in the area is the Green River with the Duchesne and White Rivers as major tributaries. The Uintah basin is divided into two drainages—the North Slope and the south slope of the Uinta Mountains. Elevations in the basin range from 13,528 feet and Kings Peak in the Uinta Mountains to 4,600 feet along the green river near it's excite from Uintah County.

The Uinta Mountain range is unique, being the only major range of mountains in North America running east and west. The Uintah Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, arêtes, cirques, and glacial troughs. Lateral and terminal moraines often form natural dams, creating over a thousand small lakes that dot the region. The Uintah Basin is very dependant upon their runoff for water supply. Drought years in the Uintah Basin can be divesting, causing a huge economic impact to the agricultural business. *For more information regarding the economic and demographic data of the region see Appendix J.*

NATURAL HAZARD: DROUGHT

FEMA Hazard Profile for Drought

Frequency	Seven – year cycle (currently in fifth year)		
Severity	X	Catastrophic	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire county		
Seasonal Pattern	Year – round		
Duration	Up to several years.		
Speed of Onset	Not measurable		

VULNERABILITY: High

AFFECT:

The current drought situation in Daggett County, Duchesne County, and Uintah County will present a serious threat to the health and safety of its residents, private property, agriculture, the environment and the economy. The severe drought has reduced soil moisture, stream flows, ground and water levels and could result in agricultural, residential and commercial losses of millions of dollars. The potential for wildfires throughout the county is high and the availability of firefighting resources is expected to be limited as drought conditions worsen. Immediate action is required to protect public health and safety and private property, wildfire, agriculture and the environment. *For a description of drought and possible causes see the drought section in Appendix A*.

Impacts of Drought

- Decreased land prices
- Loss to industries directly dependent on agricultural production (machinery and fertilizer manufactures, food processors, dairies, etc)

- Unemployment from drought related declines in production
- Strain on financial institutions (foreclosures, more credit risk, capitol shortfalls)
- Revenue losses to federal, state, and local governments from reduced tax base.
- Reduction of economic development.
- Rural population loss and relocation to larger cities.
- Loss to recreation and tourism industry
- Energy related effects
- Water suppliers revenue shortfalls
- Higher cost of water transport
- Decline in food production causes increase in food prices and increase in importation of food

Social

- Mental and physical stress
- Health related low flow problems including cross-connection contamination diminished sewage flows, increased pollutant concentrations, and reduced fire-fighting capabilities.
- Loss of human life
- Public safety concerns caused by increased threat of forest and range fires
- Increases in conflicts of water users.
- Changes lifestyles of those living in rural areas.
- Reduction of modification of recreation activities.
- Public dissatisfaction with government drought response plan

Environmental

- Damage to animal species
- Reduction and degradation of fish and wildlife habitat
- Increased contact of wild animals with agricultural producers.
- Loss of biodiversity
- Lower water levels in reservoirs and lakes
- Reduced stream flow.
- Loss of wetlands
- Increased ground water depletion, land subsidence, reduced recharge.
- Increased number and severity of wild fires.
- More dust and pollutants in the air.
- Visual and landscape qualities diminished.

Drought History in Uintah Basin

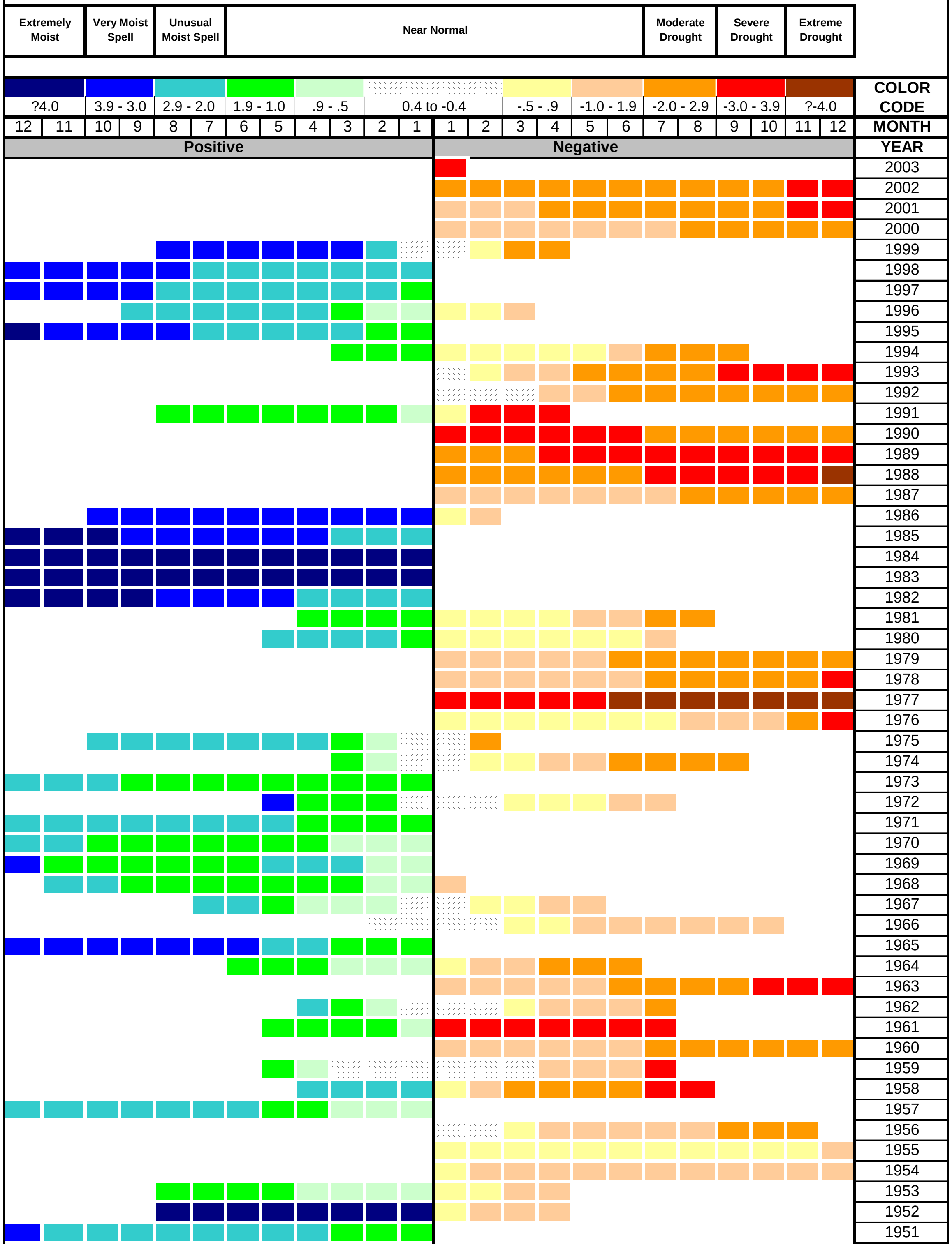
According to Utah’s annual Palmer Drought Severity Index Charts, Utah has experienced as many as 60 years of drought out the past 100 years, with several of these being multi-year droughts” (35). Multi-year droughts affecting the entire state occurred during 1896-1905, 1930-1936, 1939-1940, 1953-1956, 1958-1964, 1976-1979, and 1995-1996. Single year droughts occurred during “1924, 1966, and 1974” (State of Utah 35). The Chart below provides a drought history for the Uintah Basin, using date for Utah climate zone five and six, from the present back to 1895. Drought severity is measured using the Palmer Drought Severity Index (PDSI). The PDSI drought severity is represented monthly with a numerical id between +6 and –6 with server droughts having higher negative numbers.

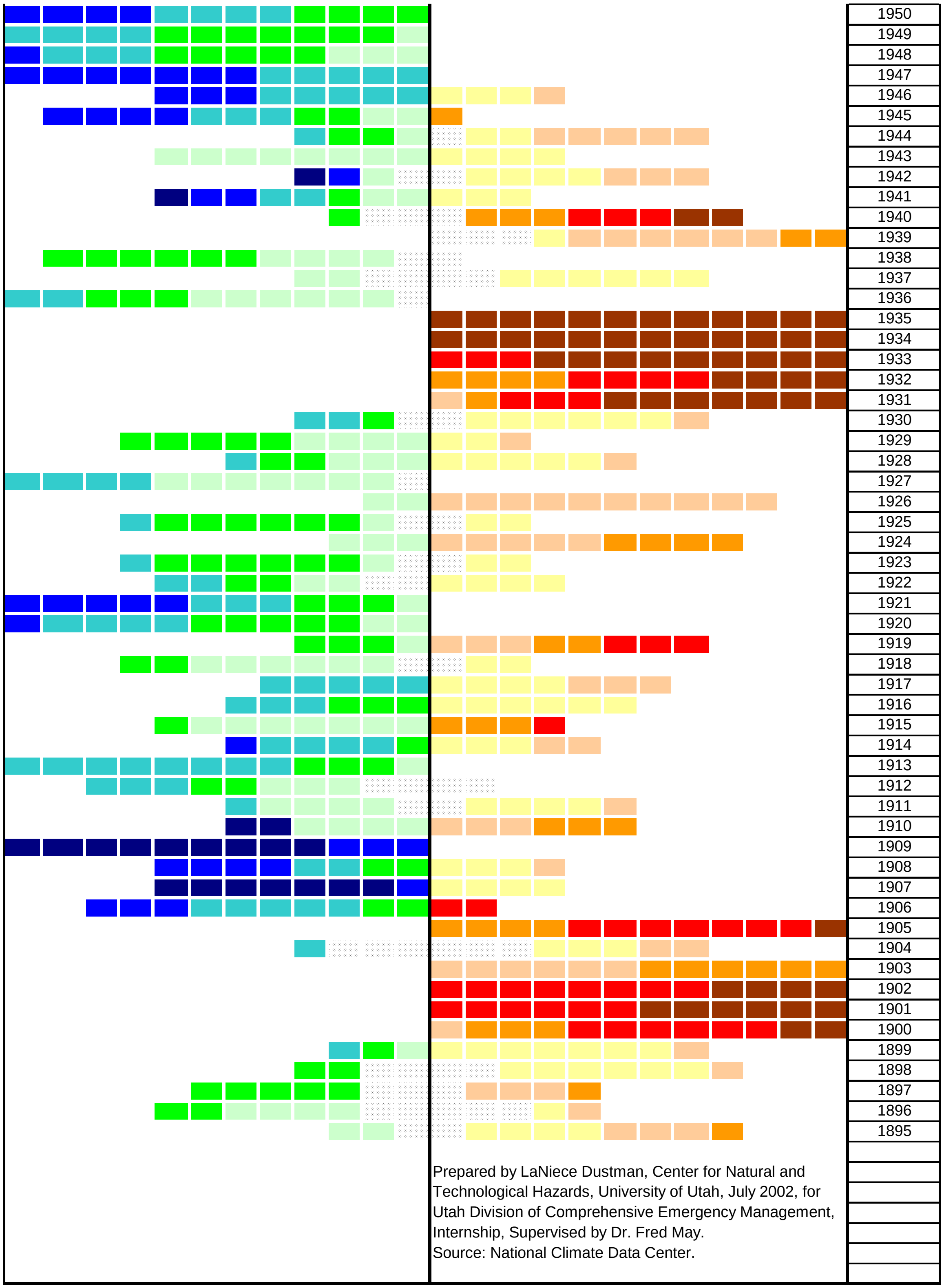
The Palmer Drought Severity Index

Palmer Drought Severity Index, an index, developed by Wayne Palmer in the 1960's, which measures drought severity using temperature and rainfall to determine dryness. The Palmer Drought Severity Index or (PDSI) has become the "semi-official" drought index as it is "standardized" to local climate and can be applied to any part of the country. The PDSI uses zero as normal and assigns a monthly numerical id between +6 and -6 with, server droughts having higher negative numbers. Thus, a moderate drought is minus 2, a sever drought minus 3, and extreme drought is minus 4. Excess rain is expressed using plus figures, with plus 2 representing moderate rainfall, etc.

PALMER DROUGHT SEVERITY INDEX CHART
UTAH CLIMATE DIVISION 5
1895 - 2001

Chart depicts numbers of positive and negative months for each year.

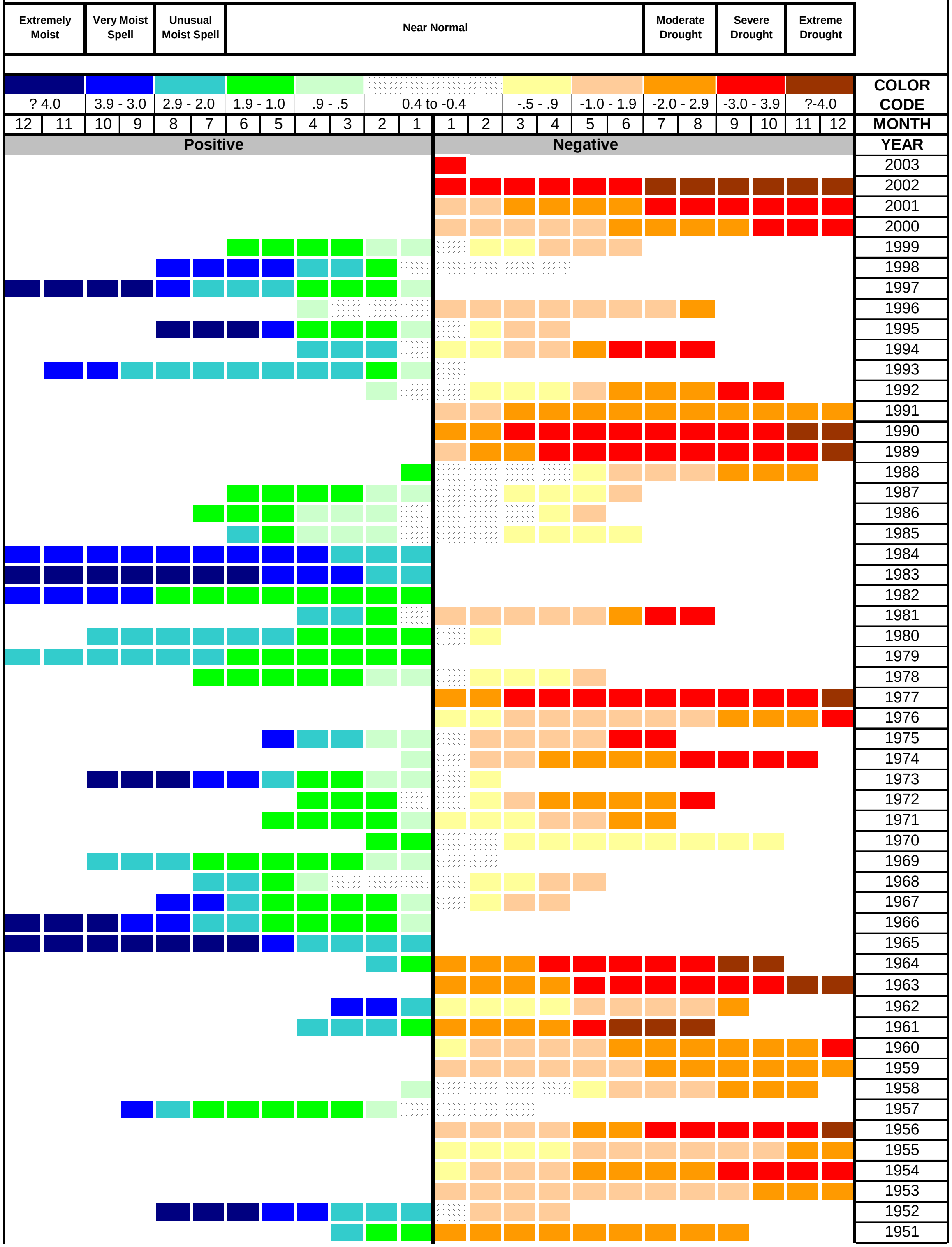


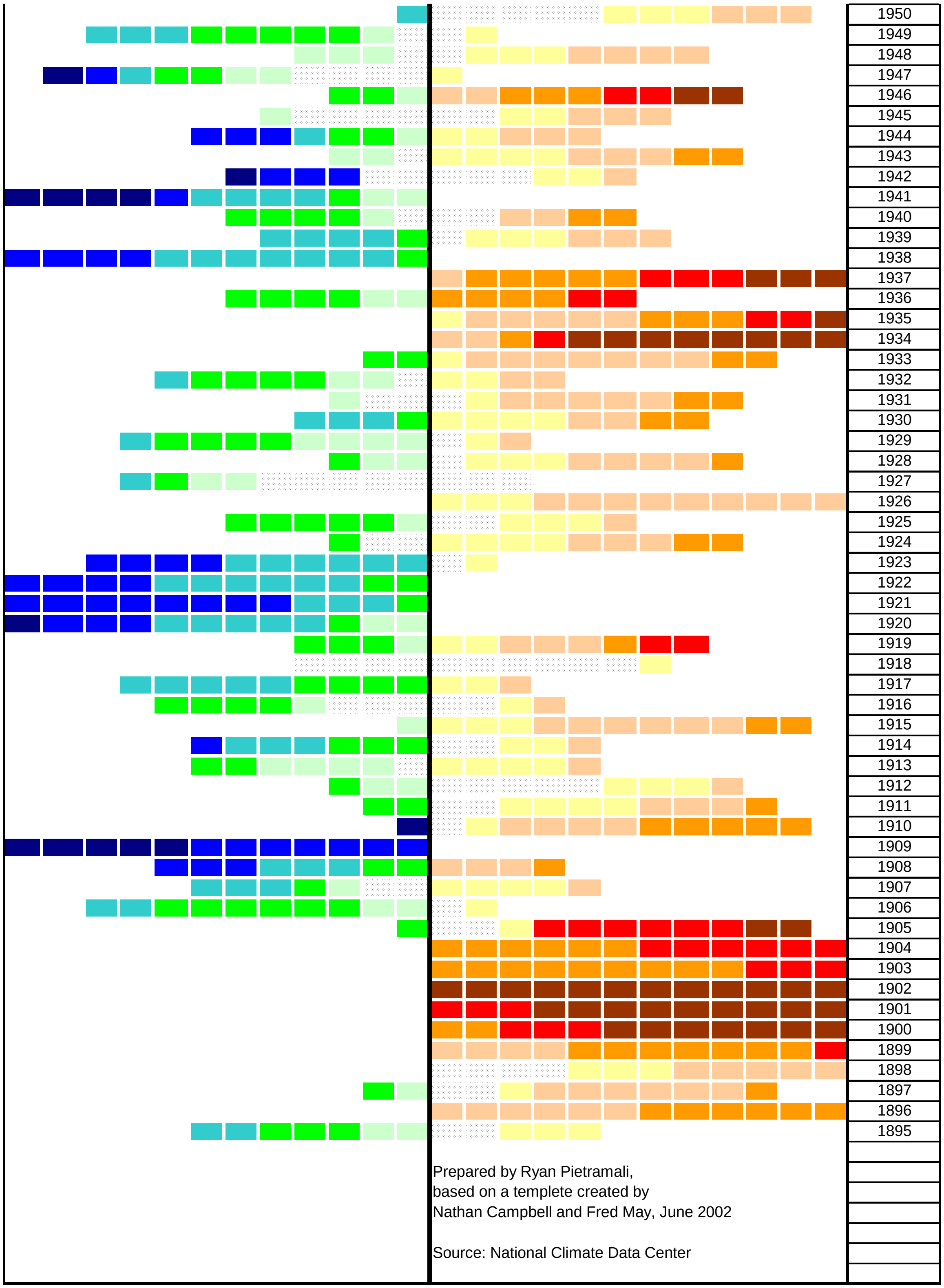


Prepared by LaNiece Dustman, Center for Natural and Technological Hazards, University of Utah, July 2002, for Utah Division of Comprehensive Emergency Management, Internship, Supervised by Dr. Fred May.
Source: National Climate Data Center.

PALMER DROUGHT SEVERITY INDEX CHART
UTAH CLIMATE DIVISION 6
1895 - 2002

Chart depicts numbers of positive and negative months for each year.





Prepared by Ryan Pietramali,
based on a templete created by
Nathan Campbell and Fred May, June 2002

Source: National Climate Data Center

Generic Mitigation:

- Educate Daggett County residents on conserving water.
- Reduce water consumption.
- Quickly deal with leaks and breaks in irrigation equipment.
- Monitor water system efficiency.

NATURAL HAZARD: TORNADO

FEMA Hazard Profile for Tornado

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
	X	**Unlikely**	**Less than 1% probability in next 100 years**
Severity		**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
	X	**Negligible**	**Less than 10%** (of the jurisdiction that can be affected)
Location	Daggett County		
Seasonal Pattern	Summer		
Duration	Five minutes or less		
Speed of Onset	Minimal or no warning		

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm (or sometimes as a result of a hurricane) and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of the high wind velocity and wind-blown debris. Tornado season is generally March through August, although tornadoes can occur at any time of year. They tend to occur in the afternoons and evenings: over 80 percent of all tornadoes strike between noon and midnight.

When a tornado threatens, individuals need to have a safe place to go and time to get there. Even with advances in meteorology, warning times may be short or sometimes not possible. Lives are saved when individuals receive and understand the warning, know what to do, and know the safest place to go.
Source: http://www.fema.gov/hazards/tornadoes/
For a description of tornados and possible causes see the tornados section in Appendix A.

NATURAL HAZARD: WINTER STORMS

FEMA Hazard Profile for Winter Storms

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
	X	**Possible**	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	X	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Duchesne County		
Seasonal Pattern	November, December, January, February		
Duration	Weeks and sometimes Months		
Speed of Onset	6 to 12 hours warning		

A winter storm can range from moderate snow over a few hours to blizzard conditions with blinding wind-driven snow that last several days. Some winter storms may be large enough to affect several states while others may affect only a single community. All winter storms are accompanied by low temperatures and blowing snow, which can severely reduce visibility. A severe winter storm is one that drops four or more inches of snow during a 12- hour period, or six or more inches during a 24-hour span. An ice storm occurs when freezing rain falls from clouds and freezes immediately on impact.
Source: http://www.fema.gov/hazards/winterstorms/
For a description of winter storms and possible causes see the severe weather section in Appendix A.

VULNERABILITY: Medium

AFFECT:

All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can impact a community or region for days, weeks, and even months. Storm effects such as extreme cold, flooding, and snow accumulation can cause hazardous conditions and hidden problems for people in the affected area. A harsh winter storm affects the transportation of food and fuel to and from the Wasatch Front, and impacts all retail and grocery stores, restaurants, and gas stations.

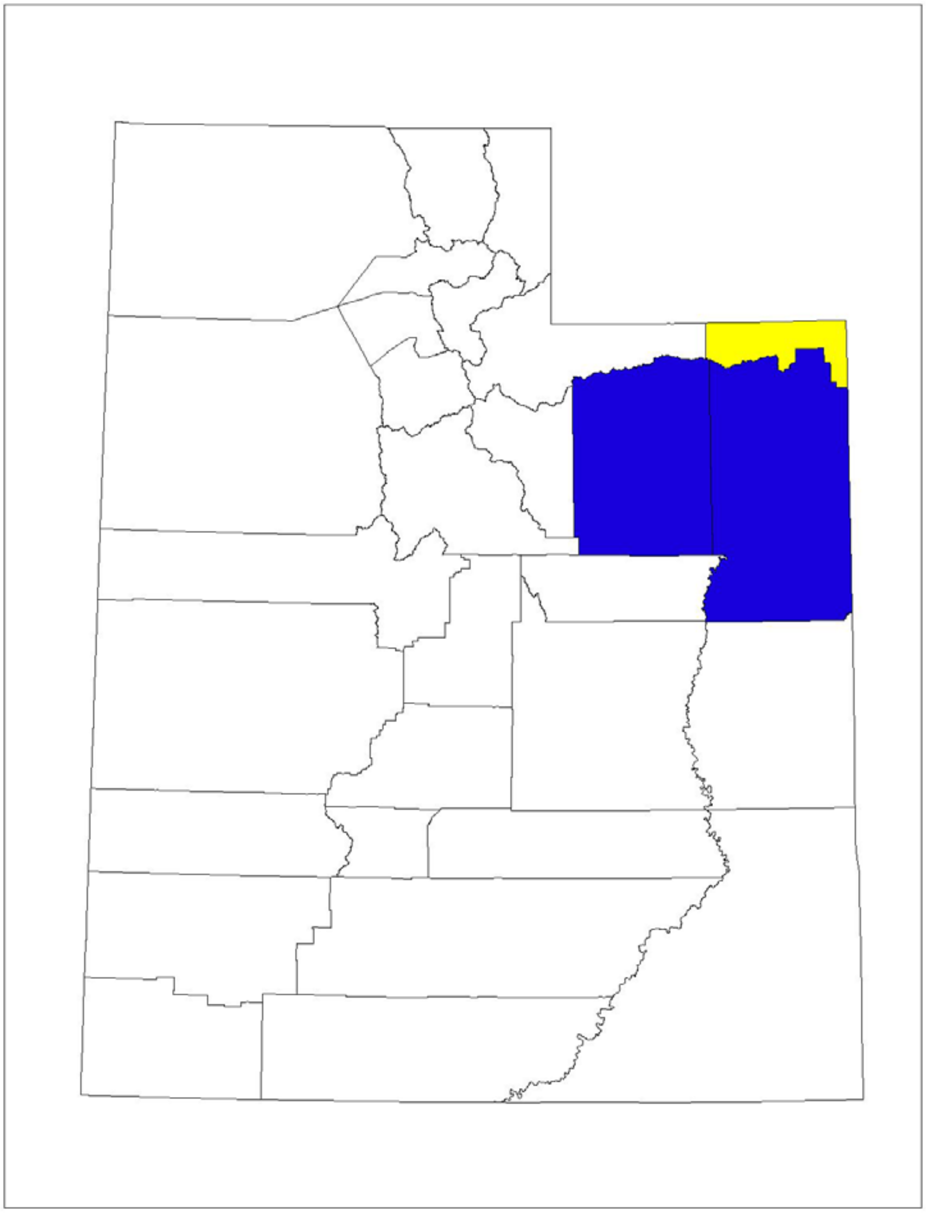
Generic Mitigation:

1. Work with UDOT on transportation and road conditions.
2. Revise and up-date building codes for carports, barns and the residential roofs.
3. Public education programs that provide back-up power and heat.
4. Research alternative forms of heat source.
5. Obtain 72 hour kits. **http://www.co.multnomah.or.us/sheriff/prepare/supplykit.htm**

Annex 2-Daggett County

Daggett County Annex

Figure 1: Tri-county map



DAGGETT COUNTY

Past Hazard Events in Daggett County

Understanding the past is often the key to discovering what the future holds; this is especially true when planning for natural disasters. The fact that the towns within Daggett County have experienced, for example, flooding in the past means flooding can occur in the future. While over time some of this has been mitigated for the low frequency of occurrence often results in hazards with little or no mitigation. Table 1 provides a brief history of Daggett County natural disasters. This table includes only sizable events found during our research, and may not represent the total history.

Table 1 Daggett County Natural Disaster History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flooding	Summer of 1936	County Wide	Damage to roads, bridges	No Loss of Life
Flash Flooding	June 10, 1965	Palisades Campground	Sheep Creek flash flood took out nearly 10 miles of State Highway	7 deaths
Drought	1977 Summer	All of Daggett County	Heavy impact on agriculture and drinking water for local residents	No Loss of Life
Wildfire	Summer 1977	Daggett County	Hundreds of Acres burnt	3 deaths
Flooding	Spring of 1983	County Wide	Damage to culverts and roads. The one lane bridge over Green River was destroyed.	No Loss of Life
Wildfire	August 18, 1993	Ruples Assist Fire	Unknown	Unknown

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Drought	Fall of 2000	All of Daggett County	Heavy impact on agriculture and drinking water for local residents	No Loss of Life
Wildfire	Summer of 2002	Daggett County (Dutch John)	20,000 acres burnt in Daggett County that cost 1.5 million dollars to put the fire out.	No Loss of Life
Drought	Currently (2003)	All of Daggett County	Heavy impact on agriculture and drinking water for local residents	No Loss of Life

Daggett County identified six natural hazards they wanted addressed in the Daggett County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Daggett County PDM planning committee consisted of one County Commissioner, the Mayor of Manila, the County Emergency Managers, the TRI-County Health Department, the County Planning and Zoning, the Executive Assistant to the County Commissioners, several local citizens and the Uintah Basin Association of Governments planning coordinator.

The Disaster Mitigation Plan for Daggett County identifies critical facilities located in the County *(See Appendix B).* A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in the County were not located in the natural hazard area. *Due to Data limitations, The Uintah Basin Association of Governments was unable to map the location of the critical facilities in Daggett County.*

NATURAL HAZARD: DAM FAILURE

FEMA Hazard Profile for Dam Failure

Frequency		**Highly likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
	X	**Possible**	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	X	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire County		
Seasonal Pattern	Spring		
Duration	Several months to over one year		
Speed of Onset	30 Minutes or less (Minimal or no warning)		

A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years. *For a description of dam failure and possible causes dams failure in Daggett County see the Flood Hazard Identification Study in Appendix M.*

VULNERABLIITY: High

AFFECT:

Dam failure would cause significant downstream flooding to low lying areas. Impacts could include destroyed homes, bridges, roads, crops, utilities, and business loss. Natural dam failures are rare but terrorist could target large dams such as Flaming Gorge.

Description of Hazard

The following high hazard dams exist within Daggett County according to the Utah Division of Dam Safety database.

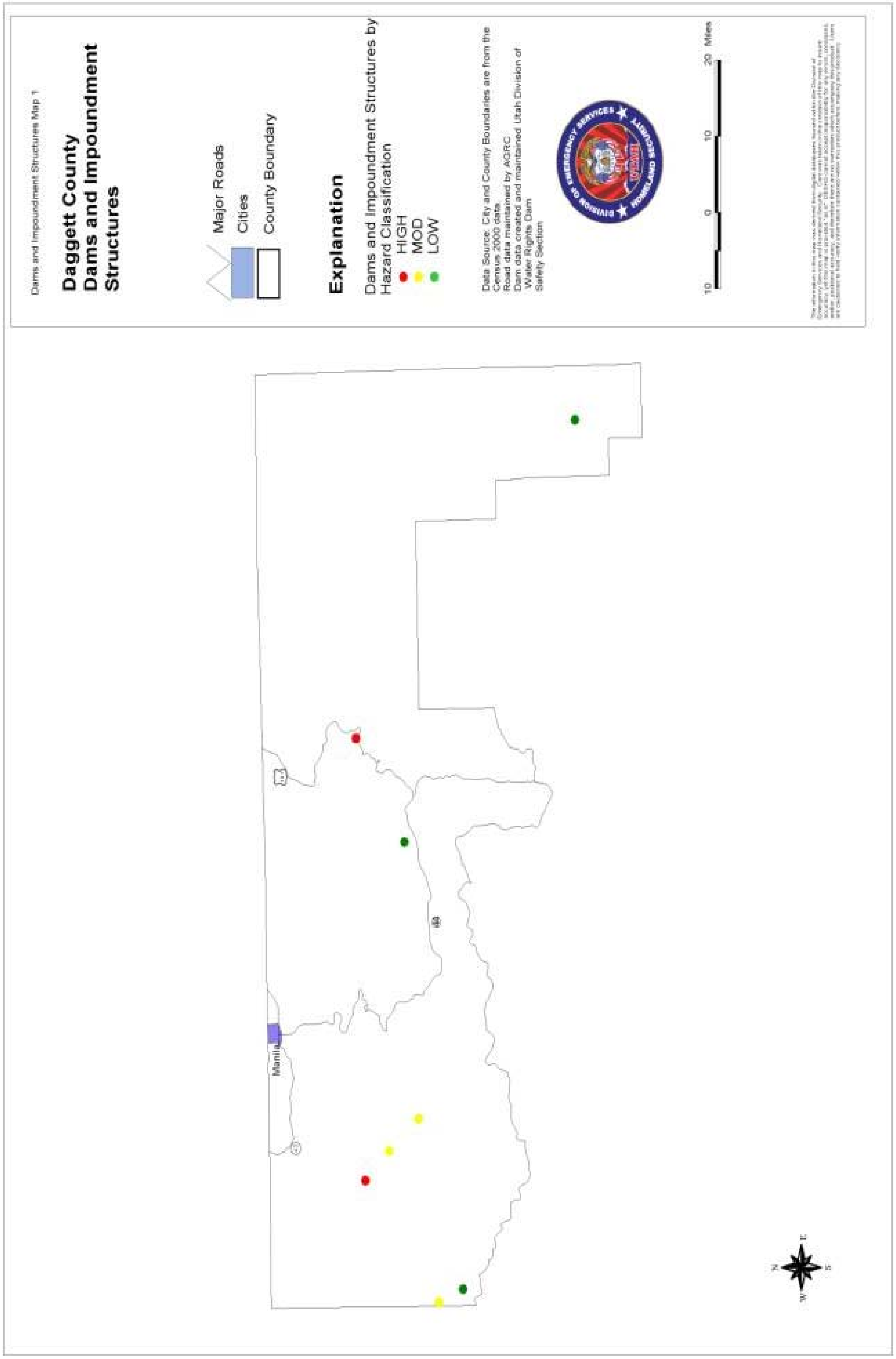
- Brownie Lake Dam
- East and West Green Lakes
- Flaming Gorge Dam
- Longs Park Dam
- Sheep Creek Lake Dam
- Spirit Lake Dam

The map on page 7 illustrates the location of each dam.

Low-lying areas down stream of these dams are particularly at risk, if a dam were to fail. *For a description of dam failure and possible causes see the dams failure section in Appendix A.*

Generic Mitigation:

- Proper mapping of flood plains, including mapping of dam breach flood potential.
- Knowledge must be made public so that emergency managers are aware and the public is aware when they buy and sell property.
- Updated Emergency Action Plans (EAP) and integration with GIS Systems.
- Maintaining proper flood plain and wetland geometry and vegetation will help route floods.
- Flood plain usage should be compatible with flood plain needs.
- More debris dams would help with floods and debris, and mud, and maintaining a flood control pool in existing dams would be beneficial.
- Protection of roads and bridges.
- General infrastructure protection.
- More authority to order releases and better forecasting would help in snowmelt floods and runoff.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.


Dams and Impoundment Structures Map 1
Daggett County
Dams and Impoundment
Structures
Major Roads
Cities
County Boundary
Explanation
Dams and Impoundment Structures by
Hazard Classification
HIGH
MOD
LOW
Data Source: City and County Boundaries are from the
Census 2000 data
Road data maintained by AGRC
Dam data created and maintained Utah Division of
Water Rights Dam
Safety Section
10
0
10
20
Miles
Manila
N
E
S
W

NATURAL HAZARD: EARTHQUAKE

FEMA Hazard Profile for Earthquake

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
	X	**Possible**	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	**X**	Catastrophic	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire county		
Seasonal Pattern	Near fault lines of the County		
Duration	Hours		
Speed of Onset	Minimal or no warning		

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of year.
Source: http://www.fema.gov/hazards/earthquakes/
For a description of earthquakes and possible causes see the earthquake section in Appendix A.

Daggett County is an area of limited seismic activity. The Pot Creek faults in eastern Daggett County are the only faults located within the County. This poorly understood group of faults has moved within the last 1.6 million years. However, because of the limited seismic danger Daggett County is zoned for little or no activity. *The map on page 14 and 15 identify Epicenters and Quaternary Faults and gives an explanation for each in Daggett County.*

VULNERABILITY: Low

The map on page 10 shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

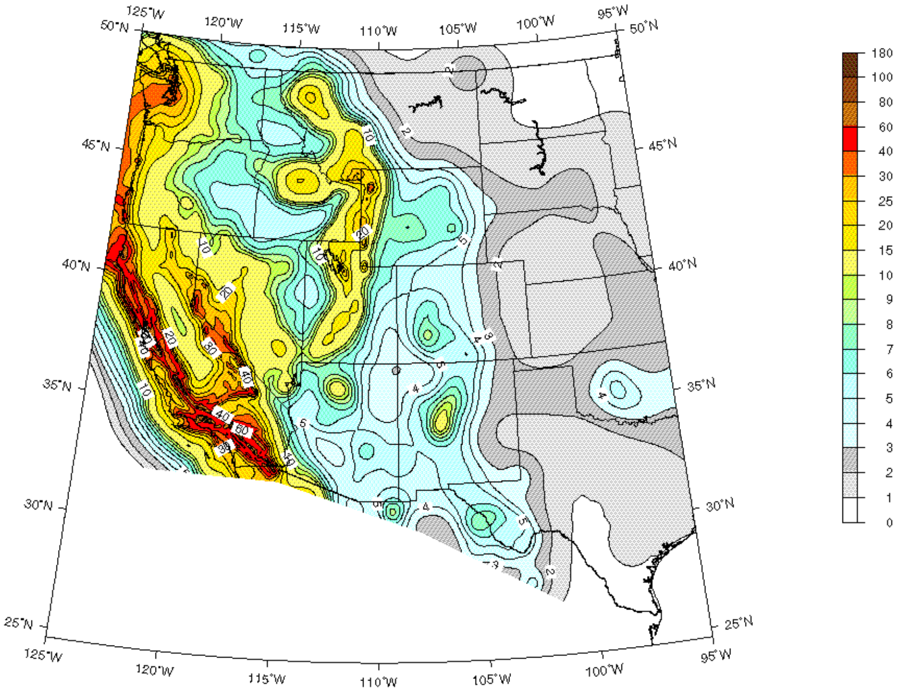
You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

Peak ground acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980cm/sec/sec). For example, In an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

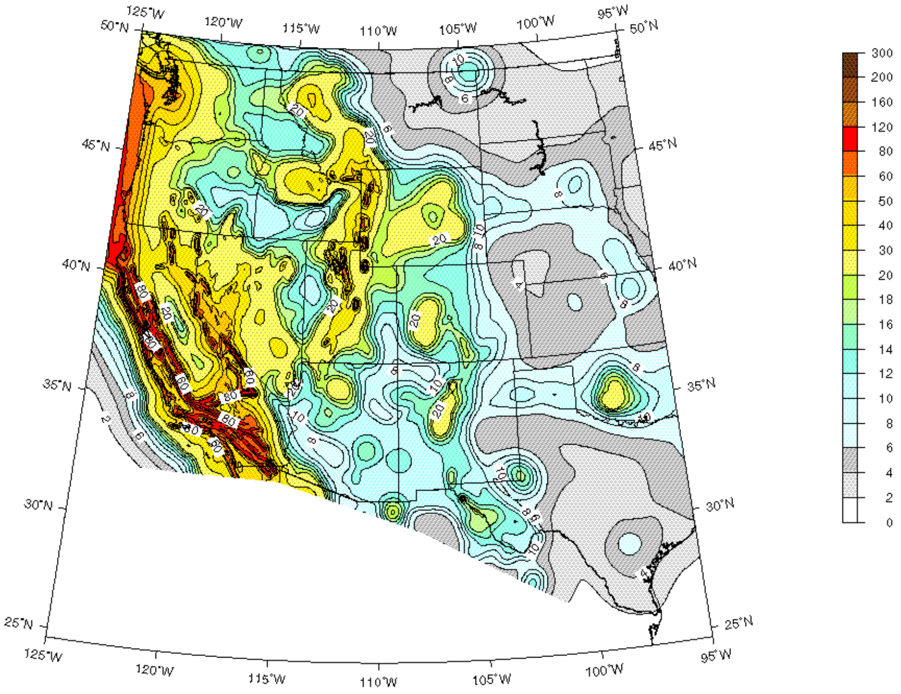
%g= Ground Surface Acceleration / Rate of Acceleration due to Gravity

%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%



Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev



Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev

POTENTIAL AFFECT:

A potential earthquake could affect water, oil and gas produced for the Uintah Basin as well as the Wasatch Front. An earthquake could affect transportation and dams. Many homes in Daggett County were not built to meet earthquake standards. *A Full Hazus MH Event Report can be found in Appendix H for earthquakes in Daggett County.*

HAZUS MH Vulnerability Assessment

Table 1.1 Casualties

Casualties	Nighttime –Minor	2
	Nighttime –Major	0
	Nighttime -Fatalities	0
	Daytime –Minor	1
	Daytime –Major	0
	Daytime- Fatalities	0
	Commute –Minor	1
	Commute –Major	0
	Commute-Fatalities	0

Buildings/Structures

Building Damage by Count -- Building damage is classified by HAZUS in five damage states: none, slight, moderate, extensive and complete. Table1.2 lists the number buildings by occupancy, which is estimated to have moderate to complete levels of damage.

Table 1.2 –Building Damage by Count with Moderate to Complete Damage

Category	Number of Structures
Residential	311
Commercial	1
Industrial	0
Totals	312

Critical facilities

Classification	Total	Least Moderate Damage >50%	Complete Damage > 50%	Functionality > 50% at day 1
Hospitals	0	0	0	0
Schools	3	0	0	0
EOCs	0	0	0	0
Police Stations	1	0	0	0
Fire Stations	2	0	0	0

Debris Removal –Table 1.4 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour.

A second debris removal issue is landfill space. Fifty thousand tons (50,000) at a weight to volume ratio of one ton per cubic yard would cover more than ten acres to a depth of one yard.

Table 1.4 –Debris Generated (millions of tons)/Loads to Remove Debris

Debris Generated	0.04
Loads (25 tons per load)	2,000

Fire Following --The Great San Francisco Earthquake of 1906 illustrated the hazard a Town could face from fire following an earthquake. Multiple ignitions and broken water mains conspired to make firefighting nearly impossible. HAZUS uses the estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake. Table 1.5 provides estimates of ignitions, people at risk and the building stock exposed to fires following an earthquake.

Table 1.5 –Fire Following Event, Population Exposed, and Building Stock Exposed

Ignitions	1
People Displaced	0
Value Exposed (mill. $)	0

*The extremely low loss numbers represented by HAZUS MH are due to Daggett County's limited built infrastructure and low seismic risk.

These numbers were derived from a HAZUS MH run based on a probabilistic 2500-year event with a magnitude 7.0 running the soils portion of the model. *The complete HAZUS MH run for Daggett County is available in appendix H.*

Generic Mitigation:

Generic Ground Shaking Mitigation

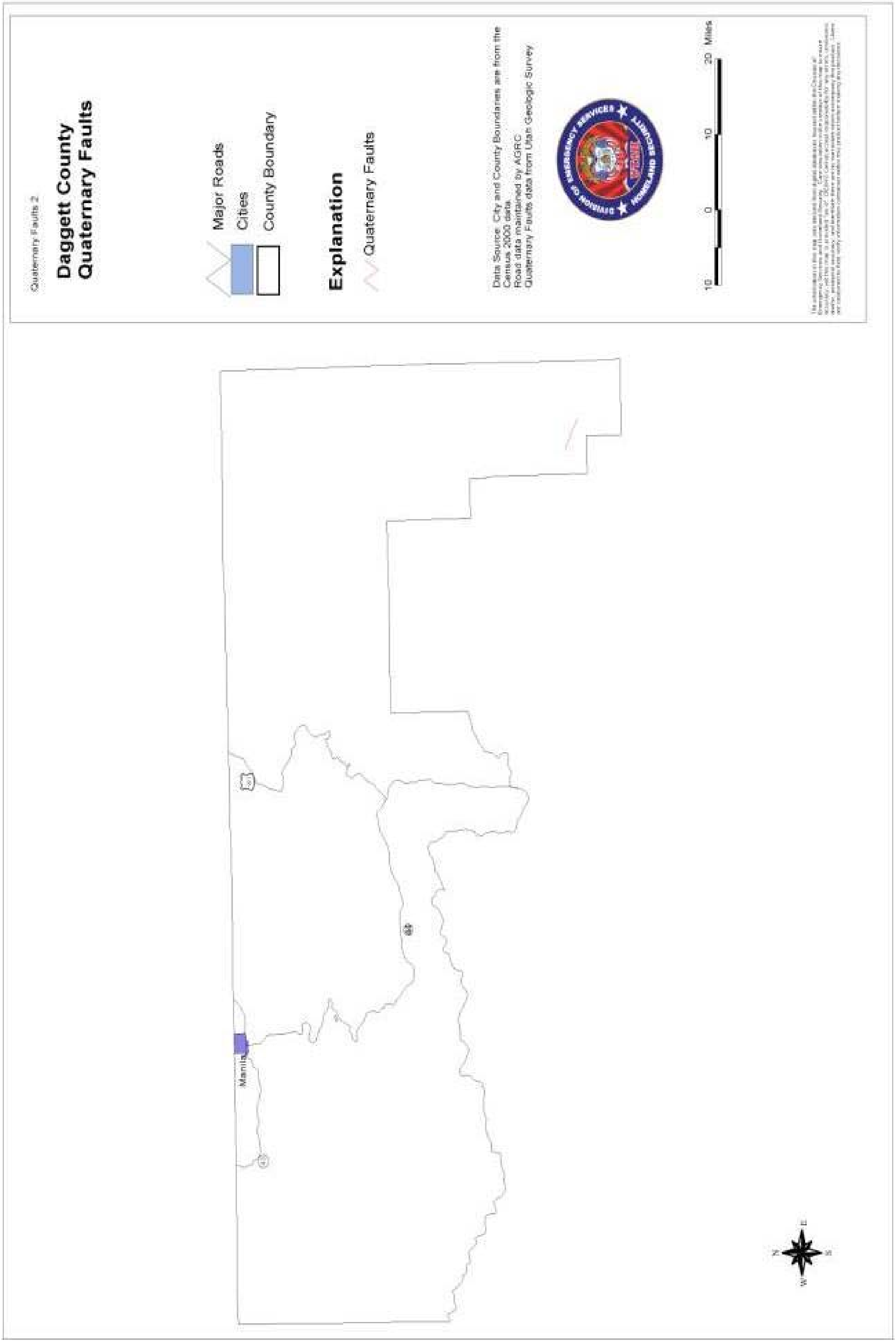
- Understand peak horizontal acceleration and recurrence interval.
- Design appropriately.
- Zoning ordinances and building codes.

Generic Liquefaction Mitigation

- Move soil out.
- Densify soils in place.
- Remove ground water.
- Structural design.

Generic Surface Fault Rupture Mitigation

- Avoidance
- Zoning ordinances


Quaternary Faults 2
Daggett County
Quaternary Faults
Major Roads
Cities
County Boundary
Explanation
Quaternary Faults
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Quaternary Faults data from Utah Geologic Survey
10
0
10
20
Miles
Manila
N
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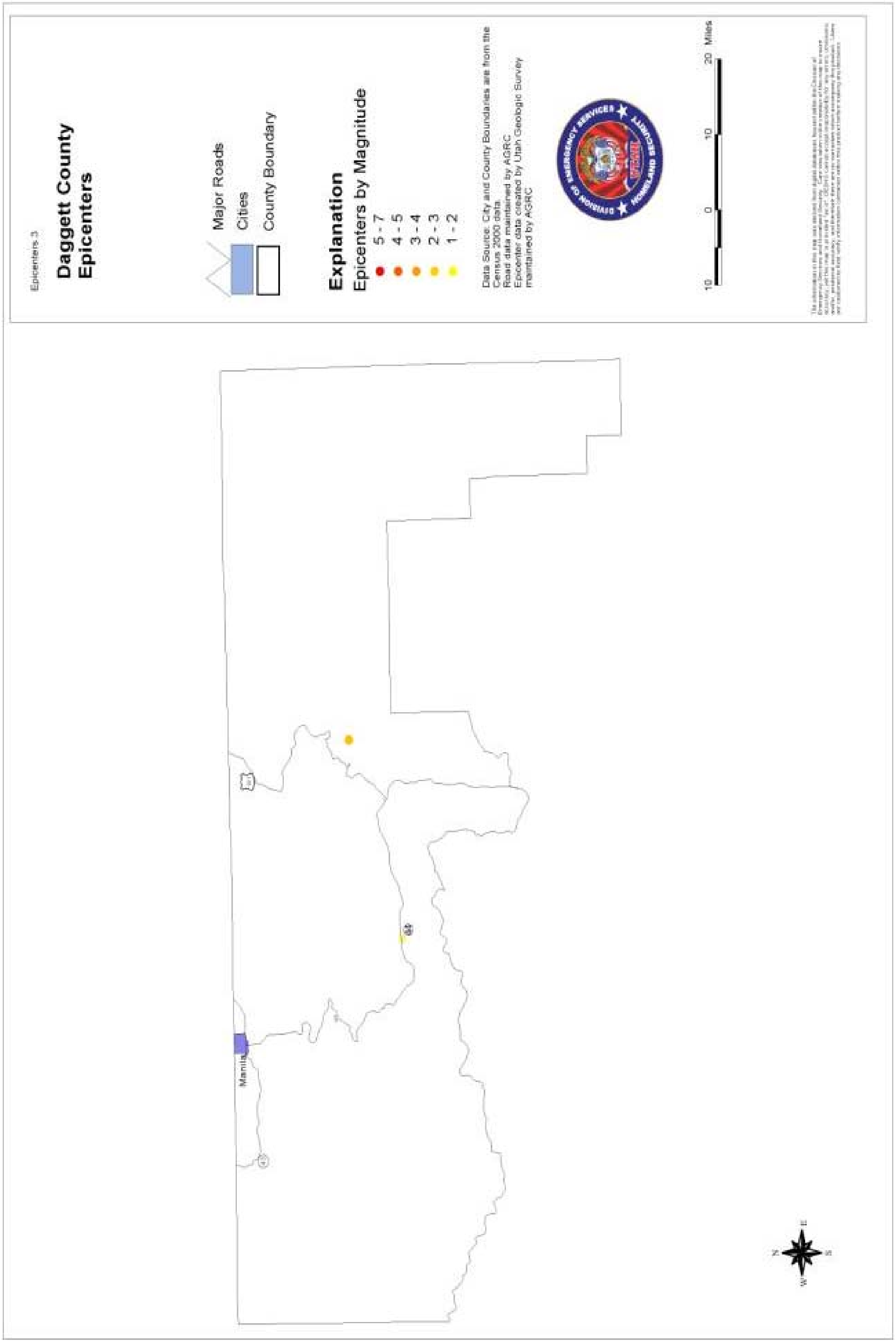

Epicenters 3
Daggett County Epicenters
Major Roads
Cities
County Boundary
Explanation
Epicenters by Magnitude
● 5 - 7
● 4 - 5
● 3 - 4
● 2 - 3
● 1 - 2
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC.
Epicenter data created by Utah Geologic Survey maintained by AGRC
DIVISION OF EMERGENCY SERVICES ★ HOMELAND SECURITY
10 0 10 20 Miles
Manila
44
191
43
N E S W

NATURAL HAZARD: FLOODING

FEMA Hazard Profile for Flooding

Frequency		**Highly Likely**	**Near 100% probability in next year**
	X	**Likely**	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity		Catastrophic	**More than 50%** (of the jurisdiction that can be affected)
	X	Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Flooding would affect all communities in the county that are in and along the flood plains		
Seasonal Pattern	After spring rains, heavy thunderstorms, or spring thaws		
Duration	Rainstorms can last for hours and possibly days. Spring run-off can last weeks		
Speed of Onset	Six to twelve hours		

Floods are the most common and widespread of all natural disasters except fire. Most communities in the United States have experienced some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws.

Precipitation in Daggett County originates from two major sources. Moisture laden polar pacific air entering the area from the west or northwest during the winter produces large general storms, which most often result in heavy snowfall in the upper elevations and either snowfall or moderate intensity rainfall in the lower elevations.

The second major source of precipitation in the area arises from tropical air masses entering from the south and southwest out of the Gulf of Mexico during the summer months. Often wrongly referred to as monsoons these air masses cause high intensity convective cloudburst storms, which are augmented by the orthographic lifting which occurs as the air mass passes over neighboring mountains.

Precipitation from these two types of storms can produce flash floods, snowmelt floods, post wildfire/damaged watershed floods, and severe winter weather

VULNERABILITY: High

Using the best available data UBAOG planners were unable to determine vulnerable structures. Currently neither Daggett County nor the Town of Manila has flood plain maps. The majority of Manila's 401 homes sit down grade from the Sheep Creek Canal. This unlined earthen canal has failed before causing damage to the KOA camp ground on the western edge of Manila.

Using GIS technology and flow velocity Town models, it would be possible to map the damage that can be expected from flood events over time. It is also possible to pinpoint the effects of certain flood events on individual properties. *For a description of flooding and possible causes see the flooding section in Appendix A.*

At this time, data was insufficient to conduct a risk analysis for flood events in Daggett County. However, the current mapping projects being led by the county and by the state will result in better data that will assist in understanding risk. As part of its efforts to mitigate hazards and protect lives and property from the devastating effects of natural disasters, FEMA aims to provide individuals, businesses, and communities with information and tools to work proactively to mitigate hazards and prevent losses resulting from disasters. One of these tools is HAZUS or Hazards U.S., a natural hazard loss estimation methodology developed by FEMA under contract with the National Institute of Building Sciences. Using Geographic Information Systems (GIS) technology, HAZUS allows users to compute estimates of damage and losses that could result from an earthquake. To support FEMA's mitigation and emergency preparedness efforts, HAZUS is being expanded into HAZUS-MH, a multi-hazard methodology with new modules for estimating potential losses from wind and flood (riverine and coastal) hazards. HAZUS data is not available at this time in Utah. *For more information regarding Flooding in Daggett County see the Flood Hazard Identification Study in Appendix M.*

Generic Mitigation:

- Avoidance
- Better flood routing through communities.
- Annual warning of risk information on how to protect property and lives.
- Flood insurance awareness, emphasis, and marketing.
- Projects such as levees/dams.
- Funding by a storm water tax in cooperation with Federal and State programs.
- Additional SNOTEL sites and enhanced instrumentation.
- Protection of roads and bridges.
- Greater reservoir capacities.
- Curtail development in flood-prone areas.
- General infrastructure protection.
- Develop river corridor parkways.
- Protection of wastewater treatment facilities from excessive inflows.
- Protection of drinking water supply systems.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.

NATURAL HAZARD: INSECT INFESTATION

FEMA Hazard Profile for Insect Infestation

Frequency	X	**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	X	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Daggett County		
Seasonal Pattern	Spring, summer, and fall		
Duration	Months and possibly years		
Speed of Onset	Minimal or no warning		

Agriculture has historically dominated the economic life of Daggett County. The county remains a significant producer of crops and livestock.
Daggett County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation. Damage to the economic base and to the health of the citizens is also a direct result of insects. Insects most notable are grasshoppers, Mormon Crickets, Bark Beetles, and mosquitoes. Currently the West Nile Virus spread by mosquitoes is a serious threat to humans and animals in Daggett County.

NATURAL HAZARD: LANDSLIDE

FEMA Hazard Profile for Landslide

Frequency		**Highly Likely**	**Near 100% probability in next year**
	X	**Likely**	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity		**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
	X	**Limited**	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Carter Creek and Sheep Creek roads		
Seasonal Pattern	After spring rains, heavy thunderstorms, or spring snow thaws		
Duration	Depending upon conditions		
Speed of Onset	Minimal or no warning		

Overall Summary of Impacts

The Uintah Basin Association of Governments identified and mapped possible landslide threats to Daggett County that would have a potential risk to pedestrians, vehicle traffic, and residential areas.
The map on page 23 illustrates Landslides and gives an explanation for Landslides in Daggett County.

In Daggett County there are several areas namely Carter Creek that could have a potential risk to pedestrians and vehicle traffic due to landslides. Based upon the information we had available at that time we were unable to come up with any hard value figures that these landslides would have on Daggett County.

In Daggett County there are approximately 12.8 residential structures at potential risk from landslide. Based upon figures provided by the Daggett County Assessors Office, the market value of those structures is estimated to be

$960,000. *For a description of Landslides and possible causes see the Landslides section in Appendix A.*

VULNERABILITY: Low

Structure Loss and Value as a Percentage of Total Acreage.

Town Name	Acres of Historically Active Landslides 1847 to Present	Households Vulnerable to Landslide/Cost
Daggett County	5551	12.8/960,000

*Includes value of land.

Transportation

Name	Miles	Estimated Cost
Local Neighborhood/local/Town street	4.07 miles	8,140,000
State Route 44	.4154 miles	1,002,567

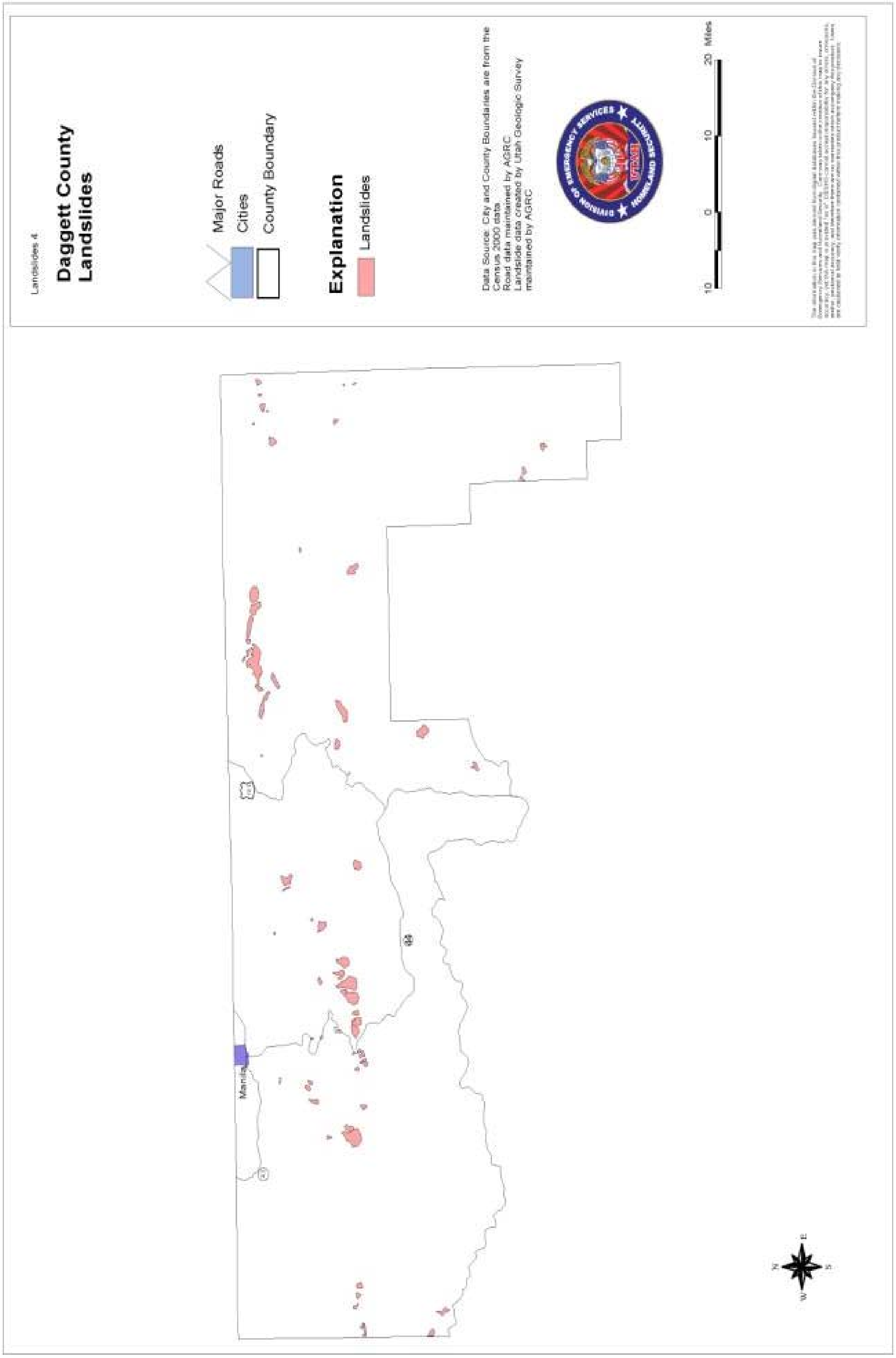
Table data represents total length of roads and rail lines, which overlay historically active landslides.

Utilities

Name	Description	Estimated Cost
Power lines	.747 miles	36,065

Generic Mitigation:

- Avoidance
- Recognize landslide area
- Zoning ordinances
- Remove landslide materials
- Drain subsurface materials
- Install surface drains
- Remove materials for the head of the landslide.
- Re-grade.
- Build buttress or retaining wall at the toe of the slope.
- Install soil nails and rock anchors.
- Maintain natural vegetation.


Landslides 4
Daggett County Landslides
Major Roads
Cities
County Boundary
Explanation
Landslides
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Landslide data created by Utah Geologic Survey maintained by AGRC
10
0
10
20 Miles
Manila
N
E
S
W

NATURAL HAZARD: WILDFIRE

FEMA Hazard Profile for Wildfire

Frequency	X	**Highly likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	X	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Daggett County		
Seasonal Pattern	June through October		
Duration	Minutes to days and months		
Speed of Onset	Minimal or no warning		

There are three different classes of wild land fires. A **surface fire** is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A **ground fire** is usually started by lightning and burns on or below the forest floor. **Crown fires** spread rapidly by wind and move quickly by jumping along the tops of trees. *For a description of wildfires and possible causes see the wildfire section in Appendix A.*

Wild land fires are usually signaled by dense smoke that fills the area for miles around. Source: http://www.fema.gov/hazards/fires/
The map on page 27 illustrates fire risk and gives a wildfire explanation for Duchesne County.

A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

VULNERABILITY: High

Generic Mitigation:

- Avoidance.
- Define, create, and maintain a defensible space.
- Plant drought and fire resistant vegetation.
- Ordinances.

County Name	Acres of Extreme	Acres of High	Acres of Moderate	Acres of Low/Very Low
Daggett	N/A	67,693	204,401	189,792

Unincorporated County

County	Households in Extreme/Cost	Households in High/Cost	Households in Moderate/Cost
Daggett	None	159/9,540,000	479/28,740,000

Cities of Daggett County

Town Name	Acres of Extreme	Acres of High	Acres of Moderate
Manila	None	None	93

Structures in Wildfire Area

Town Name	Households in Extreme/Cost	Households in High/Cost	Households in Moderate/Cost
Manila	None	None	72/4,320,000

*Excludes content value, which would result in, and increase of 50% to the values listed.

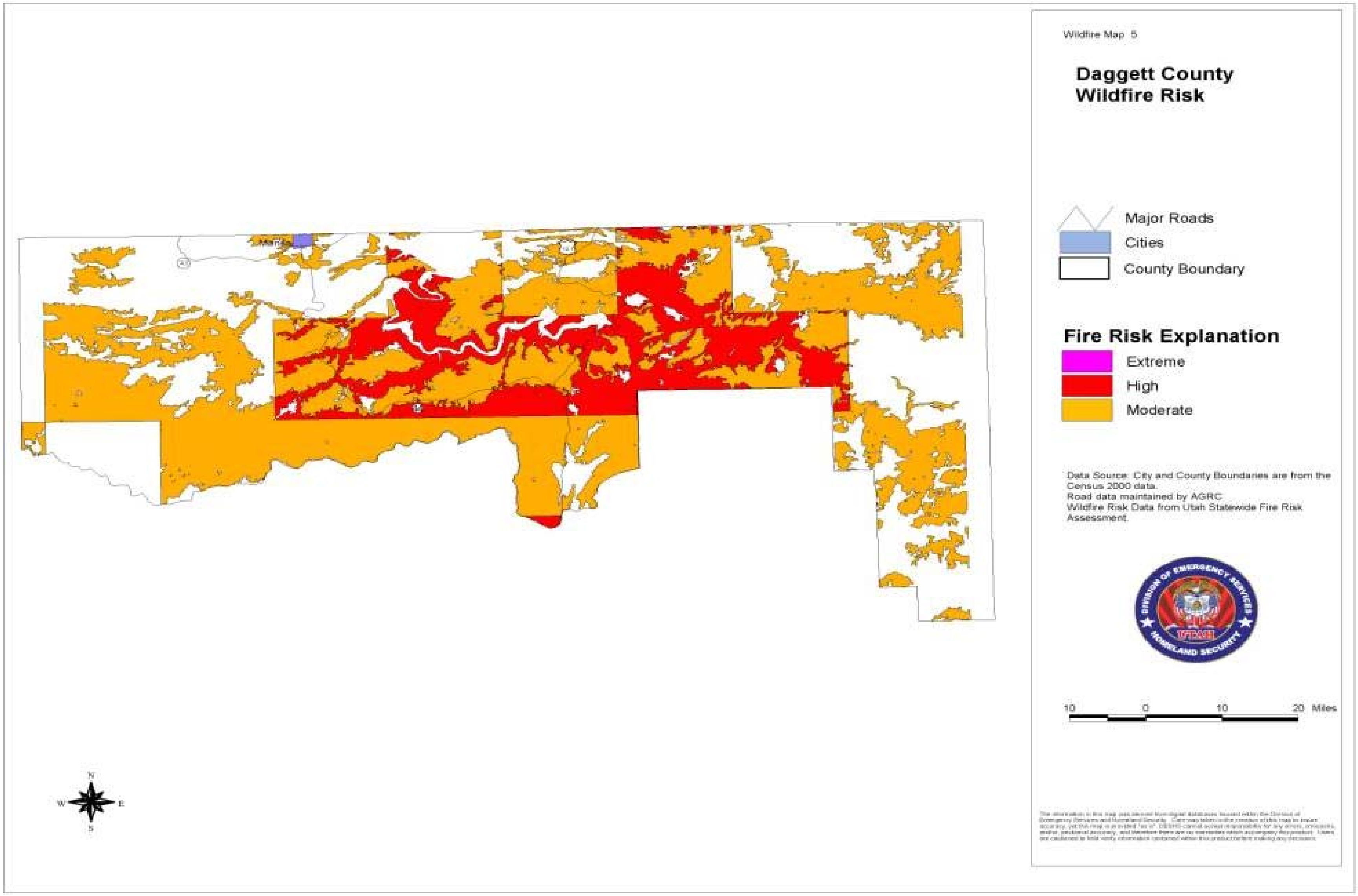
Transportation Roads, highways, and Rail Lines

Name	Miles	Estimated Cost
Local Neighborhood/local/Town street	218.1	436,200,000
State Route 43	1.18	2,847,930
State Route 44	21.31	51,431,685
US Highway 191	21	50,683,500

Table data includes road lengths within areas determined to have an extreme, high, or moderate risk to wildfire as determined by the Utah Statewide Fire Risk Assessment.

Utilities

Name	Description	Estimated Cost
Flaming Gorge	Power Generation	50,000,000
Power lines	53.45 Miles	2,580,566
KV-230	4.25 Miles	205,190
Gas	6.41 Miles of Questar	1,547,309


Wildfire Map 5
Daggett County
Wildfire Risk
Major Roads
Cities
County Boundary
Fire Risk Explanation
Extreme
High
Moderate
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Wildfire Risk Data from Utah Statewide Fire Risk Assessment.
10
0
10
20 Miles
N
W
E
S
Manila

Mitigation Capabilities of Daggett County

This portion of the Plan assesses Daggett County's current capabilities to mitigate the effects of the natural hazards identified within the plan. The assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Development Trends
4. Fiscal Capability
5. Policy and Program Capabilities
6. Political Willpower

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for Daggett County to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

1. Staff and Organizational Capability

Daggett County has **Very Limited** staff and organizational capability to implement hazard mitigation strategies. Daggett County is Utah's least populated county, containing only 753 people. While the County has a number of professional staff members to serve residents and carry out day-to-day administrative activities, much of the staff is part time or is tasked with numerous duties.

The County of Daggett does have an Emergency Manager who is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events.

2. Technical Capability

Daggett County has **very limited** technical capability to implement hazard mitigation strategies.

Technical Expertise

Daggett County does have an, emergency manager to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

Internet Access

Daggett County does provide its employees and citizens with high speed broadband Internet. Internet access opens up an enormous door for local officials to keep abreast of the latest information relative to their work and makes receiving government services more affordable and convenient. It is believed that Internet access will help further the County's hazard mitigation awareness programs, but should be supplemented with more traditional (and less technical) means as well.

3. Development Trends

Daggett County is approximately 90% federal land. Out of the remaining 10% around 8% is used for agricultural purposes. This leaves approximately 2% of the land available for development. Therefore, future development in Daggett County will be minimal.

4. Fiscal capability

Daggett County has **very limited** fiscal capability to implement hazard mitigation strategies.

Under the Disaster Mitigation Act of 2000, FEMA has made special accommodations for "small and impoverished communities", who will be eligible for a 90% Federal share, 10% non-Federal cost split for projects funded through the Pre-Disaster Mitigation Grant Program. Daggett County is not yet classified as small and impoverished but it is thought they meet the requirements.

5. Policy and program capability

Emergency Operations Plan

Daggett County has developed and adopted an Emergency Operations Plan, which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The Plan was adopted April 12, 2000. For the most part, the Plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster. The Plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during and immediately following an emergency. There are no foreseeable conflicts between this Hazard Mitigation Plan and Daggett County's Emergency Management Plan, primarily because they are each focused on two separate phases of emergency management (mitigation vs. preparedness and response).

Floodplain Management Plan

Daggett County does not currently participate in the National Flood Insurance Program. However, this Hazard Mitigation Plan recommends that Daggett County participate in the NFIP.

Storm water Management Plan

Daggett County Currently has no formal Storm water Management Plan.

County Ordinances

The Daggett County currently does not have any county ordinance that addresses natural disasters. However, the planning committee was in attendance at our Natural Disaster meetings and agreed to work on implementing and adopting new County Ordinances that are relevant to hazard mitigation.

6. Political Willpower

Most Daggett County residents are quite knowledgeable about the potential hazards that their community faces. Recent wildfires have increased the understanding and need for mitigation within the government structure of Daggett County.

The Uintah Basin Association of Governments used historical data to estimate to the best of their ability (with the data available at the time) the potential dollar losses if the County were to experience flooding and wildfires, the two most likely hazards to occur in the County. The estimated costs are as follows:

Potential flood losses:

At this time, data was insufficient to conduct a loss analysis for flood events in Daggett County. However, the current mapping projects being led by the county and by the state will result in better data that will assist in understanding potential losses due to flooding.

Potential wildfire losses:

At this time, data was insufficient to conduct a loss analysis for wildfire events in Daggett County. However, the current mapping projects being led by the county and by the state will result in better data that will assist in understanding potential losses due to wildfires. Wildfires pose little threat to the residential and commercial properties, as well as, the local school system located within Daggett County.

Daggett County

The Daggett County Local Emergency Prepardness Committee which consists of one County Commissioner, the Mayor of Manila, the County Emergency Managers, the TRI-County Health Department, the County Planning and Zoning, the Executive Assistant to the County Commissioners, and several local citizens in conjunction with the Uintah Basin Association of Governments held a 3 day round table discussion to review and analyze the risk assessment studies that were performed for the County. The goals listed were determined to be those goals that would have the greatest benefit in hazard reduction to the County. The goals, objectives and actions represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Listed below is our definition of goals and objectives. *Daggett County participated in the County Pre-Disaster Mitigation Planning Grant and their complete Mitigation Strategies Workbook can be found in Appendix N.*

Goals: General guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

Objectives: Define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

The Local Emergency Prepardness Committee and the Uintah Basin AOG Mitigation Planner decided upon the following goals, objectives, action items, and priorities for each of the natural hazards. The priorities for each hazard are ranked in the following order: High, Medium, and Low. Each hazard is ranked by order of importance; however, this does not mean the ranking of each hazard will not potentially change over time.

Mitigation Strategies

Dam Failure

Daggett County

GOAL 1: Reduce future flooding in Daggett County due to dam failure.

Medium Priority

Objective 1.1

- Use technology to aid in prevention of flood loss due to dam failure

Action 1.1.1:

- Digitize high hazard dam failure inundation maps

Time Frame: ongoing
Funding: state government
Estimated Cost: 500 dollars per dam
Staff: Utah Dam Safety Section, and AGRC

Action 1.1.2:

- Update Emergency Operations Plan to include GIS dam failure estimates

Time Frame: Next EOP update
Funding: County
Estimated Cost: Undetermined
Staff: County GIS and Emergency Manager

Action 1.1.3:

- Educate the local elected officials, developers, and citizens.

Time Frame: Within the next two years
Funding: County
Estimated Cost: Minimal
Staff: County employees

Action 1.1.4

- Updated Emergency Action Plans (EAP) and integration with GIS Systems**.**

Time Frame: Ongoing
Funding: FEMA, State and Local
Estimated Cost: Unknown
Staff: State and Local

Action 1.1.5:

- Implementation of more debris dams would assist in controlling floods, reducing the amount of debris and mud that come through. Maintenance of flood control pools in existing dams would also be very beneficial.

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: Numerous technological advancements have been made which will help reduce the likely hood of dam failure and reduce the risk to town stream populations should a dam fail. These techniques will only reduce the risk if they are properly understood and implemented. The above mitigation recommendations when implemented will represent a first step into this new technology for Daggett County. The county understands there are additional technologic steps that can be taken such as increase number of telemeter snow and stream gauges. Look for these advances in future revisions to the mitigation plan.

Drought

Daggett County

GOAL 1: Reduce water loss within Daggett County.

High Priority

Objective 1.1

- Conserve culinary water by educating the public.

Action 1.1.1:

- The Local LEPC will hold meetings semi-annually to educate the public on the need to be water wise.

Time Frame: Ongoing
Funding: County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: Use a newsletter to educate the public

Objective 1.2:

- Develop more water storage tanks within the County.

Action 1.1.2:

- Conduct a feasibility study.

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: unknown
Staff: Water surveyor and newsletter editor

Action 1.1.3:

- Install new wheel lines to improve efficiency of water.

Time Frame: Ongoing
Funding: Federal, and State funding
Estimated Cost: Unknown
Staff: NRCS, UACD, USU, Extension, ect.

Action 1.1.4:

- Implement and enforce water laws that prohibit the use of extensive amounts of water.

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: Unknown
Staff: Water surveyor and newsletter editor

Drought

Manila

GOAL 1: Reduce water loss within the Town of Manila.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1

- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:

- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: Town funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Manila Town Staff, Professional Services, and Contractors

Objective 1.2

- Conserve culinary water by conservation

Action 1.1.2:

- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The Town should continue to maintain and implement a tiered water rate structure.

Earthquake

Daggett County

GOAL 1: Reduce potential confusion with the citizens of Daggett County by providing public awareness regarding possible earthquakes.
Problem Identification: Transportation and utilities services could be severely impacted.

Medium Priority

Objective 1.1

- Provide for emergency response and relief

Action 1.1.1:

- Identify and maintain critical transportation and utility services

Time Frame: ongoing
Funding: Local governments and possible grants
Estimated Cost: Unknown- Determined by the extent of damage anticipated.
Staff: Town staff.
Background: Critical transportation systems

Objective 1.2

- Public Awareness

Action 1.1.2:

- Conduct a public awareness campaign.

Time Frame: ongoing
Funding: Local governments and possible grants
Estimated Cost: Unknown
Staff: Agency personnel and volunteers

Background: Contact DESHS earthquake program specialist. Enhance earthquake instructions in school.

GOAL 2: Identify the number of seismically unsafe structures within the County.
Problem Identification: Unknown number of seismically unsafe structures around the county.

High Priority

Objective 1.2

- Have a study done to determine seismic resistance of structures within the county i.e. Elementary and high schools, public buildings, high traffic areas, ECT.

Action 1.1.2:

- Structural and non-structural earthquake hazard assessment.

Time Frame: ongoing
Funding: Unknown
Estimated Cost: Unknown
Staff: Unknown

Background: Critical transportation systems

Flooding

Daggett County

GOAL 1: Reduce flood damage in Daggett County.
Problem Identification: Control flooding in residential areas of Daggett County, Including but not limited to the Town of Manila and the unincorporated Dutch John. Flooding occurs from heavy rains and fast moving thunderstorms. *For more information regarding Flooding in Daggett County see the Flood Hazard Identification Study in Appendix M.*

High Priority

Objective 1.1:

- Obtain Aerial photography with contours of each residential area in Daggett County.

Action 1.1.1:

- Set horizontal and vertical survey control and order aerial photography with contours for each residential area in the county.

Time Frame: Ongoing
Funding: Local, State and Federal grants
Estimated Cost: Unknown
Staff: State, Local, and possibly Federal
Background: Aerial Topography is needed for master storm drainage design.

Objective 1.2:

- Design master storm drainage plans for residential areas.

Action 1.1.2:

- Design master storm drainage plans to handle storm water runoff through residential areas.

Time Frame: 3 months to 2 years, (depending on number of areas worked on)
Funding: Grants
Estimated Cost: $10,000.00 per residential area, depending on size
Staff: County Staff and contracted staff.

Background: Engineers design master storm drainage plans for the residential areas.

Objective 1.3:

- Implement storm drainage plans throughout the residential areas of Daggett County.

Action 1.1.3:

- Provide information to the public on how the storm drainage plans will assist in preventing flood damage to the residents of Daggett County.

Time Frame: 2 years or as soon as the storm drainage plans are finished.
Funding: State and Federal grants
Estimated Cost: unknown, will depend on the finals plans and what is required for facilities
Staff: County and contracted staff

Background: Construct storm drainage facilities and require all new developments to meet county storm drainage plans.

Manila

GOAL 1: Reduce flooding in Manila related to the Sheep Creek Canal. The Majority of the Town of Manila's 401 homes sit down grade from the Sheep Creek
Problem Identification: This unlined earthen canal has failed before causing damage to the KOA camp ground on the Western edge of Manila.

High Priority

Objective 1.1:

- Use technology to aid in prevention of flood loss due to canal failure.

Action 1.1.1:

- Daggett County and the Town of Manila will form a partnership with the current owners of the Sheep Creek Canal. In doing so, this will enable them to work together in the lining or piping of portions of the canal as funding becomes available.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.2:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the populated areas in Daggett County.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and Town Employees, Local Volunteers

Action 1.1.3:

- Place a restrictive clause in the County and Town Ordinances that will prohibit any new development in the County floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.4:

- Place a restrictive clause in the County and Town Ordinances that will prohibit any undercutting of the canal.

Time Frame: Within the next year
Funding: FEMA, state and local
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.5:

- Educate the public on Canal maintaince and repair.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers
Background: Past and future flooding

Action 1.1.6:

- County and Town building inspectors and the planning committee will implement a maintenance and inspection schedule in coordination with the owners of the canal.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers
Background: Past and future flooding

Action 1.1.7:

- County and Town building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.8:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.9:

- Implement a flood ordinance that will cover the County and Town with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time

Staff: County and Town Employees, Local Volunteers

Insect Infestation

Daggett County

GOAL 1: Reduce insect Infestation to the agricultural businesses'
Problem Identification: South and west sides of Daggett County are vulnerable to Mormon cricket and Cutworm infestations as well as some mosquito problems.

High Priority

Objective 1.1

- Reduce the impact of insects

Action 1.1.1:

- Spread insect bait and spray for mosquitoes

Time Frame: When required
Funding: Town and County funds, Mosquito abatement funds come from property tax
Estimated Cost: Approximately $3.00 per property owner per month
Staff: County Mosquito Abatement District

Objective 1.2:

- Reduce the severity of infestations

Action 1.1.2:

- The County has applied for a $6,000.00 grant to assist in purchasing 4 Mosquito magnets, propane tanks to run the magnets and to assist in salaries for the county employees to maintain the magnets.

Time Frame: Spring and summer of 2004
Funding: $6,000.00 in grants
Estimated Cost: $6,000.00
Staff: County employees

Background: Several agricultural fields surround Daggett County; these fields have been subjected to insect infestation especially during the recent years of drought.

Objective 1.3:

- Reduce the threat of West Nile Virus within Daggett County

Action 1.1.3:

- Educate the public on the importance of vaccinating their animals.

Time Frame: Spring and summer of 2004
Funding: State and local funding
Estimated Cost: $6,000.00
Staff: County employees

Background: Several of the Daggett County residents have horses that could be affected by the West Nile virus.

Manila

GOAL 1: Reduce grasshopper infestations within residential areas of the Town of Manila.
Problem Identification: Periodic Grasshopper infestations tend to be more sever on the edge of the developed town area and in the fields surrounding the town.

High Priority

Objective 1.1:

- Reduce the severity of infestations

Action 1.1.1:

- Conduct aerial spraying to reduce infestations.

Time Frame: As infestations occur
Funding: By private individuals in most cases
Estimated Cost: Varies, depending on acreage treated
Staff: Contractor

Background: Many agricultural fields surround Daggett County and the Town of Manila. These fields have been subjected to insect infestation especially during the recent years of drought.

Landslide

Daggett County

GOAL 1: Protect vehicle traffic from possible accidents due to the Carter Creek rockslides.
Problem Identification: There is a potential risk to pedestrians and vehicle traffic due to the Carter Creek rockslides, which are located in areas identified by the county as landslide risk areas.

High Priority

Objective 1.1

- Reduce potential landslide risk on highway 44 in areas of known landslide potential.

Action 1.1.1:

- Assess the probability of landslides and identify specific structures at risk

Time Frame: Undetermined
Funding: Property owner
Estimated Cost: Unknown
Staff: Unknown

Background: Soil surveys and other engineering surveys are needed.

Action 1.1.2:

- Coordinate with all government agencies' that would assist in sloping of the hillside near Carter Creek. The county will need to contact the following agency's on the possibility of implementing some kind of protective netting or fencing that would eliminate the rock's from tumbling down on to Highway 44.

Time Frame: Undetermined
Funding: Unknown
Estimated Cost: Unknown
Staff: Unknown

Background: Soil surveys and other engineering surveys are needed.

Action 1.1.3:

- The county's and town's planning committee will review and update the zoning ordinances within the County and Town to make sure that individuals are not constructing new homes near potential landslide areas.

Time Frame: Undetermined
Funding: Unknown
Estimated Cost: Unknown
Staff: Unknown

Background: Hold monthly planning and zoning meetings within the town and county.

Severe Weather

Daggett County

GOAL 1: Reduce structural damage to both residential and commercial buildings due to Severe Weather.
Problem Identification: Daggett experiences occasional, damaging high winds and snowstorms.

High Priority

Objective 1.1

- Reduce damage to structures through strict adherence to building codes

Action 1.1.1:

- Ensure that 80 MPH wind load requirement is met by builders

Time Frame: Ongoing
Funding: Fees from Building permits
Estimated Cost: Minimal
Staff: Building Inspector

Background: Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events

Manila

GOAL 1: Provide protection for the citizens from possible power line failure.
Problem Identification: Power lines are at risk from seasonal high winds.

High Priority

Objective 1.1

- Reduce service disruptions and damage to power lines

Action 1.1.1:

- Provide adequate clearances for power lines and conduct ongoing line maintenance. Maintain outage plan.

Time Frame: Ongoing
Funding: Possible Grants
Estimated Cost: To be determined
Staff: County and town employees

Background: Extreme winds have occurred, utilities disruption has occurred in past years due to damage to power poles and transmission lines by high winds.

Wildfire

Daggett County

GOAL 1: To develop mitigation strategies that will improve the protection of the citizens of Daggett County from wildfires.
Problem Identification: Continuing non-compliance with existing building codes and fire codes.

High Priority

Objective 1.1
- Increase compliance with existing building and fire codes.

Action 1.1.1:
- Develop and enforce current local, state and national codes

Time Frame: Ongoing
Funding: Local, state and federal grants
Estimated Cost: Unknown
Staff: Local, state and federal agencies

Background: Implement and enforce rules, regulations and codes

Manila

GOAL 1: Reduce the threat of wildfires within the Town of Manila.
Problem Identification: Specific areas of the county are susceptible to wildland fire danger.

High Priority

Objective 1.1
- Educate homeowners on how to reduce risk of wildfire damage

Action 1.1.1:
- The local LEPC will provide semi-annual training for the citizens of Daggett County and the Town of Manila.

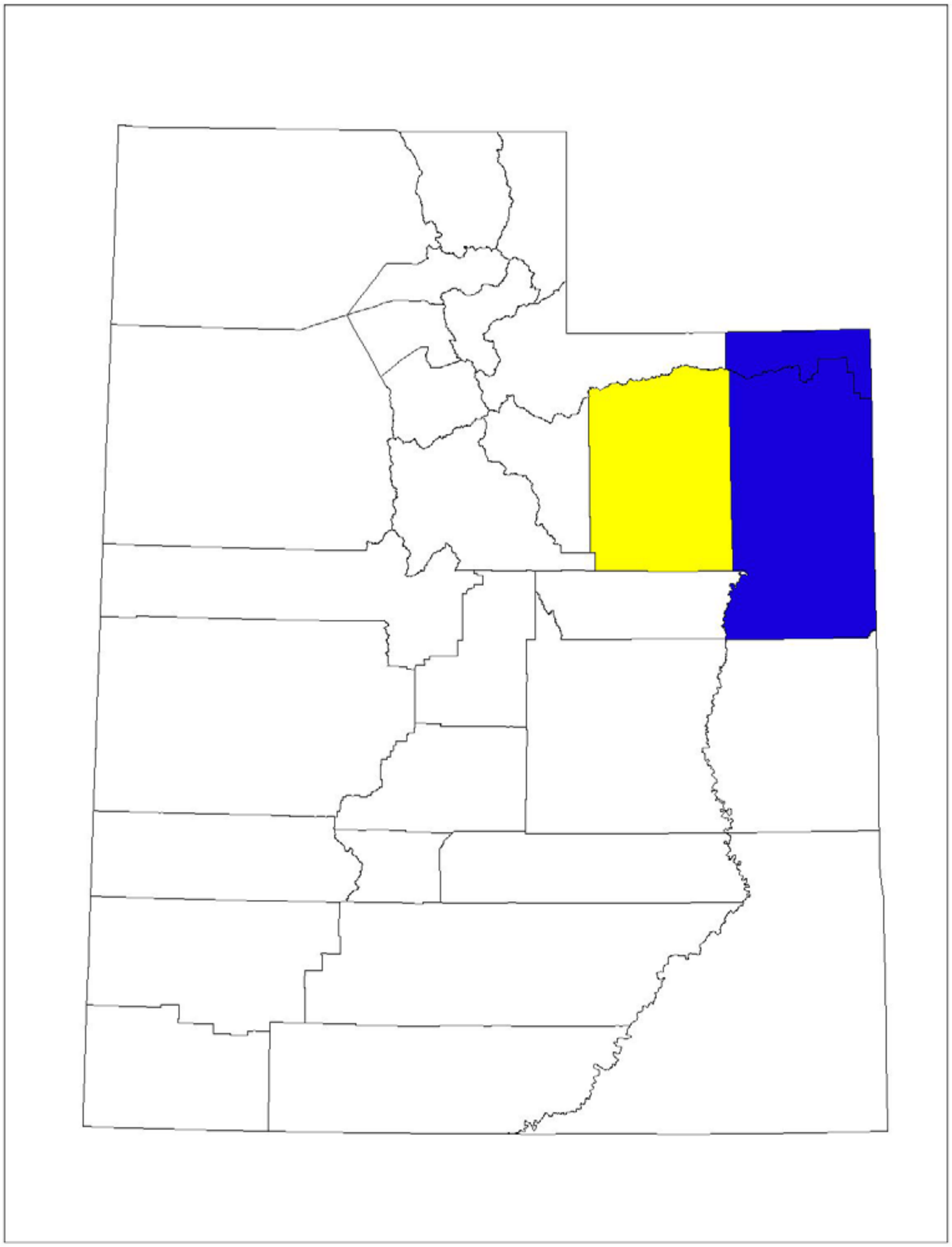
Time Frame: Starting 2004
Funding: State and local
Estimated Cost: Minimal
Staff: County

Background: Educate the public on how to reduce the risk of wildfires.

Annex 3- Duchesne County

Duchesne County Annex

Figure 1: Tri-county map



DUCHESNE COUNTY

Past Hazard Events in Duchesne County

Understanding the past is often the key to discovering what the future holds; this is especially true when planning for natural disasters. The fact that cities within Duchesne County have experienced, for example, flooding in the past means flooding can occur in the future. While over time some of this has been mitigated for the low frequency of occurrence often results in hazards with little or no mitigation. Table 1 provides a brief history of Duchesne County natural disasters. This table includes only sizable events found during our research, and may not represent the total history.

Table 1 Duchesne County Natural Disaster History

Hazard	Date	Location	Critical Facility or area impacted	Comments
Flood	September 13, 1940	Duchesne	Damage in Indian Canyon and roads flooded	No loss of life
Flood	August 7, 1941	Mountain Home	Destroyed bridges washed out road over Kofford wash and caused damage in Rock Creek	No loss of life
Flood	August 7, 1945	Strawberry Creek area	Damage to roads, ranches, and irrigation diversions near Strawberry Creek	No loss of life
Flood	August 1, 1953	Sowers Canyon	Damage to farm house and 200 acres	No loss of life

Hazard	Date	Location	Critical Facility or area impacted	Comments
Flood	August 5, 1957	Tabiona/Hanna	Damage to homes, roads, farms, and crops	Farm Creek
Flood	September 2, 1960	Hanna	Flood homes and damaged approximately 100 acres of farmland	No loss of life
Flood	August 11, 1969	Duchesne	Damage to town due to flooding	Source Yellowstone river, Strawberry river, Duchesne River, and Reed Creek

Duchesne County identified six natural hazards they wanted addressed in the Duchesne County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Duchesne County Disaster Mitigation Planning committee consisted of one County Commissioner, the Mayor of Duchesne, the Mayor of Altamont, the Mayor of Tabiona, the Roosevelt City Manager, the Mayor of Myton, the County Emergency Manager and the Uintah Basin Association of Governments planning Coordinator.

The Disaster Mitigation Plan for Duchesne County identifies critical facilities located in the County *(See Appendix B).* A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in the County were not located in the natural hazard area. *Due to Data limitations, The Uintah Basin Association of Governments was unable to map the location of the critical facilities in Duchesne County.*

NATURAL HAZARD: DAM FAILURE

FEMA Hazard Profile for Dam Failure

Frequency		**Highly likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
	X	**Unlikely**	**Less than 1% probability in next 100 years**
Severity	**X**	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire county		
Seasonal Pattern	Spring		
Duration	Several months to over one year		
Speed of Onset	Range from 35 minutes to three hours		

A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years. *For a description of dam failure and possible causes dams failure in Duchesne County see the Flood Hazard Identification Study in Appendix M.*

VULNERABLIITY: High

Description of Hazard

The following high hazard dams exist within Duchesne County according to the Utah Division of Dam Safety database.

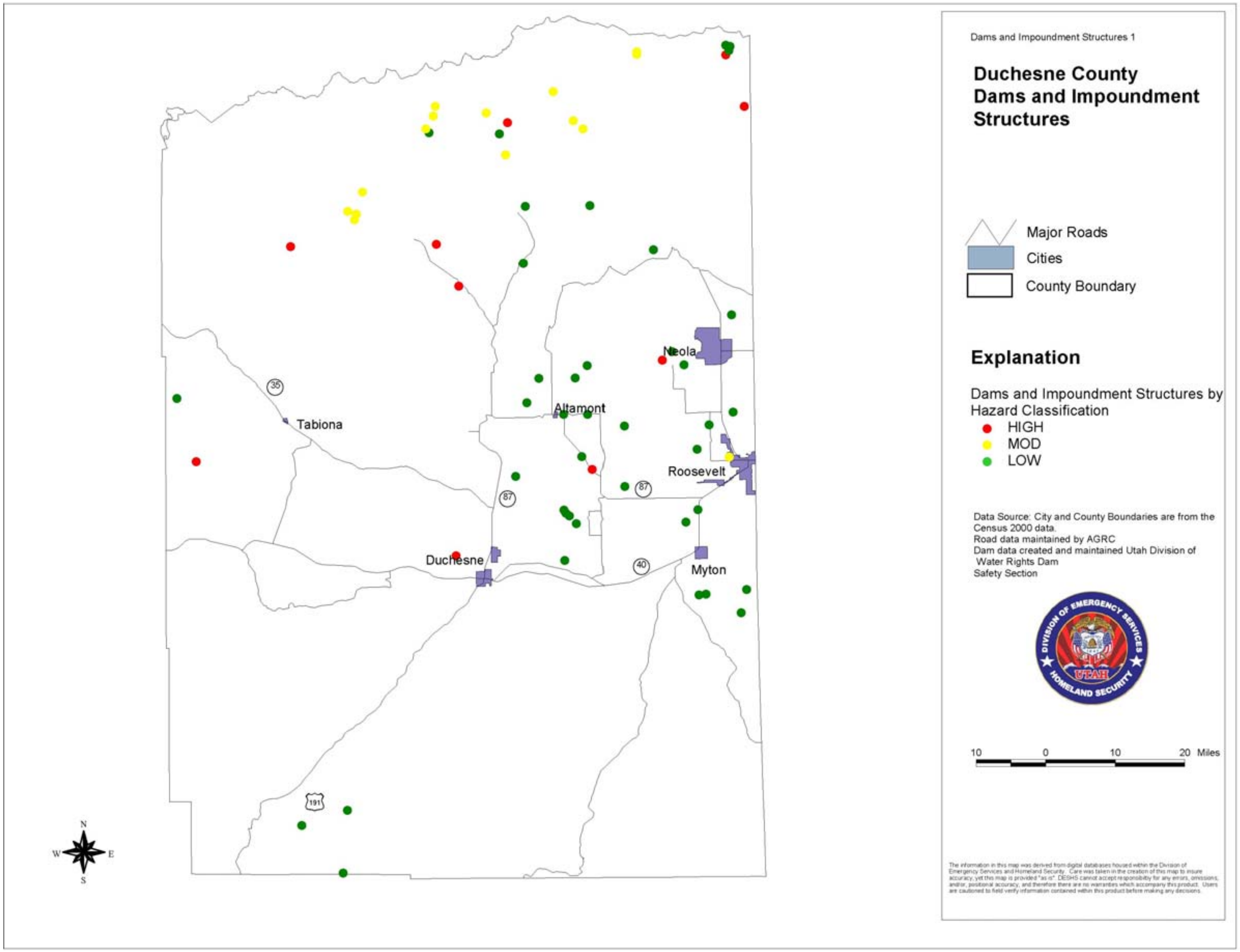
- Cliff Lake
- Browns Draw
- Starvation
- Twin Pots
- Moon Lake
- East Timothy
- Red Creek
- Chepeta Lake
- Stillwater
- Big Sand Wash

The map on page 7 illustrates the location of each dam.

Low lying areas down stream of these dams are particularly at risk, if a dam were to fail. *For a description of dam failure and possible causes see the dams failure section in Appendix A.*

Generic Mitigation:

- Proper mapping of flood plains, including mapping of dam breach flood potential.
- Knowledge must be made public so that emergency managers are aware and the public is aware when they buy and sell property.
- Updated Emergency Action Plans (EAP) and integration with GIS Systems.
- Maintaining proper flood plain and wetland geometry and vegetation will help route floods.
- Flood plain usage should be compatible with flood plain needs.
- More debris dams would help with floods and debris, and mud, and maintaining a flood control pool in existing dams would be beneficial.
- Protection of roads and bridges.
- General infrastructure protection.
- More authority to order releases and better forecasting would help in snowmelt floods and runoff.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.



Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Dam data created and maintained Utah Division of Water Rights Dam Safety Section

The information in this map was derived from digital databases housed within the Division of Emergency Services and Homeland Security. Care was taken in the creation of this map to insure accuracy, yet this map is provided "as is". DESHS cannot accept responsibilty for any errors, omissions, and/or, positional accuracy, and therefore there are no warranties which accompany this product. Users are cautioned to field verify information contained within this product before making any decisions.

NATURAL HAZARD: EARTHQUAKE

FEMA Hazard Profile for Earthquake

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
	X	**Unlikely**	**Less than 1% probability in next 100 years**
Severity	**X**	Catastrophic	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire county		
Seasonal Pattern	Near fault zones County Wide		
Duration	Hours		
Speed of Onset	Minimal or no warning		

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, and fires. Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of year. Source: http://www.fema.gov/hazards/earthquakes/
For a description of earthquakes and possible causes see the earthquake section in Appendix A.

Duchesne County contains the Towanta Flat Graben and the Duchesne Pleasant Valley Fault system. The Duchesne Pleasant valley system is a poorly understood system with fault traces running east and west. This east west orientation is at odds with contemporary tectonic stress regimes so it has not been determined if this fault could produce a large magnitude earthquake or not. Research indicates the Towanta Flat fault last moved in the mid to late Quaternary period. Duchesne County is an area of limited seismic hazard due to the long recurrence intervals along the Towanta Flat and Pleasant Valley Fault zones. Duchesne being zoned for little or no seismic activity is warranted.

VULNERABILITY: Low

The map on page 10 shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

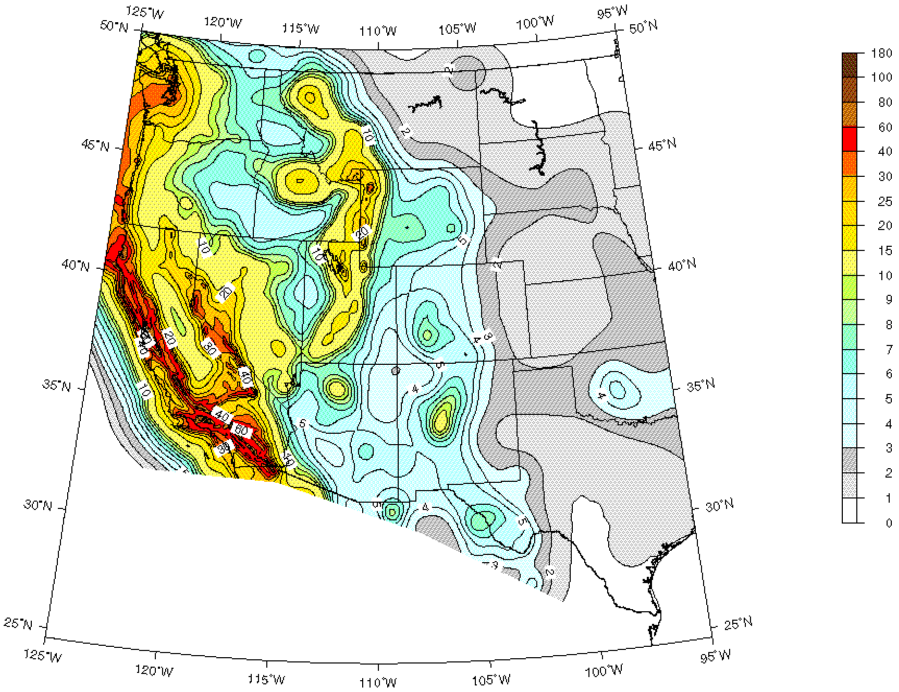
You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). For example, In an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

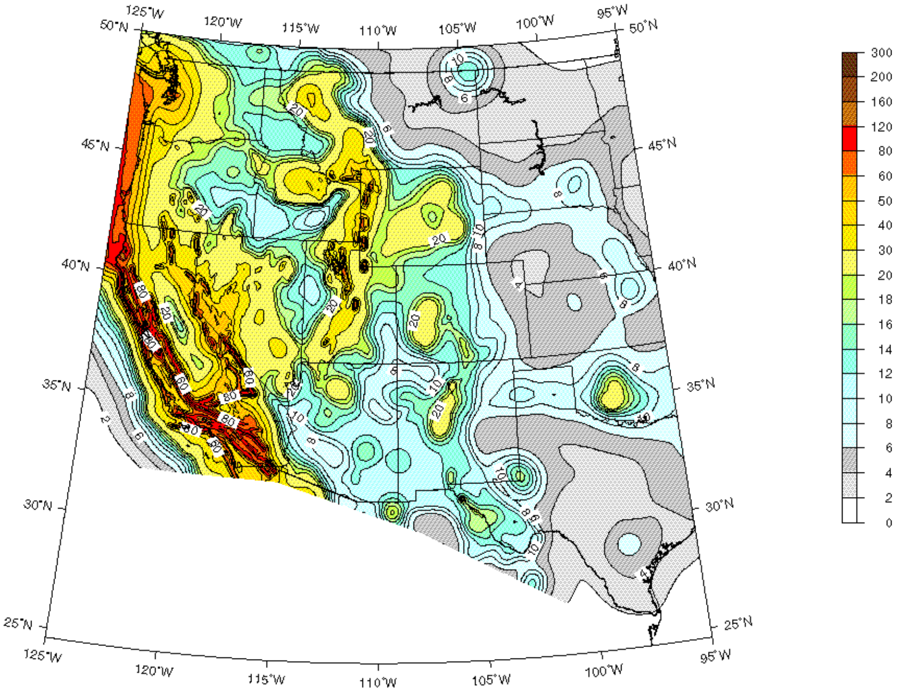
%g= Ground Surface Acceleration/ Rate of Acceleration due to Gravity

%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%



Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev



Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev

POTENTIAL AFFECT:

A potential earthquake could affect water, oil and gas produced for the Uintah Basin as well as the Wasatch Front. An earthquake could affect transportation and dams. Many homes in Duchesne County were not built to meet earthquake standards. *The map on page 14 and 15 identify Epicenters and Quaternary Faults and gives an explanation for each in Duchesne County.*

HAZUS MH Vulnerability Assessment

Table 1.1 Casualties

Casualties	Nighttime –Minor	33
	Nighttime –Major	1
	Nighttime -Fatalities	1
	Daytime –Minor	31
	Daytime –Major	1
	Daytime- Fatalities	2
	Commute –Minor	28
	Commute –Major	1
	Commute-Fatalities	1

Buildings/Structures

Building Damage by Count -- Building damage is classified by HAZUS in five damage states: none, slight, moderate, extensive and complete. Table1.2 lists the number buildings by occupancy, which is estimated to have moderate to complete levels of damage.

Table 1.2 –Building Damage by Count with Moderate to Complete Damage

Category	Number of Structures
Residential	1,011
Commercial	9
Industrial	3
Totals	1,023

Critical facilities

Classification	Total	Least Moderate Damage >50%	Complete Damage > 50%	Functionality > 50% at day 1
Hospitals	1	0	0	1
Schools	16	0	0	2
EOCs	0	0	0	0
Police Stations	1	0	0	1
Fire Stations	2	0	0	0

Debris Removal –Table 1.4 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour.

A second debris removal issue is landfill space. Fifty thousand tons (50,000) at a weight to volume ratio of one ton per cubic yard would cover more than ten acres to a depth of one yard.

Table 1.4 –Debris Generated (millions of tons)/Loads to Remove Debris

Debris Generated	0.04
Loads (25 tons per load)	2,000

Fire Following --The Great San Francisco Earthquake of 1906 illustrated the hazard a city could face from fire following an earthquake. Multiple ignitions and broken water mains conspired to make firefighting nearly impossible. HAZUS uses the estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake. Table 1.5 provides estimates of ignitions, people at risk and the building stock exposed to fires following an earthquake.

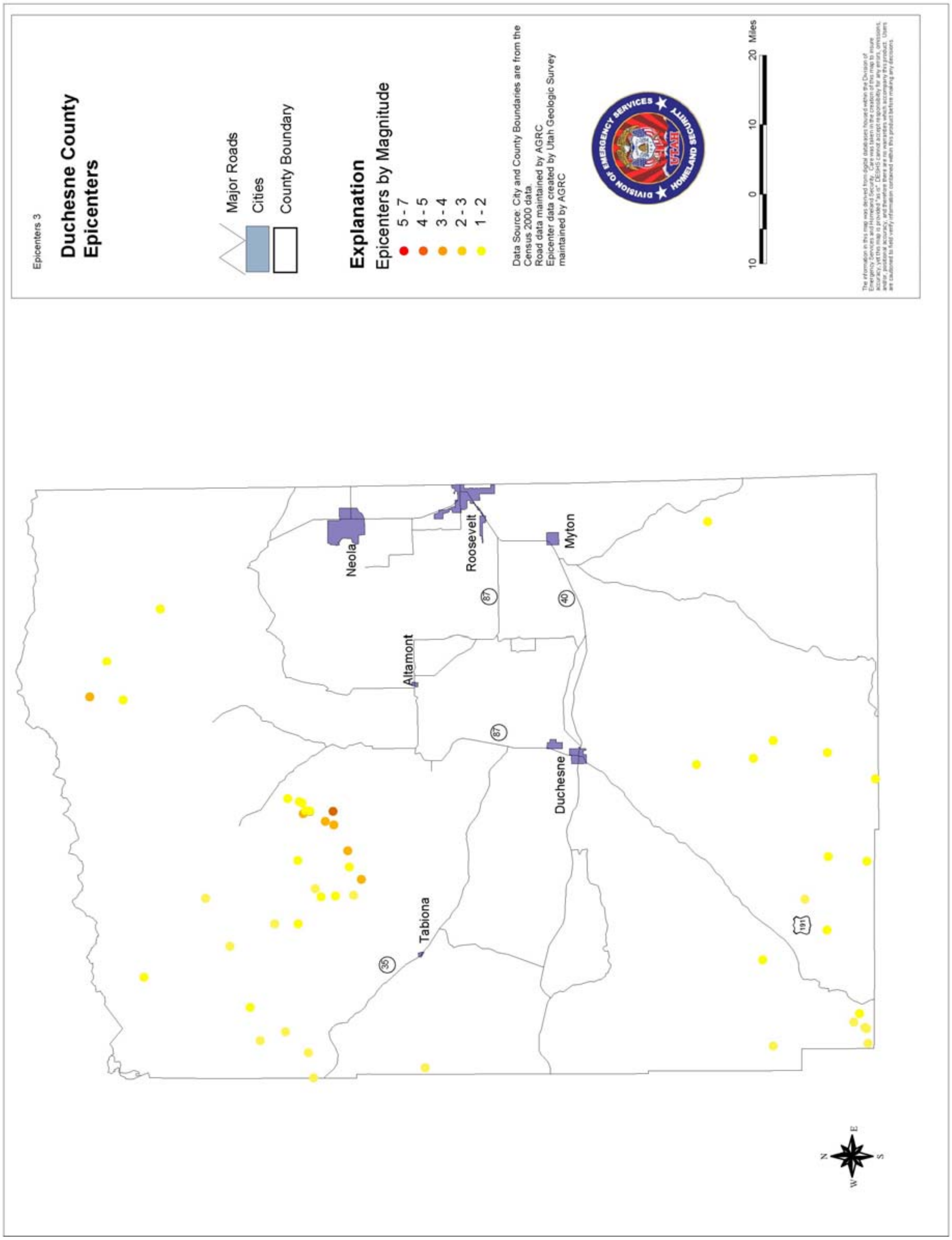
Table 1.5 –Fire Following Event, Population Exposed, and Building Stock Exposed

Ignitions	1
People Displaced	0
Value Exposed (mill. $)	0

These numbers were derived from a HAZUS MH run based on a probabilistic 2500-year event with a magnitude 7.0 running the soils portion of the model. *The complete HAZUS MH run for Duchesne County is available in appendix H.*

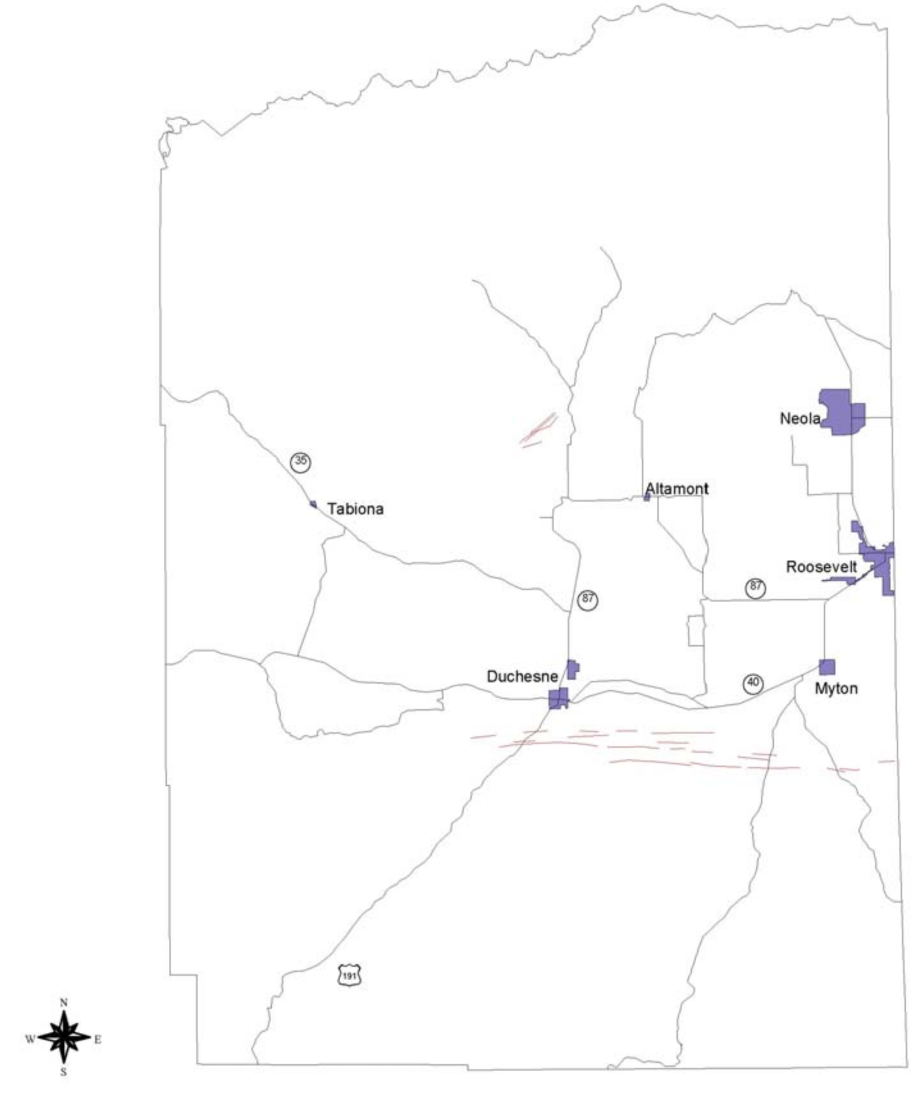
Generic Mitigation:

- Avoidance
- Build all homes and building's to meet the standards and code of earthquakes. County adopts building codes on all new construction.
- Educate the public on potential hazards.
- Working with local LEPC on exercising plans in existence.
- Educate local school systems to utilize LEPC.


Epicenters 3
Duchesne County Epicenters
Major Roads
Cities
County Boundary
Explanation
Epicenters by Magnitude
5 - 7
4 - 5
3 - 4
2 - 3
1 - 2
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Epicenter data created by Utah Geologic Survey maintained by AGRC
10
0
10
20 Miles
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
87
40
35
191
N
E
S
W

Quaternary Faults 2

Duchesne County Quaternary Faults



Explanation

Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Quaternary Faults data from Utah Geologic Survey

NATURAL HAZARD: FLOODING

FEMA Hazard Profile for Flooding

Frequency		**Highly likely**	**Near 100% probability in next year**
	X	**Likely**	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity		Catastrophic	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
	X	Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Flooding would affect all communities in the county that are in and along the flood plains		
Seasonal Pattern	After spring rains, heavy thunderstorms, or spring thaws		
Duration	Rainstorms can last for hours and possibly days. Spring run-off can last weeks		
Speed of Onset	Six to twelve hours		

Floods are the most common and widespread of all natural disasters except fire. Most communities in the United States have experienced some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws.

A flood, as defined by the National Flood Insurance Program is: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:

- Overflow of inland or tidal waters.
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- A mudflow.

[The] collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood." *For a description of flooding and possible causes see the flooding section in Appendix A.*

Floods can be slow, or fast rising but generally develop over a period of days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation steps now, such as, engaging in floodplain management activities, constructing barriers, such as levees, and purchasing flood insurance will help reduce the amount of structural damage to your home and financial loss from building and crop damage should a flood or flash flood occur. Source: http://www.fema.gov/hazards/floods/
For more information regarding Flooding in Duchesne County see the Flood Hazard Identification Study in Appendix M.

VULNERABILITY: High

Generic Mitigation:

- Avoidance
- Revise and up-date building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.
- Manufactured homes need to be installed properly and inspected.
- Enforce zoning
- Protection of roads and bridges.
- Protection of drinking water supply systems.
- Education of local officials, developers, and citizens.
- Better flood routing through communities.
- Development of improved mitigation techniques.

NATURAL HAZARD: INSECT INFESTATION

FEMA Hazard Profile for Insect Infestation

Frequency	**X**	**Highly likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	**X**	Catastrophic	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Duchesne County		
Seasonal Pattern	Spring, summer, and fall		
Duration	Not applicable		
Speed of Onset	Not applicable		

Agriculture has historically dominated the economic life of Duchesne County. The county remains a significant producer of crops and livestock. Duchesne County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation. Damage to the economic base and to the health of the citizens is also a direct result of insect infestation. Insects most notable are grasshoppers, Mormon Crickets, Bark Beetles, and mosquitoes. Currently the West Nile Virus spread by mosquitoes is a serious threat to humans and animals in Duchesne County.

Generic Mitigation:

- Avoidance
- Spread insect bait and spray for mosquitoes
- Vaccinate

NATURAL HAZARD: LANDSLIDE

FEMA Hazard Profile for Landslide

Frequency		**Highly likely**	**Near 100% probability in next year**
	X	**Likely**	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity		**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
	X	**Limited**	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Dye Dugway, Indian Canyon, Ravola Dougway, and Wolf Creek Pass in Duchesne County.		
Seasonal Pattern	After spring rains, heavy thunderstorms, or spring snow thaws.		
Duration	Depending upon conditions.		
Speed of Onset	Not applicable.		

VULNERABILITY: Low

AFFECT:

In 1983, the Dye Dugway moved and peeled off the side. Damages were approximately $50,000. Other areas that incur landslides are Indian Canyon, Ravola Dugway, and Wolf Creek Pass.

Overall Summary of Impacts

The Uintah Basin Association of Governments identified and mapped possible landslide threats to Duchesne County that would have a potential risk to pedestrians, vehicle traffic, and residential areas.
The map on page 22 illustrates Landslides and gives an explanation for Landslides in Duchesne County.

In Duchesne County there are several areas namely Indian Canyon, Ravola Dugway, and Wolf Creek Pass that could have a potential risk to pedestrians and vehicle traffic due to landslides. Based upon the information we had available at that time we were unable to come up with any hard value figures that these landslides would have on Duchesne County.

In Duchesne County there are approximately 253 residential structures at potential risk from landslide. Based upon figures provided by the Duchesne County Assessors Office, the market value of those structures is estimated to be $20,240,000. *For a description of Landslides and possible causes see the Landslides section in Appendix A.*

Structure Loss and Value as a Percentage of Total Acreage.

City Name	Acres of Historically Active Landslides 1847 to Present	Households Vulnerable to Landslide/Cost
Duchesne County	82,560	253/$20,240,000
Duchesne	1	.373/$29,840
Neola	182	7.6/$611,520

*Includes value of land.

Vulnerable Transportation Within Duchesne County

Name	Miles	Estimated Cost
Local Neighborhood/local/city street	95.95	191,900,000
State Route 87	.268	646,818
State Route 40	.448	1,081,248

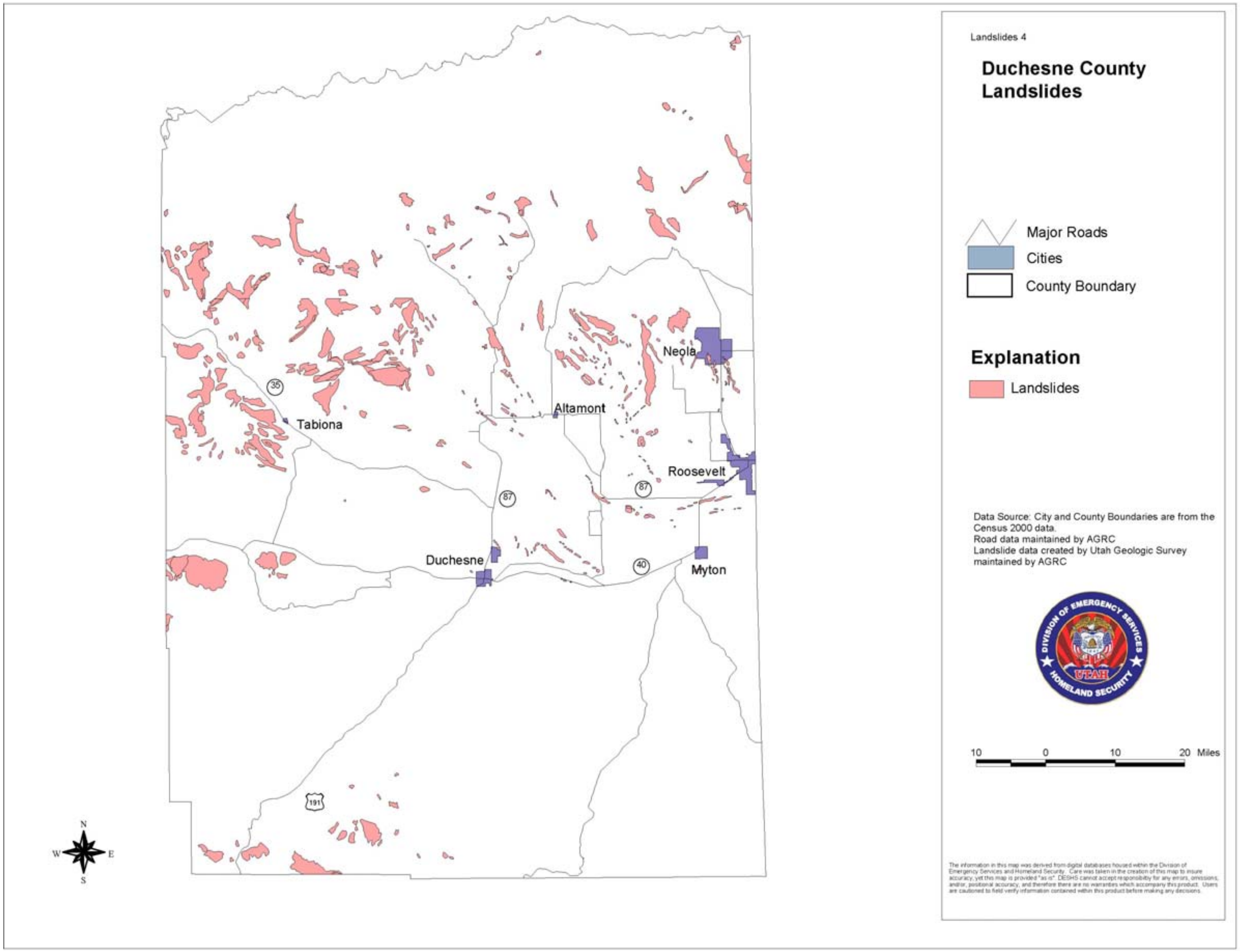
Table data represents total length of roads, which overlay historically active landslides.

Vulnerable Utilities Within Duchesne County

Name	Description	Estimated Cost
KV-138 Lines	1.929 miles	93,132
Other power lines	9.27 miles	447,555
Gas lines	1.62 miles Questar	391,051

Generic Mitigation:

- Avoidance
- Recognize landslide areas
- Zoning Ordinances
- Install surface drains
- Remove materials from the head of the landslide
- Install a pipeline for run-off.
- Seed hillsides to prevent landslides
- Re-grade



Duchesne County Landslides

Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Landslide data created by Utah Geologic Survey maintained by AGRC

The information in this map was derived from digital databases housed within the Division of Emergency Services and Homeland Security. Care was taken in the creation of this map to insure accuracy, yet this map is provided "as is". DESHS cannot accept responsibilty for any errors, omissions, and/or, positional accuracy, and therefore there are no warranties which accompany this product. Users are cautioned to field verify information contained within this product before making any decisions.

NATURAL HAZARD: WILDFIRE

FEMA Hazard Profile for Wildfire

Frequency	X	**Highly likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	X	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Duchesne County		
Seasonal Pattern	June through October		
Duration	Minutes to days and months		
Speed of Onset	Minimal or no warning		

There are three different classes of wild land fires. A **surface fire** is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A **ground fire** is usually started by lightning and burns on or below the forest floor. **Crown fires** spread rapidly by wind and move quickly by jumping along the tops of trees.

Wild land fires are usually signaled by dense smoke that fills the area for miles around. Source: http://www.fema.gov/hazards/fires/
The map on page 26 illustrates fire risk and gives a wildfire explanation for Duchesne County.

A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

VULNERABILITY: High

Generic Mitigation:

- The County cannot mitigate because the forest service won't allow counties to manage their land.
- Poor land management on BLM and forestlands.
- Obtain fire-fighting equipment to control wildfires in rough terrain.
- Provide wild land fire training.
- Obtain fire grant from FEMA for personnel equipment.
- Weed control.

County Name	Acres of Extreme	Acres of High	Acres of Moderate	Acres of Low/Very Low
Duchesne	N/A	10,842	569,861	1,496,417

Unincorporated County

County	Households in Extreme/Cost	Households in High/Cost	Households in Moderate/Cost
Duchesne	N/A	2.86/163,840	150.1/9,606,400

Duchesne County

City Name	Acres of Extreme	Acres of High	Acres of Moderate
Duchesne City			659
Roosevelt City			87
Neola			552

Structures in Wildfire Area

City Name	Households in Extreme/Cost	Households in High/Cost	Households in Moderate/Cost
Duchesne City			245.8/15,731,200
Roosevelt City			40.5/2,592,000
Neola			23.18/1,483,520

*Excludes content value, which would result in, and increase of 50% to the values listed.

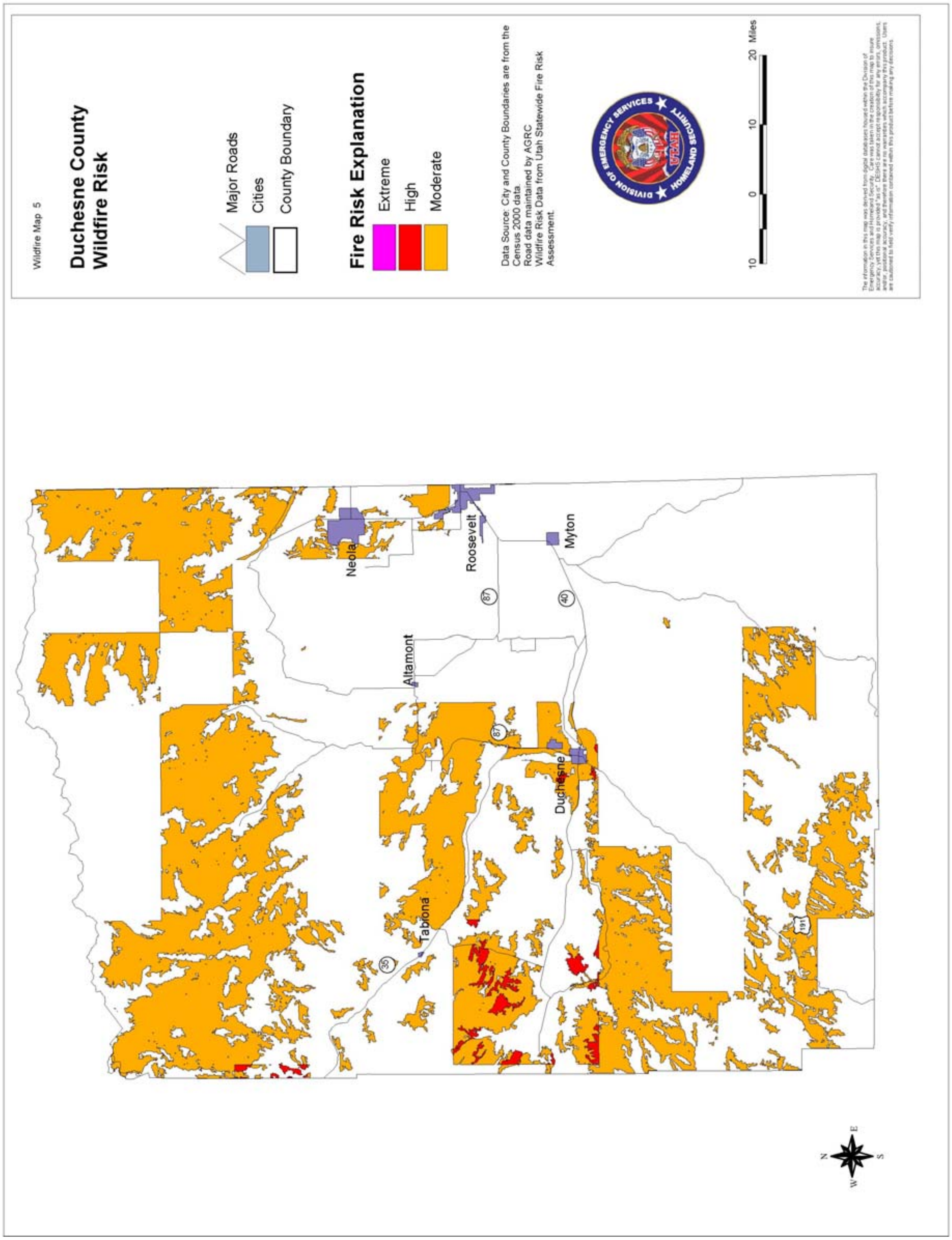
Transportation Roads, highways, and Rail Lines

Name	Miles	Estimated Cost
Local Neighborhood/local/city street	618.918	1,237,836,000
State Route 35	1.1	2,654,850
State Route 87	13.07	31,544,445
State Route 121	.90	2,172,150
State Route 150	3.68	8,881,680
State Route 191	4.88	11,777,880
State Route 208	5.85	14,118,975
State Route 311	2.59	6,250,965

Table data includes road lengths within areas determined to have an extreme, high, or moderate risk to wildfire as determined by the Utah Statewide Fire Risk Assessment.

Utilities

Name	Description	Estimated Cost
KV-138	6.01 miles	290,162
Uncoded Power lines	46.27 miles	2,233,915
Mono Lake Plant	Power Generation	10,000,000
Gas lines	9.37 miles of Questar	2,261,824


Wildfire Map 5
Duchesne County
Wildfire Risk
Major Roads
Cities
County Boundary
Fire Risk Explanation
Extreme
High
Moderate
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Wildfire Risk Data from Utah Statewide Fire Risk Assessment.
10 0 10 20 Miles
The information in this map was derived from digital databases housed within the Division of Emergency Services and Homeland Security. Care was taken in the creation of this map to insure accuracy, yet this map is provided "as is". DESHS cannot accept responsibility for any errors, omissions, and/or, positional accuracy, and therefore there are no warranties which accompany this product. Users are cautioned to field verify information contained within this product before making any decisions.
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
87
40
35
191
N
E
S
W

Mitigation Capabilities of Duchesne County

This portion of the Plan assesses Duchesne County's current capacity to mitigate the effects of the natural hazards identified within the plan. The assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Development Trends
4. Fiscal Capability
5. Policy and Program Capabilities
6. Political Willpower

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for Duchesne County to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

1. Staff and Organizational Capability

Duchesne County has **Very Limited** staff and organizational capability to implement hazard mitigation strategies. Duchesne County is Utah's 15th most populated county, containing only 14,759 people. While the County has a number of professional staff members to serve residents and carry out day-to-day administrative activities, much of the staff is part time or is tasked with numerous duties.

The County of Duchesne does have an Emergency Manager who is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events.

2. Technical Capability

Duchesne County has **very limited** technical capability to implement hazard mitigation strategies.

Technical Expertise

Duchesne County does have an, emergency manager to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

Internet Access

Duchesne County does provide its employees and citizens with high speed broadband Internet. Internet access opens up an enormous door for local officials to keep abreast of the latest information relative to their work and makes receiving government services more affordable and convenient. It is believed that Internet access will help further the County's hazard mitigation awareness programs, but should be supplemented with more traditional (and less technical) means as well.

3. Development Trends

Agriculture has historically dominated the economic life of Duchesne County. The county remains a significant producer of crops and livestock. However, during the second half of the 20th Century, the development of oil and gas reserves provided an important boost to the economy, and this industry remains a major contributor to growth. Other expanding industries include government and trade. Duchesne County includes part of the tribal lands of the Uintah-Ouray Indian Reservation. New retail and service developments on tribal lands help sustain the Native American population and add to the economic vitality of the area.

For the third consecutive quarter, nonfarm employment in Duchesne County reported a year-over decline. Second quarter data for 1999 showed a decrease of 4.2 percent. Slowdowns in oil and gas activity continue to stymie economic growth in the area. Duchesne County's unemployment rate jumped from 7.2 percent in second quarter 1998 to 8.4 percent in second quarter 1999, one of the highest rates in Utah.

Slower economic growth has slowed the demand for construction in Duchesne County. The total valuation of second quarter permit-authorized construction slipped from $6.8 million in 1998 $4.6 million in 1999. Residential construction continued to slow, as new dwelling unites fell from 88 to 73. The value of residential construction declined from $5.2 million to $3.4 million. Nonresidential building slowed from building slowed from $1.0 million in 1998 to $820,600 in 1999 as fewer nonresidential projects were authorized. Total additions, alternations, and repairs dropped 29.2 percent in valuation; however, renovations to commercial structure did improve slightly. *For more information regarding Duchesnes County's development trends see Appendix L.*

4. Fiscal Capability

Duchesne County has **very limited** fiscal capability to implement hazard mitigation strategies.

5. Policy and Program Capability

Emergency Operations Plan

Duchesne County has developed and adopted an Emergency Operations Plan, which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The Plan was last updated in 1997. For the most part, the Plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

The Plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during and immediately following an emergency. There are no foreseeable conflicts between this Hazard Mitigation Plan and Duchesne County's Emergency Management Plan, primarily because they are each focused on two separate phases of emergency management (mitigation vs. preparedness and response).

Floodplain Management Plan

Although Duchesne County currently participates in the National Flood Plain Insurance Program they do not have a current Floodplain Management Plan. However, this Disaster Mitigation Plan recommends that Duchesne County work on updating and/or revising their Floodplain Management Plan.

Stormwater Management Plan

Duchesne County Currently has no formal Storm water Management Plan.

County Ordinances

The Duchesne County currently does not have any county ordinances that address natural disasters. However, a member of the planning committee was in attendance at our Natural Disaster meetings and agreed to work on implementing and adopting new County Ordinances that are relevant to hazard mitigation.

6. Political Willpower

Most Duchesne County residents are quite knowledgeable about the potential hazards that their community faces. Recent wildfires have increased the understanding and need for mitigation within the government structure of Duchesne County.

The Uintah Basin Association of Governments used historical data to estimate to the best of their ability (with the data available at the time) the potential dollar losses if the County were to experience flooding and wildfires, the two most likely hazards to occur in the County. The estimated costs are as follows:

Potential flood losses:

- Residential properties (including senior citizens home): Depending upon the location of the flood, losses could result into millions of dollars. *Approximately; 4 to 5 million dollars*
- Local Hospital: The local Hospital in Duchesne County is located in Roosevelt City, which currently does not have a flood plain map. However, it is not likely that potential floods would affect the hospital. Past floods that have occurred in Duchesne County have not affected the Hospital. Minimal damages would occur if the Hospital were affected by potential flooding. *Approximately; $100,000.00*
- Schools: The Schools located in Duchesne City, are likely to be affected by a flood. The elementary school and the High School are located in the flood plain. *Approximately; 4 to 5 million dollars*

- Communication utility company: Due to the fact that the communications and the utility companies are not located in the flood plain minimal damages would result from a flood. *Approximately; $100,000.00*
- Waste water treatment plant: It is not likely that the wastewater treatment plant would have any damages due to flooding. *Approximately; $100,000.00*

Potential wildfire losses:

- Residential properties: Depending upon the location of the flood, losses could result into excess of millions of dollars. *Approximately; 4 to 5 million dollars*
- Hospital: The Duchesne County Hospital would have minimal damages if any that would result from potential wildfire losses. *Approximately; $100,000.00*
- Secondary School: Duchesne County does have a couple of school systems located on the outskirts of the County that could have potential damages due to wildfires. *Approximately; 1 to 2 million dollars*

Duchesne County

The Duchesne County Disaster Mitigation Planning committee, which consists of one County Commissioner, the Mayor of Duchesne, the Mayor of Altamont, the Mayor of Tabiona, the Roosevelt City Manager, the Mayor of Myton, the County Emergency Manager in conjunction with the Uintah Basin Association of Governments meet on several different occasions to review and analyze the risk assessment studies that were performed for the County. The goals listed were determined to be those goals that would have the greatest benefit in hazard reduction to the County. The goals, objectives and actions represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Listed below is our definition of goals and objectives.

Goals: General guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

Objectives: Define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

The Duchesne County Disaster Mitigation Planning Committee and the Uintah Basin AOG Mitigation Planner decided upon the following goals, objectives, action items, and priorities for each of the natural hazards. The priorities for each hazard are ranked in the following order: High, Medium, and Low. Each hazard is ranked by order of importance; however, this does not mean the ranking of each hazard will not potentially change over time.

Mitigation Strategies

Dam Failure

Duchesne County

GOAL 1: Help reduce future flooding in Duchesne County due to dam failure.
Problem Identification: Reduce down stream loss in Duchesne County due to dam failure.

High Priority

Objective 1.1

- Use technology to aid in prevention of flood loss due to dam failure

Action 1.1.1:

- Digitize high hazard dam failure inundation maps

  Time Frame: ongoing
  Funding: state government
  Estimated Cost: 500 dollars per dam
  Staff: Utah Dam Safety Section, and AGRC

Action 1.1.2:

- Update Emergency Operations Plan to include GIS dam failure estimates

  Time Frame: Next EOP update
  Funding: County
  Estimated Cost: Undetermined
  Staff: County GIS and Emergency Manager

Action 1.1.3:

- Educate the local elected officials, developers, and citizens.

  Time Frame: Within the next two years
  Funding: County
  Estimated Cost: Minimal
  Staff: County employees

Action 1.1.4

- Updated Emergency Action Plans (EAP) and integration with GIS Systems**.**

Time Frame: Ongoing
Funding: FEMA, State and Local
Estimated Cost: Unknown
Staff: State and Local

Action 1.1.5:

- Implementation of more debris dams would assist in controlling floods, reducing the amount of debris and mud that come through. Maintenance of flood control pools in existing dams would also be very beneficial.

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: Numerous technological advancements have been made which will help reduce the likely hood of dam failure and reduce the risk to down stream populations should a dam fail. These techniques will only reduce the risk if they are properly understood and implemented. The above mitigation recommendations when implemented will represent a first step into this new technology for Duchesne County. The county understands there are additional technologic steps that can be taken such as increase number of telemeter snow and stream gauges. Look for these advances in future revisions to the mitigation plan.

Drought

Duchesne County

GOAL 1: Reduce water loss within Duchesne County due to drought.
Problem Identification: Current, past and future drought issues within Duchesne County.

High Priority

Objective 1.1

- Conserve culinary water by educating the public

Action 1.1.1:

- Educate the public on the need to be water wise

Time Frame: Ongoing
Funding: County funds
Estimated Cost: minimal

Staff: Water surveyor and newsletter editor

Background: Use a newsletter to educate the public

Objective 1.2:
- Develop more water storage tanks within the County

Action 1.1.2:
- Conduct a feasibility study

Time Frame: Ongoing
Funding: County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Action 1.1.3:
- Install new wheel lines to improve the water efficiency.

Time Frame: Ongoing
Funding: Federal, and State funding
Estimated Cost: Unknown
Staff: NRCS, UACD, USU, Extension, ect.

Action 1.1.4:
- Implement and enforce water laws that prohibit the use of extensive amounts of water.

Time Frame: Ongoing
Funding: County funds
Estimated Cost: Unknown
Staff: Water surveyor and newsletter editor

Drought

Altamont Town

GOAL 1: Reduce water loss within the town of Altamont.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1
- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:

- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: Town funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Altamont Town Staff, Professional Services, and Contractors

Objective 1.2

- Conserve culinary water by conservation

Action 1.1.2:

- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The Town should continue to maintain and implement a tiered water rate structure.

Duchesne City

GOAL 1: Reduce water loss within Duchesne City.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1

- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:

- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: City Staff, Professional Services, and Contractors

Objective 1.2

- Conserve culinary water by conservation

Action 1.1.2:

- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: City and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The City should continue to maintain and implement a tiered water rate structure.

Myton City

GOAL 1: Reduce water loss within Myton City.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1

- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:

- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Myton City Staff, Professional Services, and Contractors

Objective 1.2

- Conserve culinary water by conservation

Action 1.1.2:

- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: City and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The City should continue to maintain and implement a tiered water rate structure.

Roosevelt City

GOAL 1: Reduce water loss within Roosevelt City.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1
- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:
- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Roosevelt City staff, Professional Services, Contractors

Objective 1.2
- Conserve culinary water by conservation

Action 1.1.2:
- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: City and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The City should continue to maintain and implement a tiered water rate structure.

Tabiona Town

GOAL 1: Reduce water loss within the town of Tabiona.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1

- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:

- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: Town funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Tabiona Town Staff, Professional Services, and Contractors
Objective 1.2

- Conserve culinary water by conservation

Action 1.1.2:

- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: Town and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The Town should continue to maintain and implement a tiered water rate structure.

Earthquake

Duchesne County

GOAL1: Provide public awareness regarding earthquakes.
Problem Identification: Transportation and utilities services could be severely impacted.

High Priority

Objective 1.1

- Provide for emergency response and relief.

Action 1.1.1:

- Identify and maintain critical transportation and utility services.

Time Frame: ongoing
Funding: Local governments and possible grants

Estimated Cost: Unknown- Determined by the extent of damage anticipated.
Staff: Town staff.

Background: Critical transportation systems

Objective 1.2
- Public Awareness

Action 1.1.2:
- Conduct a public awareness campaign.

Time Frame: ongoing
Funding: Local governments and possible grants
Estimated Cost: Unknown
Staff: Agency personnel and volunteers

Background: Contact DESHS earthquake program specialist. Enhance earthquake instructions in school.

Duchesne County

Goal 2: Identify the number of seismically unsafe structures within the County.
Problem Identification: Unknown number of seismically unsafe structures around the county.

High Priority

Objective 1.1
- Have a study done to determine seismic resistance of structures within the county i.e. Elementary and high schools, public buildings, high traffic areas, ECT.

Action 1.1.1:
- Structural and non-structural earthquake hazard assessment.

Time Frame: ongoing
Funding: Unknown
Estimated Cost: Unknown
Staff: Unknown

Background: Critical transportation systems

Flooding

Duchesne County

GOAL 1: Reduce flood damage in Duchesne County.
Problem Identification: Control flooding in residential areas of Duchesne County, Including but not limited to the Town of Altamont, Duchesne City, Roosevelt City, and the town of Tabiona. Flooding occurs from heavy rains and fast moving thunderstorms. *For more information regarding Flooding in Duchesne County see the Flood Hazard Identification Study in Appendix M.*

High Priority

Objective 1.1:
- Obtain Aerial photography with contours of each residential area in Duchesne County.

Action 1.1.1:
- Set horizontal and vertical survey control and order aerial photography with contours for each residential area in the county.

Time Frame: Ongoing
Funding: Local, State and Federal grants
Estimated Cost: Unknown
Staff: State, Local, and possibly Federal

Background: Aerial Topography is needed for master storm drainage design.

Objective 1.2:
- Design master storm drainage plans for residential areas.

Action 1.1.2:
- Design master storm drainage plans to handle storm water runoff through residential areas.

Time Frame: 3 months to 2 years, (depending on number of areas worked on)
Funding: Grants
Estimated Cost: $10,000.00 per residential area, depending on size
Staff: County Staff and contracted staff.

Background: Engineers design master storm drainage plans for the residential areas.

Objective 1.3:
- Implement storm drainage plans throughout the residential areas of Duchesne County.

Action 1.1.3:

- Implement storm drainage plans throughout the residential areas of Duchesne County.

Time Frame: 2 years or as soon as the storm drainage plans are finished.
Funding: State and Federal grants
Estimated Cost: unknown, will depend on the finals plans and what is required for facilities
Staff: County and contracted staff

Background: Construct storm drainage facilities and require all new developments to meet county storm drainage plans.

Altamont Town

GOAL 1: Reduce flooding in the town of Altamont.
Problem Identification: Control flooding in the Town of Altamont. Flooding occurs from heavy rains and fast moving thunderstorms.

High Priority

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the town of Altamont.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and Town Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the Town Ordinances that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.3:

- Town building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.4:

- Town building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and Town with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time

Staff: County and Town Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Background: Past and future flooding

Duchesne City

High Priority

GOAL 1: Reduce flooding in Duchesne City.
Problem Identification: Control flooding in Duchesne City. Flooding occurs from heavy rains and fast moving thunderstorms.

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Duchesne City.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and City Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the City Ordinance that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.3:

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.4:

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and City with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Myton City

High Priority

GOAL 1: Reduce flooding in Myton City.
Problem Identification: Control flooding in Myton City. Flooding occurs from heavy rains and fast moving thunderstorms.

Objective 1.1:
- Use technology to aid in prevention of flood loss.

Action 1.1.1:
- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Myton City.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and City Employees, Local Volunteers

Action 1.1.2:
- Place a restrictive clause in the City Ordinance that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.3:
- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.4:

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and City with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Roosevelt City

High Priority

GOAL 1: Reduce flooding in Roosevelt City.

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Roosevelt City.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and City Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the County and City Ordinances that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.3:

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.4:

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time

Staff: County and City Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and City with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Tabiona Town

High Priority

GOAL 1: Reduce flooding in the Town of Tabiona.

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the town of Tabiona.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and town Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the County and Town Ordinances that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers
Background: Past and future flooding

Action 1.1.3:

- County and town building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.4:

- County and town building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.

Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and Town with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Insect Infestation

Duchesne County

GOAL 1: Reduce insect infestation
Problem Identification: Duchesne County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation.

Priority High

Objective 1.1

- Reduce the impact of insects

Action 1.1.1:

- Spread insect bait and spray for mosquitoes

Time Frame: When required
Funding: Town and County funds, Mosquito abatement funds come from property tax
Estimated Cost: Approximately $3.00 per property owner per month
Staff: County Mosquito Abatement District

Objective 1.2:

- Reduce the severity of infestations

Action 1.1.2:

- Apply for grants to purchase Mosquito magnets and propane tanks to run the magnets.

Time Frame: Spring and summer of 2004
Funding: $6,000.00 in grants
Estimated Cost: $6,000.00
Staff: County employees

Background: Several agricultural fields surround Duchesne County; these fields have been subjected to insect infestation especially during the recent years of drought.

Objective 1.3:

- Reduce the threat of West Nile Virus within Duchesne County

Action 1.1.3:

- Educate the public on the importance of vaccinating their animals.

Time Frame: Spring and summer of 2004
Funding: State and local funding
Estimated Cost: minimal
Staff: County employees

Background: Several of the Duchesne County residents have horses that could be affected by the west nile virus.

Duchesne County

GOAL 1: Reduce grasshopper infestations.
Problem Identification: Periodic Grasshopper infestations more sever in the rural areas of Duchesne County.

High Priority

Objective 1.1:

- Reduce the severity of infestations

Action 1.1.1:

- Conduct aerial spraying to reduce infestations.

Time Frame: As infestations occur
Funding: By private individuals in most cases
Estimated Cost: Varies, depending on acreage treated
Staff: Contractor

Background: Many agricultural fields surround Duchesne County. These fields have been subjected to insect infestation especially during the recent years of drought.

Landslide

Duchesne County

GOAL 1: Protect residential areas from potential landslides.
Problem Identification: There is a potential risk to residential and commercial buildings due to rockslides, which are located in areas identified by the county as landslide risk areas.

High Priority

Objective 1.1

- Reduce potential landslides to residential and commercial areas.

Action 1.1.1:

- Assess the probability of landslides and identify specific structures at risk

Time Frame: Undetermined
Funding: Property owner
Estimated Cost: Unknown
Staff: Unknown

Background: Soil surveys and other engineering surveys are needed.

Action 1.1.2:

- The county’s, city’s and town’s planning committee will review and update the zoning ordinances within the County to make sure that individuals are not constructing new homes near potential landslide areas.

Time Frame: Undetermined
Funding: Unknown
Estimated Cost: Unknown

Staff: Unknown

Background: Hold monthly planning and zoning meetings within the town and county.

Duchesne County

GOAL 2: Protect vehicle traffic from future accidents due to landslides.
Problem Identification: In Duchesne County there are several areas namely Indian Canyon, Ravola Dugway, and Wolf Creek Pass that could have a potential risk to pedestrians and vehicle traffic due to landslides.

High Priority

Objective 1.1

- Reduce potential landslides to residential and commercial areas.

Action 1.1.1:

- Assess the probability of landslides and identify specific structures at risk

Time Frame: Undetermined
Funding: Property owner
Estimated Cost: Unknown
Staff: Unknown

Background: Soil surveys and other engineering surveys are needed.

Severe Weather

Duchesne County

Goal 1: Reduce Structural damage to both residential and commercial buildings due to Severe Weather.
Problem Identification: Duchesne County experiences occasional, damaging high winds and snowstorms.

High Priority

Objective 1.1

- Reduce damage to structures through strict adherence to building codes

Action 1.1.1:

- Ensure that 80 MPH wind load requirement is met by builders

Time Frame: Ongoing
Funding: Fees from Building permits
Estimated Cost: Minimal
Staff: Building Inspector

Background: Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events

Duchesne County

Goal 2: Provide protection for citizens regarding power line failure.
Problem Identification: Power lines are at risk from seasonal high winds.

Priority High

Objective 1.1

- Reduce service disruptions and damage to power lines

Action 1.1.1:

- Provide adequate clearances for power lines and conduct ongoing line maintenance. Maintain outage plan.

Time Frame: Ongoing
Funding: Possible Grants
Estimated Cost: To be determined
Staff: County and town employees

Background: Extreme winds have occurred, utilities disruption has occurred in past years due to damage to power poles and transmission lines by high winds.

Wildfire

Duchesne County

Goal: Reduce the threat of wildfires within Duchesne County.
Problem Identification: Continuing non-compliance with existing building codes and fire codes.

High Priority

Objective 1.1

- Increase compliance with existing building and fire codes.

Action:

- Develop and enforce current local, state and national codes

Time Frame: Ongoing
Funding: Local, state and federal grants
Estimated Cost: Unknown
Staff: Local, state and federal agencies
Background: Implement and enforce rules, regulations and codes

Duchesne County

Goal 1: Reduce wildfire danger within the County.
Problem Identification: Specific areas of the county are susceptible to wildland fire danger.

Objective 1.2

- Educate homeowners on how to reduce risk of wildfire damage

Action 1.1.2:

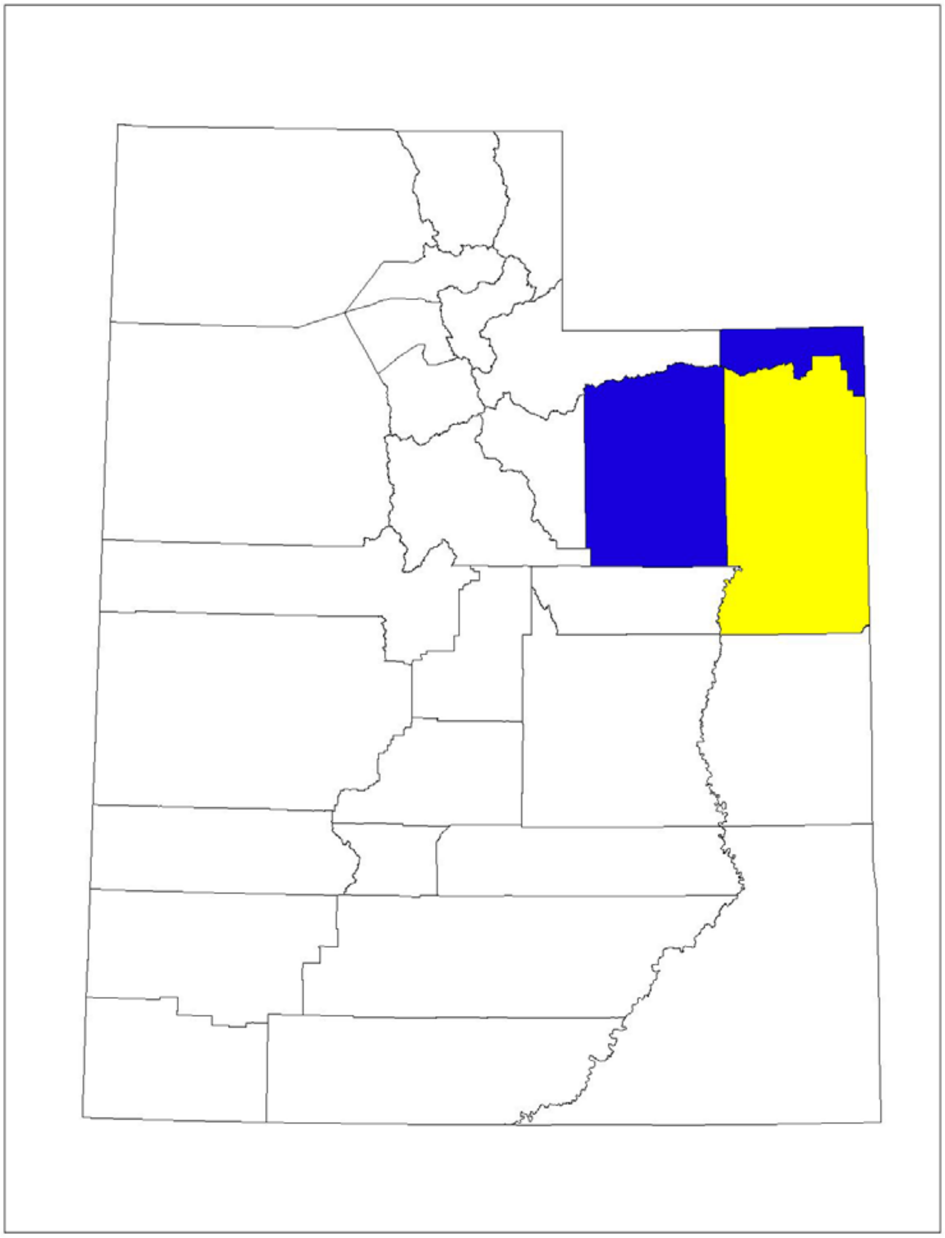
- The local LEPC will provide semi-annual training for the citizens of Duchesne County.

Time Frame: Starting 2004
Funding: State and local
Estimated Cost: Minimal
Staff: County
Background: Educate the public on how to reduce the risk of wildfires.

Annex 4-Uintah County

Uintah County Annex

Figure 1: Tri-county map



UINTAH COUNTY

Past Hazard Events in Uintah County

Understanding the past is often the key to discovering what the future holds; this is especially true when planning for natural disasters. The fact that cities within Uintah County have experienced, for example, flooding in the past means flooding can occur in the future. While over time some of this has been mitigated for the low frequency of occurrence often results in hazards with little or no mitigation. Table 1 provides a brief history of Uintah County natural disasters. This table includes only sizable events found during our research, and may not represent the total history.

Table 1 Uintah County Natural Disaster History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flash flood	September 1, 1909	Ashley River near Vernal	1 Death	Man crossing Ashley Creek with a wagon
Flash flood	July 4, 1925	Five Mile Canyon near Vernal	1 Death	Child swept from automobile
Flood	August 9, 1941	Vernal/Jensen	Approximately $75,000.00 to crops was caused by heavy rain and hail. Red Wash bridge damaged	No loss of life
Flood	August 25, 1955	Lapoint	$3,000.00 in damage to bridges and roads	No loss of life
Flood	July 30, 1956	Jensen	$25,000 damage to farmlands and crops	No loss of life
Flood	June 10, 1965	Maeser/Ouray	Damage to homes, crops, and waterlines	Source: Ashley Creek, Dry Fork, The Green, White, and Duchesne rivers

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flood	1983	County Wide	Limited	Source
Wildfire	July 23, 1988	Green River Fire	Unknown	No loss of life
Wildfire	September 17, 1992	Diamond Mountain Bonus	Unknown	No loss of life
Wildfire	August 16, 1996	Diamond Rim #2	Unknown	No loss of life
Wildfire	June 25, 1999	Walsh Knolls	1096 Acres	No loss of life
Wildfire	June 27, 1999	WhiteRocks	Unknown	No loss of life
Wildfire	March 26, 2000	Max Assist	Unknown	No loss of life
Wildfire	May 29, 2000	Sweetwater Complex	3700 Acres	No loss of life
Wildfire	July 28, 2000	Pot Creek	Unknown	No loss of life

Uintah County identified six natural hazards they wanted addressed in the Uintah County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the Uintah County PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for there Pre-Disaster Mitigation Plan.

The Uintah County Disaster Mitigation Planning committee consisted of one County Commissioner, the County Emergency Manager, the Vernal City Planner, the Naples City Manager, and Ballard City and the Uintah Basin Association of Governments planning coordinator.

The Disaster Mitigation Plan for Uintah County identifies critical facilities located in the County *(See Appendix B).* A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in the County were not located in the natural hazard area. *Due to Data limitations, The Uintah Basin Association of Governments was unable to map the location of the critical facilities in Uintah County.*

NATURAL HAZARD: DAM FAILURE

FEMA Hazard Profile for Dam Failure

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
	X	**Unlikely**	**Less than 1% probability in next 100 years**
Severity	**X**	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire county		
Seasonal Pattern	Spring		
Duration	Several months to over one year		
Speed of Onset	Range from 35 minutes to three hours		

A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years. *For a description of dam failure and possible causes dams failure in Uintah County see the Flood Hazard Identification Study in Appendix M.*

VULNERABLIITY: High

Description of Hazard

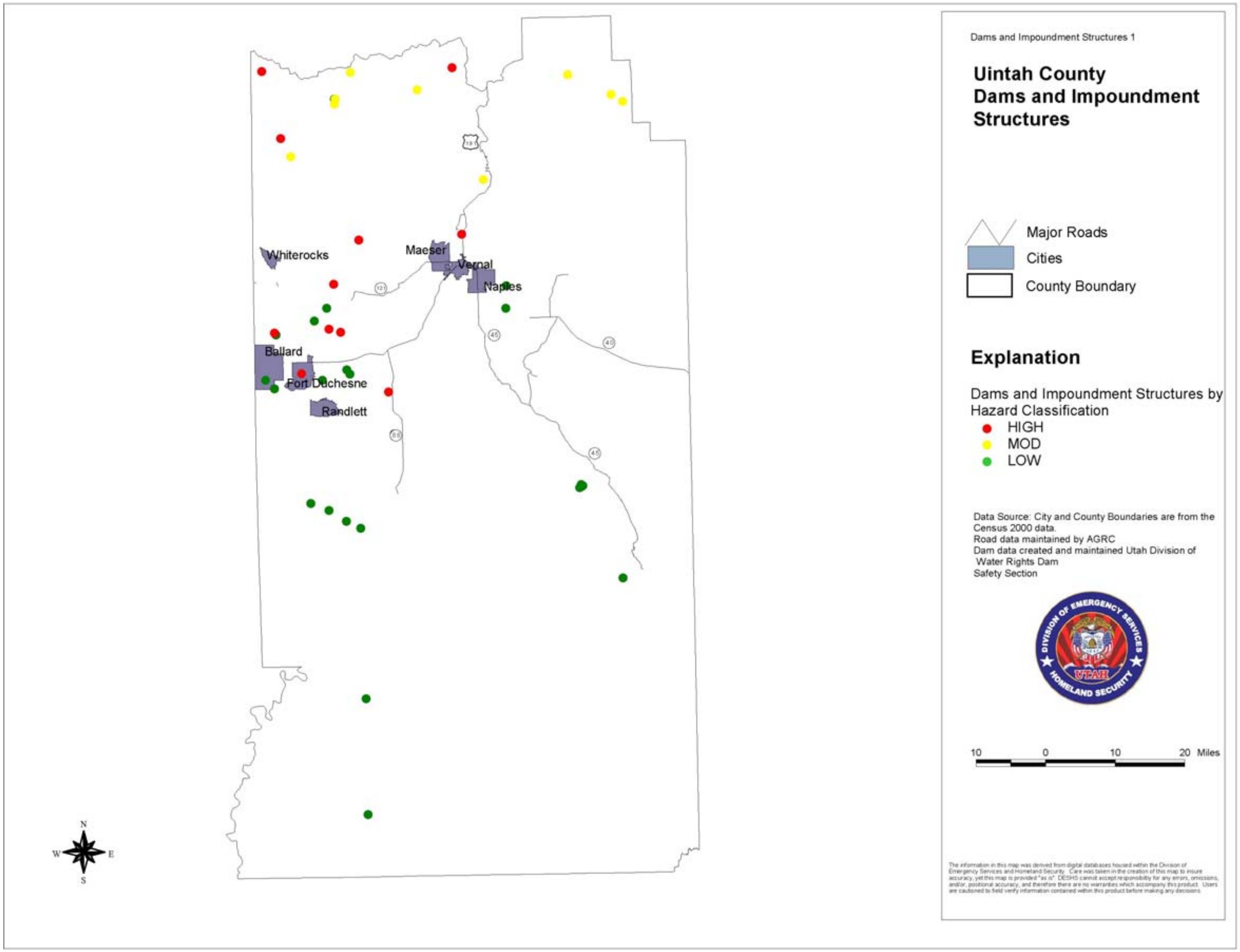
The following high hazard dams exist within Uintah County according to the Utah Division of Dam Safety database.

- Brough
- Whiterocks
- East Park
- Paradise Park
- Bullock Draw
- Lapoint
- Montes Creek
- Cottonwood
- Steineker
- Red Fleet

The map on page 7 illustrates the location of each dam.
Low lying areas down stream of these dams are particularly at risk, if a dam were to fail. *For a description of dam failure and possible causes see the dams failure section in Appendix A.*

Generic Mitigation:

- Proper mapping of flood plains, including mapping of dam breach flood potential.
- Knowledge must be made public so that emergency managers are aware and the public is aware when they buy and sell property.
- Updated Emergency Action Plans (EAP) and integration with GIS Systems.
- Maintaining proper flood plain and wetland geometry and vegetation will help route floods.
- Flood plain usage should be compatible with flood plain needs.
- More debris dams would help with floods and debris, and mud, and maintaining a flood control pool in existing dams would be beneficial.
- Protection of roads and bridges.
- General infrastructure protection.
- More authority to order releases and better forecasting would help in snowmelt floods and runoff.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.



Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Dam data created and maintained Utah Division of Water Rights Dam Safety Section

The information in this map was derived from digital databases housed within the Division of Emergency Services and Homeland Security. Care was taken in the creation of this map to insure accuracy, yet this map is provided "as is". DESHS cannot accept responsibility for any errors, omissions, and/or, positional accuracy, and therefore there are no warranties which accompany this product. Users are cautioned to field verify information contained within this product before making any decisions.

NATURAL HAZARD: EARTHQUAKE

FEMA Hazard Profile for Earthquake

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
	X	**Unlikely**	**Less than 1% probability in next 100 years**
Severity	**X**	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Entire county		
Seasonal Pattern	Near fault lines located in the County		
Duration	Months and possibly years		
Speed of Onset	Minimal or no warning		

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of year.
Source: http://www.fema.gov/hazards/earthquakes/
For a description of earthquakes and possible causes see the earthquake section in Appendix A.

The Diamond Gulch Fault in Uintah County is the only source area for a large magnitude earthquake. Uintah County is similar to the other counties within the

Uintah Basin and has a low seismic hazard, as it is uncertain if the Diamond Gulch Fault has moved during the quaternary period.

VULNERABILITY: Low

The map on page 10 shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

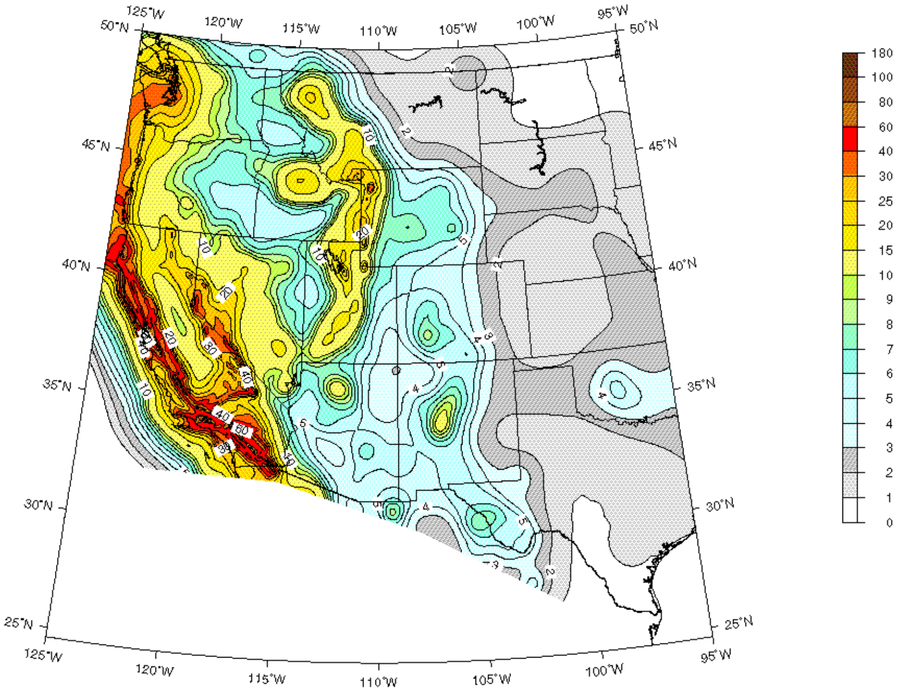
Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). For example, in an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

%g= Ground Surface Acceleration/ Rate of Acceleration due to Gravity

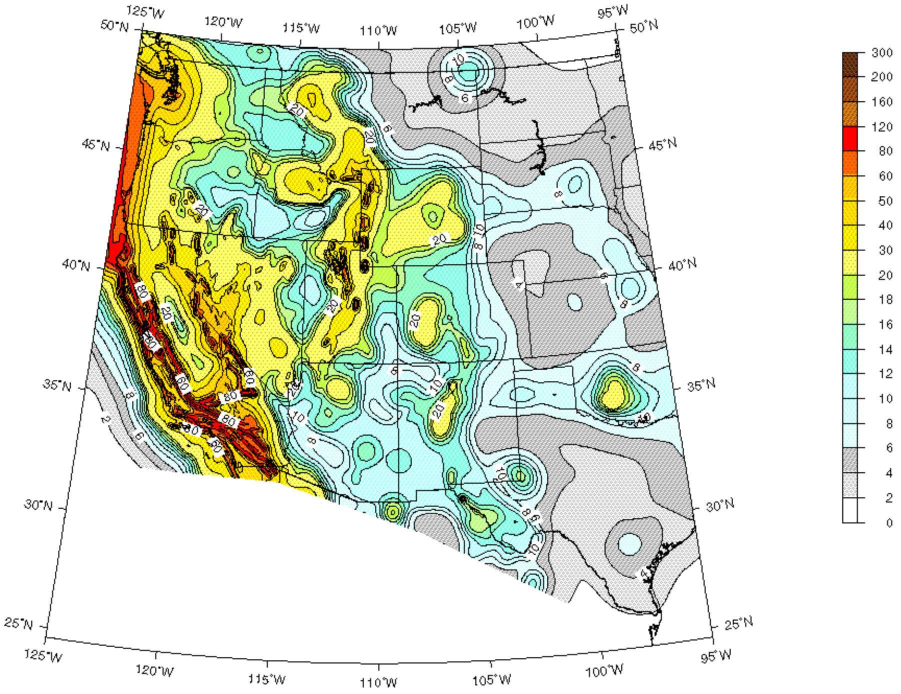
%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%

Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev



Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev



AFFECT:

The Diamond Gulch Fault in Uintah County is the only source area for a large magnitude earthquake. Uintah County is similar to the other counties within the Uintah Basin and has a low seismic hazard, as it is uncertain if the Diamond Gulch Fault has moved during the quaternary period.

POTENTIAL AFFECT:

A potential earthquake could affect water, oil and gas produced for the Uintah Basin as well as the Wasatch Front. An earthquake could affect transportation and dams. Many homes in Uintah County were not built to meet earthquake standards. *The map on page 14 and 15 identify Epicenters and Quaternary Faults and gives an explanation for each in Uintah County.*

HAZUS MH Vulnerability Assessment

Table 1.1 Casualties

Casualties	Nighttime –Minor	57
	Nighttime –Major	1
	Nighttime -Fatalities	2
	Daytime –Minor	52
	Daytime –Major	1
	Daytime- Fatalities	2
	Commute –Minor	48
	Commute –Major	1
	Commute-Fatalities	2

Buildings/Structures

Building Damage by Count -- Building damage is classified by HAZUS in five damage states: none, slight, moderate, extensive and complete. Table1.2 lists the number buildings by occupancy, which is estimated to have moderate to complete levels of damage.

Table 1.2 –Building Damage by Count with Moderate to Complete Damage

Category	Number of Structures
Residential	731
Commercial	29
Industrial	10
Totals	770

Critical facilities

Classification	Total	Least Moderate Damage >50%	Complete Damage > 50%	Functionality > 50% at day 1
Hospitals	1	0	0	1
Schools	10	0	0	0
EOCs	1	0	0	1
Police Stations	3	0	0	0
Fire Stations	2	0	0	0

Debris Removal –Table 1.4 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour.

A second debris removal issue is landfill space. Fifty thousand tons (50,000) at a weight to volume ratio of one ton per cubic yard would cover more than ten acres to a depth of one yard.

Table 1.4 –Debris Generated (millions of tons)/Loads to Remove Debris

Debris Generated	0.04
Loads (25 tons per load)	2,000

Fire Following --The Great San Francisco Earthquake of 1906 illustrated the hazard a city could face from fire following an earthquake. Multiple ignitions and broken water mains conspired to make firefighting nearly impossible. HAZUS uses the estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake. Table 1.5 provides estimates of ignitions, people at risk and the building stock exposed to fires following an earthquake.

Table 1.5 –Fire Following Event, Population Exposed, and Building Stock Exposed

Ignitions	1
People Displaced	8
Value Exposed (mill. $)	0

These numbers were derived from a HAZUS MH run based on a probabilistic 2500-year event with a magnitude 7.0 running the soils portion of the model. *The complete HAZUS MH run is available in Appendix H.*

Generic Mitigation:

- Build all homes and building’s to meet the standards and code of earthquakes. County adopts building codes on all new construction.
- Educate the public on potential hazards.
- Working with local LEPC on exercising plans in existence.
- Educate local school systems to utilize LEPC.

Generic Ground Shaking Mitigation

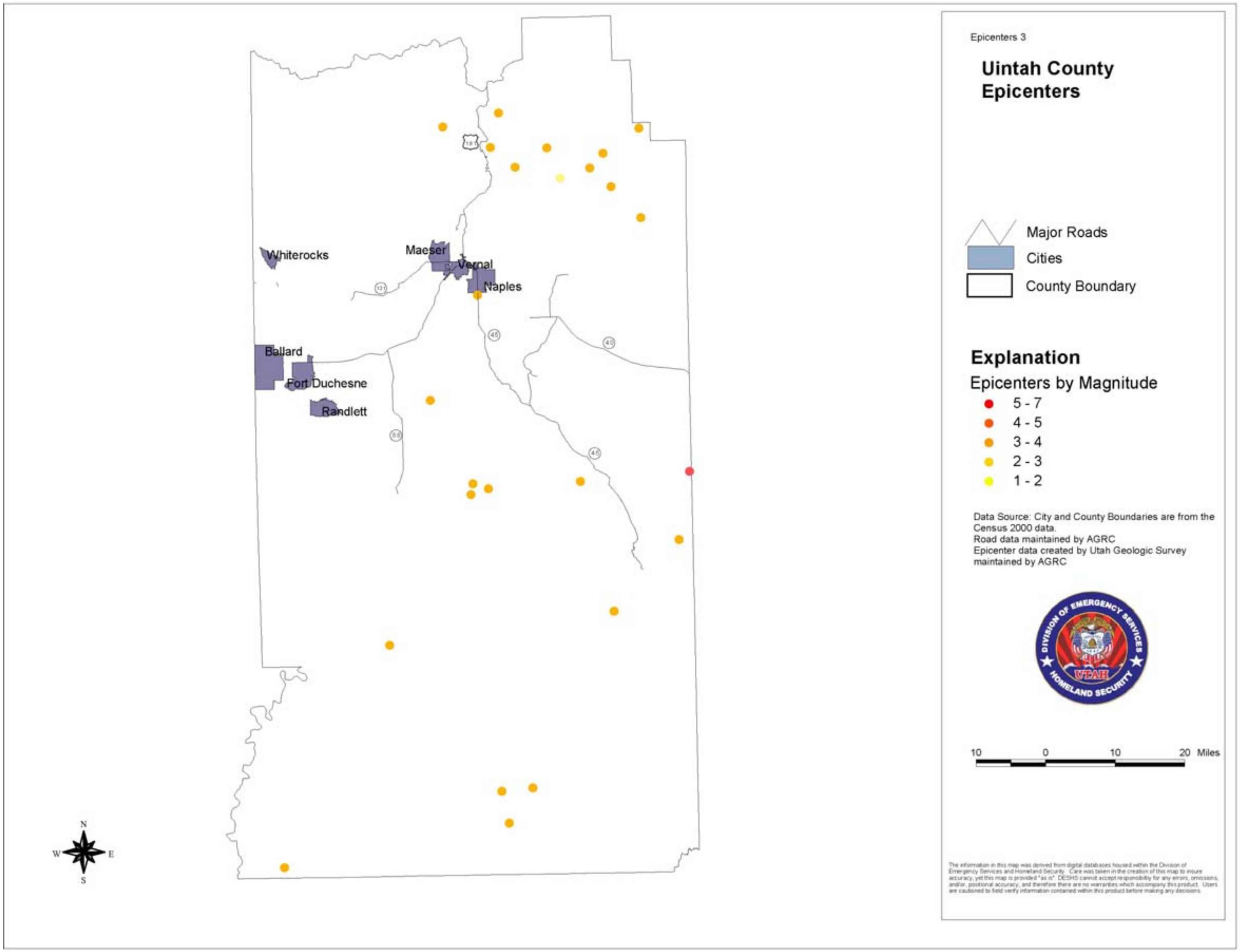
- Understand peak horizontal acceleration and recurrence interval.
- Design appropriately.
- Zoning ordinances and building codes.

Generic Liquefaction Mitigation

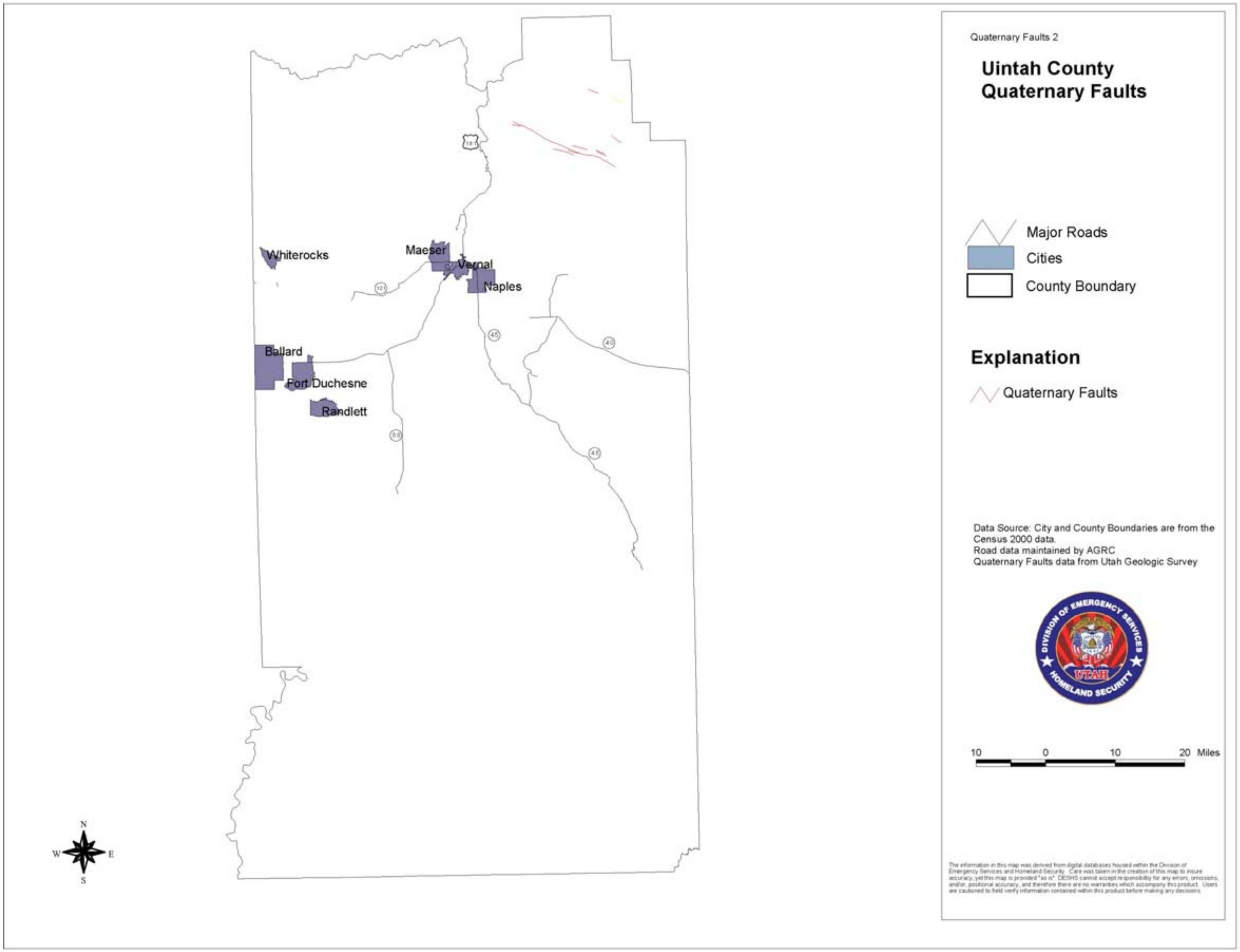
- Move soil out.
- Densify soils in place.
- Remove ground water.
- Structural design.

Generic Surface Fault Rupture Mitigation

- Avoidance
- Zoning ordinances



Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Epicenter data created by Utah Geologic Survey maintained by AGRC



Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Quaternary Faults data from Utah Geologic Survey

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NATURAL HAZARD: FLOODING

FEMA Hazard Profile for Flooding

Frequency		**Highly Likely**	**Near 100% probability in next year**
	X	**Likely**	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity		**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
	X	**Critical**	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Flooding would affect all communities in the county that are in and along the flood plains		
Seasonal Pattern	After spring rains, heavy thunderstorms, or spring thaws		
Duration	Rainstorms can last for hours and possibly days. Spring run-off can last weeks		
Speed of Onset	Six to twelve hours		

Floods are the most common and widespread of all natural disasters except fire. Most communities in the United States have experienced some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws.

A flood, as defined by the National Flood Insurance Program is: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:

- Overflow of inland or tidal waters.
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- A mudflow.

[The] collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood." *For a description of floods and possible causes see the floods section in Appendix A.*

Floods can be slow, or fast rising but generally develop over a period of days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation steps now, such as, engaging in floodplain management activities, constructing barriers, such as levees, and purchasing flood insurance will help reduce the amount of structural damage to your home and financial loss from building and crop damage should a flood or flash flood occur. Source: http://www.fema.gov/hazards/floods/

VULNERABILITY: High

AFFECT:

Naples City had some structural damage due to microbursts. Uintah County has had four to five flash floods in the last twenty years with little damage. However, some bridges were lost costing Uintah County approximately $200,000.00 and Vernal City around, $2,000.00. *For more information regarding Flooding in Uintah County see the Flood Hazard Identification Study in Appendix M.*

Generic Mitigation:

- Avoidance
- Revise and up-date building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.
- Manufactured homes need to be installed properly and inspected.
- Enforce zoning.
- Flood insurance awareness, emphasis, and marketing.
- Curtail development in flood-prone areas.
- Greater reservoir capacities.
- Gather hazard and risk data/information.
- Protection of drinking water supply.
- Education of local officials, developers, and citizens.
- Better flood routing through communities.
- Funding by a storm water tax in cooperation with Federal and State programs.

NATURAL HAZARD: INSECT INFESTATION

FEMA Hazard Profile for Insect Infestation

Frequency	X	**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	X	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Uintah County.		
Seasonal Pattern	Spring, summer, and fall		
Duration	Months		
Speed of Onset	Minimal or no warning		

Agriculture has historically dominated the economic life of Uintah County. The county remains a significant producer of crops and livestock.
Uintah County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation. Damage to the economic base and to the health of the citizens is also a direct result of insect infestation. Insects most notable are grasshoppers, Mormon Crickets, Bark Beetles, and mosquitoes. Currently the West Nile Virus spread by mosquitoes is a serious threat to humans and animals in Uintah County.

Generic Mitigation:

- Avoidance
- Spread insect bait and spray for mosquitoes
- Vaccinate

NATURAL HAZARD: LANDSLIDE

FEMA Hazard Profile for Landslide

Frequency		**Highly Likely**	**Near 100% probability in next year**
		Likely	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
	X	**Unlikely**	**Less than 1% probability in next 100 years**
Severity		**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
	X	**Critical**	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Uintah County		
Seasonal Pattern	After spring rains, heavy thunderstorms, or spring snow thaws.		
Duration	Depending upon conditions.		
Speed of Onset	Not applicable.		

VULNERABILITY: Low

The Uintah Basin Association of Governments identified and mapped possible landslide threats to Uintah County that would have a potential risk to pedestrians, vehicle traffic, and residential areas. *The map on page 21 illustrates Landslides and gives an explanation for Landslides in Uintah County.*

In Uintah County there are several areas namely, Blue Mountain, Diamond Mountain, Dry Fork Canyon, and the Book Cliffs that could have a potential risk to pedestrians and vehicle traffic due to landslides. Based upon the information we had available at that time we were unable to come up with any hard value figures that these landslides would have on Uintah County.

In Uintah County there are approximately 66 residential structures at potential risk from landslide. Based upon figures provided by the Uintah County Assessors Office, the market value of those structures is estimated to be $5,280,000.00.

For a description of Landslides and possible causes see the Landslides section in Appendix A.

Structure Loss and Value as a Percentage of Total Acreage.

City Name	Acres of Historically Active Landslides 1847 to Present	Households Vulnerable to Landslide/Cost
Uintah County	20,982.9	66/5,280,000

*Includes value of land.
Data set indicates no active landslides exist within the jurisdictions of Uintah County.

Transportation

Name	Miles	Estimated Cost
Local Neighborhood/local/city street	23	46,000,000

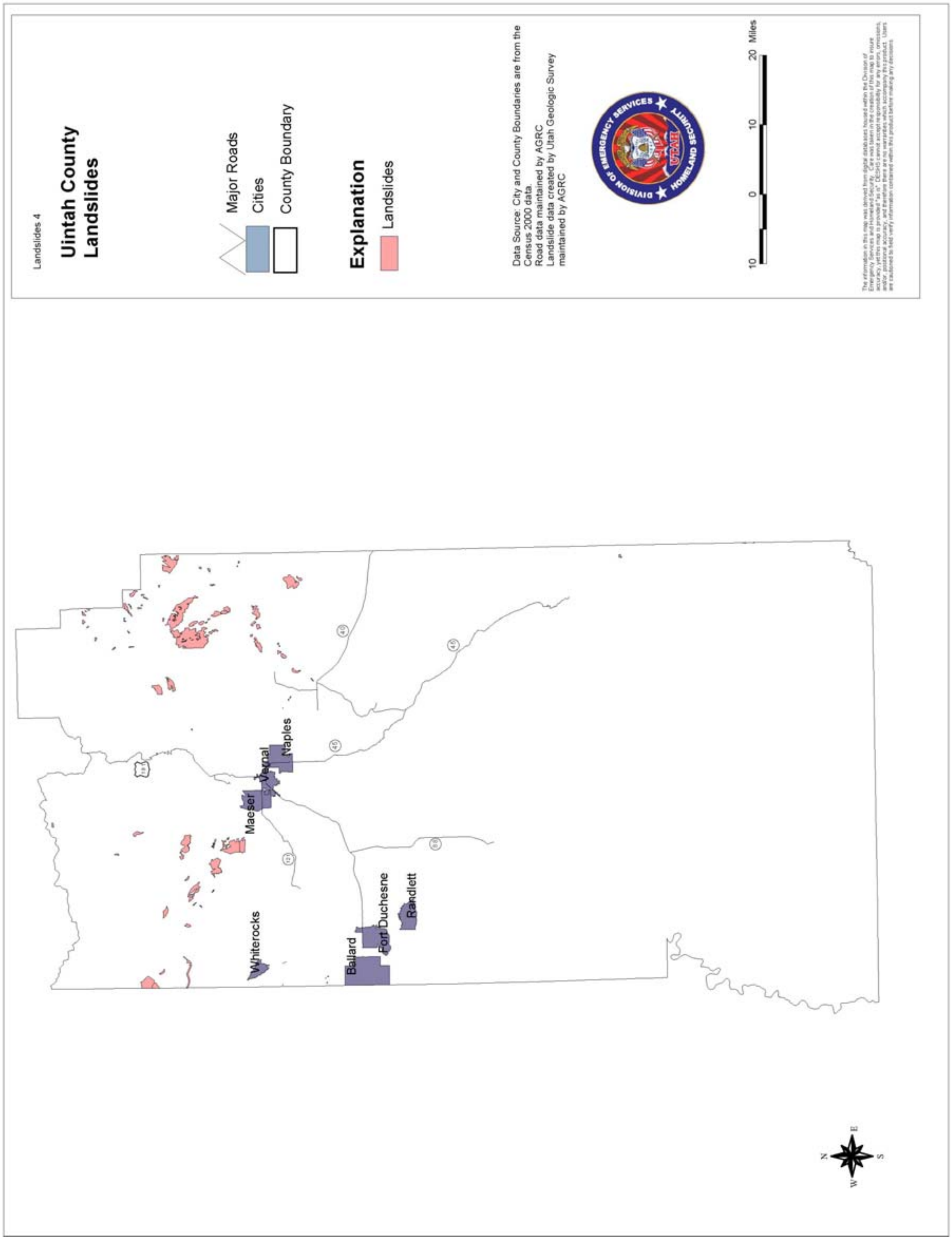
Table data represents total length of roads and rail lines, which overlay historically active landslides.

Utilities

Name	Description	Estimated Cost
Questar Gas Pipeline	1 mile	241,390
Uncoded Power Lines	.032 mile	1,544

Generic Mitigation:

- Install a pipeline for run-off.
- Seed hillsides to prevent landslides.


Landslides 4
Uintah County Landslides
Major Roads
Cities
County Boundary
Explanation
Landslides
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Landslide data created by Utah Geologic Survey maintained by AGRC
10
0
10
20 Miles
Naples
Vernal
Maeser
Whiterocks
Ballard
Fort Duchesne
Randlett
40
45
191
121
88
N
E
S
W

NATURAL HAZARD: WILDFIRE

FEMA Hazard Profile for Wildfire

Frequency		**Highly Likely**	**Near 100% probability in next year**
	X	**Likely**	**Between 10 and 100% probability in next year, of at least one chance in 10 years**
		Possible	**Between 1 and 10% probability in next year, of at least one chance in next 100 years**
		Unlikely	**Less than 1% probability in next 100 years**
Severity	**X**	**Catastrophic**	**More than 50%** (of the jurisdiction that can be affected)
		Critical	**25 to 50%** (of the jurisdiction that can be affected)
		Limited	**10 to 25%** (of the jurisdiction that can be affected)
		Negligible	**Less than 10%** (of the jurisdiction that can be affected)
Location	Uintah County.		
Seasonal Pattern	June through October.		
Duration	Minutes to days and months.		
Speed of Onset	Not applicable.		

There are three different classes of wild land fires. A **surface fire** is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A **ground fire** is usually started by lightning and burns on or below the forest floor. **Crown fires** spread rapidly by wind and move quickly by jumping along the tops of trees.

Wild land fires are usually signaled by dense smoke that fills the area for miles around. Source: http://www.fema.gov/hazards/fires/
The map on page 25 illustrates fire risk and gives a wildfire explanation for Uintah County.

A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

VULNERABILITY: High

Generic Mitigation:

- The County cannot mitigate because the forest service won't allow counties to manage their land.
- Poor land management on BLM and forestlands.
- Obtain fire-fighting equipment to control wildfires in rough terrain.
- Provide wild land fire training.
- Obtain fire grant from FEMA for personnel equipment.
- Weed control.

County Name	Acres of Extreme	Acres of High	Acres of Moderate	Acres of Low/Very Low
Uintah County	N/A	74,927	631,257	2,177,549

Unincorporated County

County	Households in Extreme/Cost	Households in High/Cost	Households in Moderate/Cost
Uintah County		235/15,040,000	1,982/126,848,000

Uintah County

City Name	Acres of Extreme	Acres of High	Acres of Moderate
Ballard			4,355.83
Naples			206.721
Fort Duchesne			2,474.9
Maeser		6.04	10.209

Structures in Wildfire Area

City Name	Households in Extreme/Cost	Households in High/Cost	Households in Moderate/Cost
Ballard			95/6,080,000
Naples			20.5/1,312,000
Fort Duchesne			91.5/5,856,000
City Name	**Households in Extreme/Cost**	**Households in High/Cost**	**Households in Moderate/Cost**
Maeser		1.4/89,600	2.3/147,200

*Excludes content value, which would result in, and increase of 50% to the values listed.

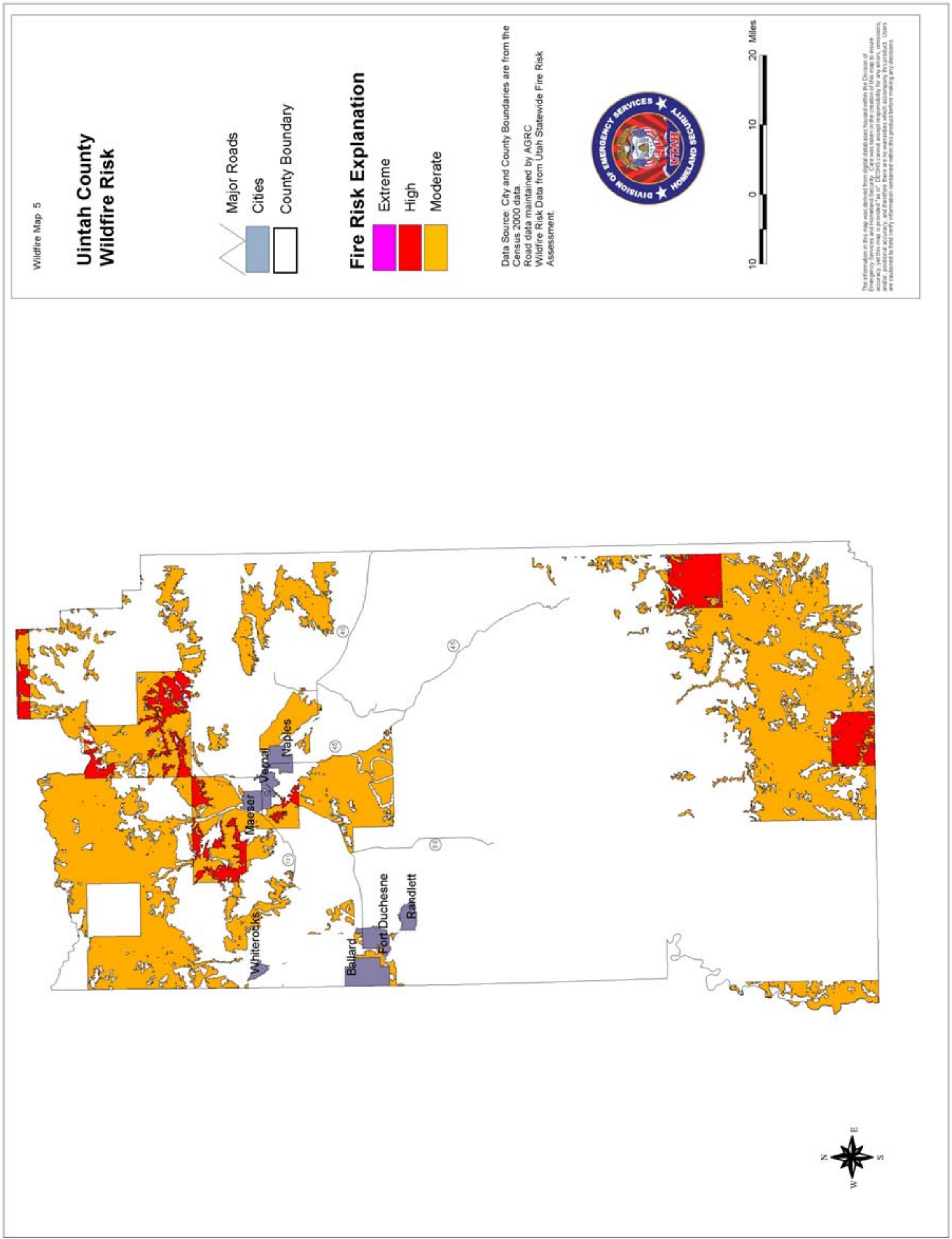
Transportation

Name	Miles	Estimated Cost
Local Neighborhood/local/city street	918.7	1,837,400,000
US Highway 40	11.7	28,237,950
US Highway 191	15.2	36,685,200
State Route 121	2.4	5,792,400
State Route 301	2.2	5,309,700
State Route 45	3.8	9,171,300

Table data includes road lengths within areas determined to have an extreme, high, or moderate risk to wildfire as determined by the Utah Statewide Fire Risk Assessment.

Utilities

Name	Description	Estimated Cost
Maeser	Power Generation	10,000,000
Chevron Resources	Power Generation	10,000,000
Uncoded Power lines	108.3 miles	5,228,724
KV-12.5 or less	4.5 miles	217,260
KV – 69	6.7 miles	323,476
KV – 138	4 miles	193,120
Questar Gas Pipeline	20.2 miles	4,876,078


Wildfire Map 5
Uintah County
Wildfire Risk
Major Roads
Cities
County Boundary
Fire Risk Explanation
Extreme
High
Moderate
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Wildfire Risk Data from Utah Statewide Fire Risk Assessment.
10
0
10
20
Miles
Naples
Vernal
Maeser
Whiterocks
Ballard
Fort Duchesne
Randlett
45
40
88
121
191
N
E
S
W

Mitigation Capabilities of Uintah County

This portion of the Plan assesses Uintah County's current capacity to mitigate the effects of the natural hazards identified within the plan. The assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Development Trends
4. Fiscal Capability
5. Policy and Program Capabilities
6. Political Willpower

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for Uintah County to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

1. Staff and Organizational Capability

Uintah County has **Very Limited** staff and organizational capability to implement hazard mitigation strategies. Uintah County is Utah's 11 most populated county, containing 25,224 people. While the County has a number of professional staff members to serve residents and carry out day-to-day administrative activities, much of the staff is part time or is tasked with numerous duties.

The County of Uintah does have an Emergency Manager who is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events.

2. Technical Capability

Uintah County has **very limited** technical capability to implement hazard mitigation strategies.

Technical Expertise

Uintah County does have an, emergency manager/building inspector to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

Geographic Information Systems (GIS)

GIS systems can best be described as a set of tools (hardware, software and people) used to collect, manage, analyze and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. Uintah County currently has GIS capability, and it has been identified as a needed enhancement for both the Planning Department and the Building Inspections office to further hazard mitigation goals.

Internet Access

Uintah County does provide its employees and citizens with high speed broadband Internet. Internet access opens up an enormous door for local officials to keep abreast of the latest information relative to their work and makes receiving government services more affordable and convenient. It is believed that Internet access will help further the County's hazard mitigation awareness programs, but should be supplemented with more traditional (and less technical) means as well.

3. Development Trends

Uintah County's economy has always relied on agriculture and mining to sustain its growth. The area has benefited from the development of several geologic deposits, such as gilsonite, oil shale, tar sand and oil, which have shaped its economic growth. While mining and agriculture remain significant to the economy, other industries such as government services, trade and the Ute Indian Tribe, are developing. These new industries help stabilize and diversify the economy.

Nonagricultural employment in Uintah County rose 2.3 percent to 8,745 by adding nearly 200 jobs between the second quarter of 1998 and the second quarter of 1999. Increased construction activity and service employment sustained economic growth. Uintah County's unemployment rate rose to 6.3 percent in 1998 to 6.4 percent for the comparable period of 1999.

Construction employment jumped 50.8 percent by adding 190 positions. All of the growth was in heavy construction for water, sewer, pipeline and communications systems. Residential, nonresidential, and special trade contractors reported slight growth. **Services** added 170 positions, and 8.4 percent year-over growth. Home health care, offices and clinics of doctors, video rental stores, temporary help agencies, residential care facilities, and tribal organizations reported growth, while jobs for equipment rental declined.
Government jobs increased 4.6 percent by adding 81 positions. Increases were reported for federal, state and local government, although local government positions dominated growth. Federal jobs related to land and wildlife management increased moderately, while state employment reported slight increases in several areas. Local positions rose for roadwork, recreation and education, but contracted for environmental and transportation services. **Manufacturing** employment experienced an increase of 17 jobs both durable and nondurable goods manufacturing added positions. Wood kitchen cabinet manufacturing, construction machinery, and publishing accounted for the growth. Oil and gas equipment reported a decline. **Finance, Insurance** and **Real Estate** year-over data indicate a net increase of one position. Real estate and insurance agents expanded, while banking/lending positions declined.

4. Fiscal Capability

Uintah County has **very limited** fiscal capability to implement hazard mitigation strategies.

5. Policy and Program Capability

Emergency Operations Plan

Uintah County has developed and adopted an Emergency Operations Plan, which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The Plan was adopted June 1986. For the most part, the Plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

The Plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during and immediately following an emergency. There are no foreseeable conflicts between this Hazard Mitigation Plan and Uintah County's Emergency Management Plan, primarily because they are each focused on two separate phases of emergency management (mitigation vs. preparedness and response).

Floodplain Management Plan

Although Uintah County currently participates in the National Flood Plain Insurance Program they do not have a current Floodplain Management Plan. However, this Disaster Mitigation Plan recommends that Uintah County work on updating and/or revising their Floodplain Management Plan.

Stormwater Management Plan

Uintah County Currently has no formal Storm water Management Plan.

County Ordinances

The Uintah County currently does not have any county ordinances that address natural disasters. However, a member of the planning committee was in attendance at our Natural Disaster meetings and agreed to work on implementing and adopting new County Ordinances that are relevant to hazard mitigation.

6. Political Willpower

Most Uintah County residents are quite knowledgeable about the potential hazards that their community faces. Recent wildfires have increased the understanding and need for mitigation within the government structure of Uintah County.

The Uintah Basin Association of Governments used historical data to estimate to the best of their ability (with the data available at the time) the potential dollar losses if the County were to experience flooding and wildfires, the two most likely hazards to occur in the County. The estimated costs are as follows:

Potential flood losses:

- Residential properties (including senior citizens home): Depending upon the location of the flood, losses could result into millions of dollars. *Approximately; 3 to 4 million dollars*
- Local Hospital: The local Hospital in Uintah County is not in the flood plain, and would, therefore not likely be affected by a flood. *Approximately; $100,000.00*
- Schools: The Schools located in Uintah County, are not likely be affected by a flood. None of the schools are located in the flood plain. *Approximately; $100,000.00*
- Communication utility company: Due to the fact that the communications and the utility companies are not located in the flood plain minimal damages would result from a flood. *Approximately; $100,000.00*
- Waste water treatment plant: Due to the fact that the waste water treatment plant are not located in the flood plain minimal damages would result from a flood. *Approximately; $100,000.00*

Potential wildfire losses:

- Residential properties: Depending upon the location of the flood, losses could result into excess of millions of dollars. *Approximately; 4 to 5 million dollars*
- Hospital: The Uintah County Hospital would have minimal damages if any that would result from potential wildfire losses. *Approximately; $100,000.00*
- Secondary School: Uintah County does have two school systems located on the outskirts of City that could have potential damages due to wildfires. *Approximately; 1 to 2 million dollars*

Uintah County

The Uintah County Disaster Mitigation Planning committee, which consists of one County Commissioner, the County Emergency Manager, the Vernal City Planner, the Naples City Manager, and Ballard City in conjunction with the Uintah Basin Association of Governments meet on several different occasions to review and analyze the risk assessment studies that were performed for the County. The goals listed were determined to be those goals that would have the greatest benefit in hazard reduction to the County. The goals, objectives and actions represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Listed below is our definition of goals and objectives.

Goals: General guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

Objectives: Define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

The Uintah County Disaster Mitigation Planning Committee and the Uintah Basin AOG Mitigation Planner decided upon the following goals, objectives, action items, and priorities for each of the natural hazards. The priorities for each hazard are ranked in the following order: High, Medium, and Low. Each hazard is ranked by order of importance; however, this does not mean the ranking of each hazard will not potentially change over time.

Mitigation Strategies

Dam Failure

Uintah County

GOAL 1: Help reduce future flooding in Uintah County due to dam failure.
Problem Identification: Reduce down stream loss in Uintah County due to dam failure.

High Priority

Objective 1.1

- Use technology to aid in prevention of flood loss due to dam failure

Action 1.1.1:

- Digitize high hazard dam failure inundation maps

  Time Frame: ongoing
  Funding: state government
  Estimated Cost: 500 dollars per dam
  Staff: Utah Dam Safety Section, and AGRC

Action 1.1.2:

- Update Emergency Operations Plan to include GIS dam failure estimates

  Time Frame: Next EOP update
  Funding: County
  Estimated Cost: Undetermined
  Staff: County GIS and Emergency Manager

Action 1.1.3:

- Educate the local elected officials, developers, and citizens.

  Time Frame: Within the next two years
  Funding: County
  Estimated Cost: Minimal
  Staff: County employees

Action 1.1.4

- Updated Emergency Action Plans (EAP) and integration with GIS Systems**.**

  Time Frame: Ongoing
  Funding: FEMA, State and Local
  Estimated Cost: Unknown
  Staff: State and Local

Action 1.1.5:

- Implementation of more debris dams would assist in controlling floods, reducing the amount of debris and mud that come through. Maintenance of flood control pools in existing dams would also be very beneficial.

  Time Frame: Ongoing
  Funding: Town and County funds
  Estimated Cost: minimal
  Staff: Water surveyor and newsletter editor

Background: Numerous technological advancements have been made which will help reduce the likely hood of dam failure and reduce the risk to down stream populations should a dam fail. These techniques will only reduce the risk if they are properly understood and implemented. The above mitigation recommendations when implemented will represent a first step into this new technology for Duchesne County. The county understands there are additional technologic steps that can be taken such as increase number of telemeter snow and stream gauges. Look for these advances in future revisions to the mitigation plan.

Drought

Uintah County

GOAL 1: Reduce water loss within Uintah County due to drought.
Problem Identification: Current, past and future drought issues within Uintah County.

High Priority

Objective 1.1

- Conserve culinary water by educating the public

Action 1.1.1:

- Educate the public on the need to be water wise

Time Frame: Ongoing
Funding: County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: Use a newsletter to educate the public

Objective 1.2:

- Develop more water storage tanks within the County

Action 1.1.2:

- Conduct a feasibility study

Time Frame: Ongoing
Funding: County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Action 1.1.3:

- Install new wheel lines to improve the water efficiency.

Time Frame: Ongoing
Funding: Federal, and State funding
Estimated Cost: Unknown
Staff: NRCS, UACD, USU, Extension, ect.

Action 1.1.4:

- Implement and enforce water laws that prohibit the use of extensive amounts of water.

Time Frame: Ongoing
Funding: County funds
Estimated Cost: Unknown
Staff: Water surveyor and newsletter editor

Drought

Ballard City

GOAL 1: Reduce water loss within Ballard City.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1

- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:

- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Ballard City staff, Professional Services, Contractors

Objective 1.2

- Conserve culinary water by conservation

Action 1.1.2:

- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: City and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The city should continue to maintain and implement a tiered water rate structure.

Naples City

GOAL 1: Reduce water loss within Naples City.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1
- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:
- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Naples City staff, Professional Services, Contractors
Objective 1.2
- Conserve culinary water by conservation

Action 1.1.2:
- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: City and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The City should continue to maintain and implement a tiered water rate structure.

Vernal City

GOAL 1: Reduce water loss within Vernal City.
Problem Identification: Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

High Priority

Objective 1.1
- Meet current and future water needs of community. Conserve culinary water by educating the public

Action 1.1.1:
- Develop additional water storage tanks as well as implement conservation plans.

Time Frame: Ongoing
Funding: City funds, State and Federal Government loans and/or grants
Estimated Cost: To be determined
Staff: Vernal City staff, Professional Services, Contractors

Objective 1.2
- Conserve culinary water by conservation

Action 1.1.2:
- Maintain and enforce rate policies that encourage water conservation

Time Frame: Ongoing
Funding: City and County funds
Estimated Cost: minimal
Staff: Water surveyor and newsletter editor

Background: The City should continue to maintain and implement a tiered water rate structure.

Earthquake

Uintah County

GOAL1: Provide public awareness regarding earthquakes.
Problem Identification: Transportation and utilities services could be severely impacted.

High Priority

Objective 1.1
- Provide for emergency response and relief.

Action 1.1.1:
- Identify and maintain critical transportation and utility services.

Time Frame: ongoing
Funding: Local governments and possible grants
Estimated Cost: Unknown- Determined by the extent of damage anticipated.
Staff: Town staff.

Background: Critical transportation systems

Objective 1.2
- Public Awareness

Action 1.1.2:

- Conduct a public awareness campaign.

Time Frame: ongoing
Funding: Local governments and possible grants
Estimated Cost: Unknown
Staff: Agency personnel and volunteers

Background: Contact DESHS earthquake program specialist. Enhance earthquake instructions in school.

Uintah County

GOAL 2: Identify the number of seismically unsafe structures within the County.
Problem Identification: Unknown number of seismically unsafe structures around the county.

High Priority

Objective 1.1

- Have a study done to determine seismic resistance of structures within the county i.e. Elementary and high schools, public buildings, high traffic areas, ECT.

Action 1.1.1:

- Structural and non-structural earthquake hazard assessment.

Time Frame: ongoing
Funding: Unknown
Estimated Cost: Unknown
Staff: Unknown

Background: Critical transportation systems

Flooding

Uintah County

GOAL 1: Reduce flood damage in Uintah County.
Problem Identification: Control flooding in residential areas of Uintah County, Including but not limited to Ballard City, Naples City, and Vernal City. Flooding occurs from heavy rains and fast moving thunderstorms. *For more information regarding Flooding in Uintah County see the Flood Hazard Identification Study in Appendix M.*

High Priority

Objective 1.1:

- Obtain Aerial photography with contours of each residential area in Uintah County.

Action 1.1.1:

- Set horizontal and vertical survey control and order aerial photography with contours for each residential area in the county.

Time Frame: Ongoing
Funding: Local, State and Federal grants
Estimated Cost: Unknown
Staff: State, Local, and possibly Federal

Background: Aerial Topography is needed for master storm drainage design.

Objective 1.2:

- Design master storm drainage plans for residential areas.

Action 1.1.2:

- Design master storm drainage plans to handle storm water runoff through residential areas.

Time Frame: 3 months to 2 years, (depending on number of areas worked on)
Funding: Grants
Estimated Cost: $10,000.00 per residential area, depending on size
Staff: County Staff and contracted staff.

Background: Engineers design master storm drainage plans for the residential areas.

Objective 1.3:

- Implement storm drainage plans throughout the residential areas of Uintah County.

Action 1.1.3:

- Implement storm drainage plans throughout the residential areas of Uintah County.

Time Frame: 2 years or as soon as the storm drainage plans are finished.
Funding: State and Federal grants
Estimated Cost: unknown, will depend on the finals plans and what is required for facilities
Staff: County and contracted staff

Background: Construct storm drainage facilities and require all new developments to meet county storm drainage plans.

Ballard City

GOAL 1: Reduce flooding in Ballard City.
Problem Identification: Control flooding in Ballard City. Flooding occurs from heavy rains and fast moving thunderstorms.

High Priority

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for Ballard City.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and City Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the City Ordinances that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.3:

- City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.4:

- City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and City with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and Town Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Background: Past and future flooding

Naples City

High Priority

GOAL 1: Reduce flooding in Naples City.
Problem Identification: Control flooding in Naples City. Flooding occurs from heavy rains and fast moving thunderstorms.

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Naples City.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and City Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the City Ordinance that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.3:

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.4:

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.

Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and City with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Vernal City

High Priority

GOAL 1: Reduce flooding in Vernal City.

Objective 1.1:

- Use technology to aid in prevention of flood loss.

Action 1.1.1:

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Vernal City.

Time Frame: Within the next two years
Funding: FEMA, state and local.
Estimated Cost: Unknown
Staff: County and City Employees, Local Volunteers

Action 1.1.2:

- Place a restrictive clause in the County and City Ordinances that will prohibit any new development in the floodplain.

Time Frame: Within the next year
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.3:

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.4:

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.5:

- The County Emergency Managers will research grant opportunities for potential funding.

Time Frame: Ongoing
Funding: FEMA, state and local.

Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.6:

- Implement a flood ordinance that will cover the County and City with flood insurance.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.7:

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Action 1.1.8:

- Enforce Zoning laws.

Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown at this time
Staff: County and City Employees, Local Volunteers

Insect Infestation

Uintah County

GOAL 1: Reduce insect infestation
Problem Identification: Uintah County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation.

Priority High

Objective 1.1

- Reduce the impact of insects

Action 1.1.1:

- Spread insect bait and spray for mosquitoes

Time Frame: When required
Funding: County funds, Mosquito abatement funds come from property tax
Estimated Cost: Approximately $3.00 per property owner per month
Staff: County Mosquito Abatement District

Objective 1.2:

- Reduce the severity of infestations

Action 1.1.2:

- Apply for grants to purchase Mosquito magnets and propane tanks to run the magnets.

Time Frame: Spring and summer of 2004
Funding: $6,000.00 in grants
Estimated Cost: $6,000.00
Staff: County employees

Background: Several agricultural fields surround Uintah County; these fields have been subjected to insect infestation especially during the recent years of drought.

Objective 1.3:

- Reduce the threat of West Nile Virus within Uintah County

Action 1.1.3:

- Educate the public on the importance of vaccinating their animals.

Time Frame: Spring and summer of 2004
Funding: State and local funding
Estimated Cost: minimal
Staff: County employees

Background: Several of the Uintah County residents have horses that could be affected by the West Nile virus.

Uintah County

GOAL 1: Reduce grasshopper infestations.
Problem Identification: Periodic Grasshopper infestations more sever in the rural areas of Uintah County.

High Priority

Objective 1.1:

- Reduce the severity of infestations

Action 1.1.1:

- Conduct aerial spraying to reduce infestations.

Time Frame: As infestations occur
Funding: By private individuals in most cases
Estimated Cost: Varies, depending on acreage treated
Staff: Contractor

Background: Many agricultural fields surround Uintah County. These fields have been subjected to insect infestation especially during the recent years of drought.

Landslide

Uintah County

GOAL 1: Protect residential areas from potential landslides.
Problem Identification: There is a potential risk to residential and commercial buildings due to rockslides, which are located in areas identified by the county as landslide risk areas.

High Priority

Objective 1.1

- Reduce potential landslides to residential and commercial areas.

Action 1.1.1:

- Assess the probability of landslides and identify specific structures at risk

Time Frame: Undetermined
Funding: Property owner
Estimated Cost: Unknown
Staff: Unknown

Background: Soil surveys and other engineering surveys are needed.

Action 1.1.2:

- The county's, city's and town's planning committee will review and update the zoning ordinances within the County to make sure that individuals are not constructing new homes near potential landslide areas.

Time Frame: Undetermined
Funding: Unknown
Estimated Cost: Unknown
Staff: Unknown

Background: Hold monthly planning and zoning meetings within the town and county.

Uintah County

GOAL 2: Protect vehicle traffic from future accidents due to landslides.
Problem Identification: In Uintah County there are several areas namely, Blue Mountain, Diamond Mountain, and Dry Fork Canyon that could have a potential risk to pedestrians and vehicle traffic due to landslides.

High Priority

Objective 1.1

- Reduce potential landslides to residential and commercial areas.

Action 1.1.1:

- Assess the probability of landslides and identify specific structures at risk

Time Frame: Undetermined
Funding: Property owner
Estimated Cost: Unknown
Staff: Unknown

Background: Soil surveys and other engineering surveys are needed.

Severe Weather

Uintah County

GOAL 1: Reduce Structural damage to both residential and commercial buildings due to Severe Weather.
Problem Identification: Uintah County experiences occasional, damaging high winds and snowstorms.

High Priority

Objective 1.1

- Reduce damage to structures through strict adherence to building codes

Action 1.1.1:

- Ensure that 80 MPH wind load requirement is met by builders

Time Frame: Ongoing
Funding: Fees from Building permits

Estimated Cost: Minimal
Staff: Building Inspector

Background: Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events

Uintah County

GOAL 2: Provide protection for citizens regarding power line failure.
Problem Identification: Power lines are at risk from seasonal high winds.

High Priority

Objective 1.1

- Reduce service disruptions and damage to power lines

Action 1.1.1:

- Provide adequate clearances for power lines and conduct ongoing line maintenance. Maintain outage plan.

Time Frame: Ongoing
Funding: Possible Grants
Estimated Cost: To be determined
Staff: County and town employees

Background: Extreme winds have occurred, utilities disruption has occurred in past years due to damage to power poles and transmission lines by high winds.

Wildfire

Uintah County

GOAL 1: Reduce the threat of wildfires within Uintah County.
Problem Identification: Continuing non-compliance with existing building codes and fire codes.

High Priority

Objective 1.1

- Increase compliance with existing building and fire codes.

Action:

- Develop and enforce current local, state and national codes

Time Frame: Ongoing
Funding: Local, state and federal grants
Estimated Cost: Unknown

Staff: Local, state and federal agencies
Background: Implement and enforce rules, regulations and codes

Uintah County

GOAL 1: Reduce wildfire danger within the County.
Problem Identification: Specific areas of the county are susceptible to wildland fire danger.

Objective 1.2

- Educate homeowners on how to reduce risk of wildfire damage

Action 1.1.2:

- The local LEPC will provide semi-annual training for the citizens of Uintah County.

Time Frame: Starting 2004
Funding: State and local
Estimated Cost: Minimal
Staff: County
Background: Educate the public on how to reduce the risk of wildfires.

Plan Maintenance Procedures

Monitoring, Evaluating and Updating the Plan

Periodic monitoring and reporting of the Plan is required to ensure that the goals and objectives for Uintah Basin are kept current and that local mitigation efforts are being carried out. The Plan has therefore been designed to be user-friendly in terms of monitoring implementation and preparing regular progress reports.

Annual Reporting Procedures

The Plan shall be reviewed annually, as required by the Executive Council, or as situations dictate such as following a disaster declaration. Each year the UBAOG Community Development Department Staff will review the plan and ensure the following:

1. The Executive Director and the Executive Council will receive an annual report and/or presentation on the implementation status of the Plan at the January Executive Council Meeting.

2. The report will include an evaluation of the effectiveness and appropriateness of the mitigation actions proposed in the Plan.

3. The report will recommend, as appropriate, any required changes or amendments to the Plan.

If the UBAOG Executive Council determines that a modification of the Plan is warranted, the Council may initiate a Plan amendment.

Revisions and Updates

Periodic revisions and updates of the Plan are required to ensure that the goals and objectives for the Uintah Basin are kept current. More importantly, revisions may be necessary to ensure the Plan is in full compliance with Federal regulations and State statutes. This portion of the Plan outlines the procedures for completing such revisions and updates. Plan maintenance and significant revision is contingent upon availability of funding.

Five (5) Year Plan Review

The entire plan including any background studies and analysis should be reviewed every five (5) years to determine if there have been any significant changes in the Uintah Basin, which would affect the Plan. Increased development, increased exposure to certain hazards, the development of new mitigation capabilities or techniques and changes to Federal or State legislation are examples of changes that may affect the condition of the Plan.

The Pre-Disaster Hazard Mitigation Plan Ad-Hoc Committee, with a potential membership representing every jurisdiction in the UBAOG, will be reconstituted for the five (5) year review/update process. Typically, the same process that was used to create the original plan will be used to prepare the update.

Further, following a disaster declaration, the Plan will need to be revised to reflect on lessons learned or to address specific circumstances arising out of the disaster.

The results of this five (5) year review should become summarized in the annual report prepared for this Plan under the direction of the Community Development Director. The annual report will include an evaluation of the effectiveness and appropriateness of the Plan, and will recommend, as appropriate, any required changes or amendments to the Plan.

If the Executive Council determines that the recommendations warrant modification to the Plan, the Council may either initiate a Plan amendment as described below, or, if conditions justify, may direct the UBAOG Community Development Department to undertake a complete update of the Plan.

Plan Amendments

An amendment to the Plan should be initiated only by the Executive Council, either at its own initiative or upon the recommendation of the Executive Director, Community Development Director or Mayor of an affected community.

Upon initiation of an amendment to the Plan, UBAOG will forward information on the proposed amendment to all interested parties including, but not limited to, all affected city or county departments, residents and businesses. Depending on the magnitude of the amendment, the full Ad-Hoc committee may be reconstituted. At a minimum, the information will be made available through public notice in a newspaper of general circulation and on the Uintah Basin or DES Website. Information will also be forwarded to the Utah Department of Public Safety, Division of Emergency Services and Homeland Security. This information will be sent out in order to seek input on the proposed Plan amendment for not less than a forty-five (45) day review and comment period.

At the end of the comment period, the proposed amendment and all review comments will be forwarded to the Executive Director (or his/her designee) for consideration. If no comments are received from the reviewing parties within the specified review period, such will be noted accordingly. The Executive Director (or his/her designee) will review the proposed amendment along with comments received from other parties and submit a recommendation to the Executive Council within sixty (60) days.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered:

1. There are errors or omissions made in the identification of issues or needs during the preparation of the Plan; and/or
2. New issues or needs have been identified which were not adequately addressed in the Plan; and/or
3. There has been a change in information, data or assumptions from those on which the Plan was based.
4. The nature or magnitude of risks has changed.
5. There are implementation problems, such as technical, political, legal or coordination issues with other agencies.

Upon receiving the recommendation of the Executive Director or his/her designee, the Executive Council will hold a public hearing. The Executive Council will review the recommendation (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the Executive Council will take one of the following actions:

1. Adopt the proposed amendment as presented.
2. Adopt the proposed amendment with modifications.
3. Refer the amendment request back to the Executive Director for further consideration.
4. Defer the amendment request for further consideration and/or hearing.
5. Reject the amendment request.

Implementation through Existing Programs

Process

Each jurisdiction included in the Uintah Basin Association of Governments Pre-Disaster Hazard Mitigation Plan has a current Capital Improvements Plan (CIP). The Capital Improvement Planning that occurs in the future will contribute and be a reflection of the goals in the Hazard Mitigation Plan. It will be the responsibility of Mayor/Council/Commissioner(s) of each jurisdiction, as he/she/they see fit, to include within the Capital Improvements Plan action items that have been outlined within the Mitigation Plan and ensure these actions are carried out no later than the target dates unless reasonable circumstances prevent their implementation (i.e. lack of funding availability).

Funding Sources

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. Uintah Basin jurisdictions will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. This portion of the Plan identifies the primary Federal and State grant programs for Uintah Basin jurisdictions to consider, and also briefly discusses local and non-governmental funding sources.

Federal

The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency

Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration. The Pre-Disaster Mitigation (PDM) program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75% Federal share and 25% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for “small and impoverished communities”, who will be eligible for 90% Federal share/10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities:

- State and local hazard mitigation planning
- Technical assistance (e.g. risk assessments, project development)
- Mitigation Projects
- Acquisition or relocation of vulnerable properties
- Hazard retrofits
- Minor structural hazard control or protection projects
- Community outreach and education (up to 10% of State allocation)

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75% Federal share/25% non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applications submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.

Title: Hazard Mitigation Grant Program
Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistant Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75% of the eligible costs of each project. The state or local cost-share match does not need to be cash; in-kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on 15% of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local governments overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency

FEMA’s Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility’s operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- Roads, bridges & culverts
- Draining & irrigation channels
- Schools, city halls & other buildings
- Water, power & sanitary systems
- Airports & parks

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- Universities and other schools
- Hospitals & clinics
- Volunteer fire & ambulance
- Power cooperatives & other utilities
- Custodial care & retirement facilities
- Museums & community centers

Title: SBA Disaster Assistance Program
Agency: US Small Business Administration

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grants
Agency: US Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low- and moderate-income people. The CDBG program also provides grants fro post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.
STATE PROGRAMS

LOCAL

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds are used to match Federal or State grant programs when required for large-scale projects.

NON-GOVERNMENTAL

Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

Paramount to having a plan deemed to be valid is its implementation. There is currently no new fiscal note attached to the implementation of this Plan.

Continued Public Involvement

Throughout the planning process, public involvement has been and will be critical to the development of the Plan and its updates. On a yearly basis the plan will be profiled at Uintah Basin’s Annual Open House, which is held in the fall of every year. There are typically 250-300 local citizens who attend the Open House. The plan will also be available on the UBAOG website to provide additional opportunities for public participation and comment.

Uintah Basin Association of Governments staff has been designated by its Executive Council as the lead agency in preparing and submitting the Uintah Basin Pre-Disaster Hazard Mitigation Plan, which includes coverage for all incorporated cities and counties within the three county region, of Daggett, Duchesne, and Uintah. The strategy of the Association of Governments in preparing the plan is to use available resources and manpower in the most efficient and cost effective manner to allow our cities and counties continued access to data, technical planning assistance and FEMA eligibility. In addition, the AOG will reach out to non-profits, public agencies, special needs organizations, groups and individuals in allowing them input and access to the plan. With limited resources, however, it becomes difficult to both identify and to individually contact the broad range of potential clients that may stand to benefit from the plan. This being the case, we have established the following course of action:

STEP 1. The AOG will publicly advertise all hearings, requests for input and meetings directly related to the Pre-Disaster Hazard Mitigation Plan process. Executive Council meetings where plan items are discussed and where actions are taken will not receive special notifications as they are already advertised according to set standards. All interested parties are welcome and invited to attend such meetings and hearings, as they are public and open to all. Advertisement will be done according to the pattern set in previous years, i.e. the AOG will advertise each hearing and request for input at least seven days (7) in advance of the activity and will publish notices of the event in the Uintah Basin Standard. The notices will advertise both the hearing and the means of providing input outside the hearing if an interested person is unable to attend.

STEP 2. The AOG has established a mailing list of many local agencies and individuals that may have an interest in the Pre-Disaster Hazard Mitigation Plan. Each identified agency or person will be mailed a notice of the hearings and open houses.

STEP 3. Comments, both oral and written, will be solicited and accepted from any interested party. Comments, as far as possible, will be included in the final draft of the Hazard Mitigation Plan; however, the AOG reserves the right to limit comments that are excessively long due to the size of the Plan.

STEP 4. Specific to risk assessment and hazard mitigation, needs analysis, and capital investment strategies, the AOG will make initial contact and solicitation for input from each incorporated jurisdiction within the region. All input is voluntary. Staff time and resources do not allow personal contact with other agencies or groups, however, comments and strategies are welcomed as input to the planning process from any party via regular mail, FAX, e-mail, phone call, etc. In addition, every public jurisdiction advertises and conducts public hearings on their planning, budget, etc. where most of these mitigation projects are initiated. Input can be received from these prime sources by the region as well.

STEP 5. The final draft of the Hazard Mitigation Plan will be presented to the Uintah Basin Executive Council at its regularly scheduled monthly meeting for adoption and approval to submit the document to State authorities. Executive Council policies on adoption or approval of items will be in force and adhered to. This document is intended to be flexible and in constant change so comments can be taken at any time of the year for consideration and inclusion in the next update. Additionally, after FEMA approval of the Plan, the Plan will be promulgated for each local jurisdiction for adoption by resolution.

STEP 6. The following policies will guide AOG staff in making access and input to the Hazard Mitigation Plan as open and convenient as possible:

A. Participation: All citizens of the region are encouraged to participate in the planning process, especially those who may reside within identified hazard areas. The AOG will take whatever actions possible to accommodate special needs of individuals including the impaired, non-English speaking, persons of limited mobility, etc.

B. Access to Meetings: Adequate and timely notification to all area residents will be given as outlined above to all hearings, forums, and meetings.

C. Access to Information: Citizens, public jurisdictions, agencies and other interested parties will have the opportunity to receive information and submit comments on any aspect of the Hazard Mitigation Plan, and/or any other documents prepared for distribution by the Association of Governments that may be adopted as part of the plan by reference. The AOG may charge a nominal fee for printing of documents that are longer than three pages.

D. Technical Assistance: Residents as well as local jurisdictions may request assistance in accessing the program and interpretation of mitigation projects. AOG staff will assist to the extent practical, however, limited staff time and resources may prohibit staff from giving all the assistance requested. The AOG will be the sole determiner of the amount of assistance given all requests.

E. Public Hearings: The AOG will plan and hold public hearings according to the following priorities: 1- Hearings will be conveniently timed for people who might benefit most from Mitigation programs, 2- Hearings will be accessible to people with disabilities (accommodations must be requested in advance according to previously established policy), and 3- Hearings will be adequately publicized. Hearings may be held for a number of purposes or functions including to: a-identify and profile hazards, b-develop mitigation strategies, and c-review plan goals, performance, and future plans.

F. Comment Period: The AOG will sponsor a 30-day public comment period prior to final plan submission. The comment period will begin with a public hearing to open the 30-day solicitation of input. Comments may be made orally, or in writing, and as far as possible, will be included in the final Pre-Disaster Hazard Mitigation Plan according to the outlined participation rules.

References:

Utah State Water Plan Uintah Basin._ Utah Division of Water Resources, December 1999.

Hazard Definitions

Flooding

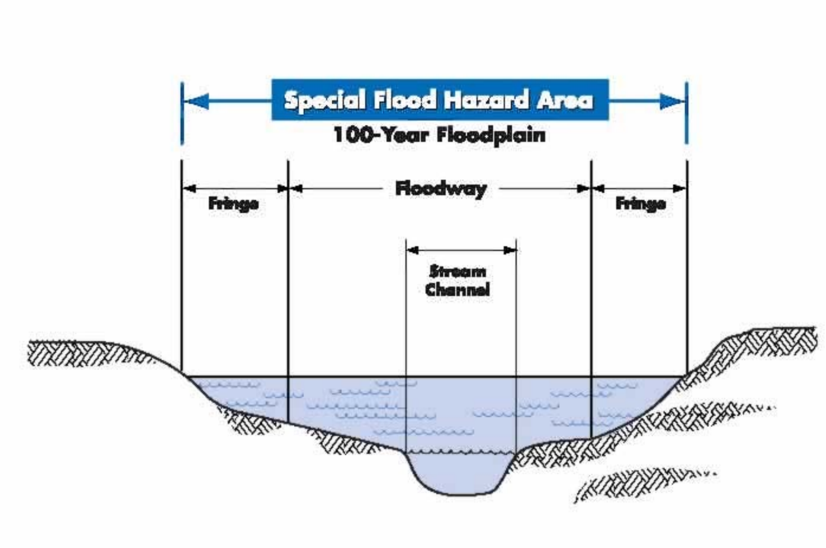
Flooding is a temporary overflow of water onto lands not normally inundated by water producing measurable property damage or forcing evacuation of people and vital resources. Floods frequently cause loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and loss, and interruption of business. Floods also increase the likelihood of hazard such as transportation accidents, contamination of water supplies, and health risk increase after a flooding event.

Several factors determine the severity of floods including rainfall intensity, duration and rapid snowmelt. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can also result in flooding at locations where the soil has been previously saturated or if rain concentrates in an area having, impermeable surfaces such as large parking lots, paved roadways, or post burned areas with hydrophobic soils. Topography and ground cover are also contributing factors for floods. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover.

Frequency of inundation depends on the climate, soil, and channel slope. In regions where substantial precipitation occurs during a particular season or in regions where annual flooding is due to spring melting of winter snow pack, areas at risk may be inundated nearly every year.

Conditions which my exacerbate floods:
Impermeable surfaces
Steeply sloped watersheds
Constrictions
Obstructions
Debris
Contamination
Soil saturation
Velocity

Explanation of Common Flood Terms



FIRM: Flood Insurance Rate Map

100-year flood: Applies to an area that has a 1 percent chance, on average, of flooding in any given year. However, a 100-year flood could occur two years in a row, or once every 10 years. The 100 year-flood is also referred to as the base flood.

Base Flood: Is the standard that has been adopted for the NFIP. It is a national standard that represents a compromise between minor floods and the greatest flood likely to occur in a given area and provides a useful benchmark.

Base Flood Elevation (BFE): As shown on the FIRM, is the elevation of the water surface resulting from a flood that has a 1% chance of occurring in any given year. The BFE is the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum (NGVD) or 1929, the North American Vertical Datum (NAVD) of 1988, or other datum referenced in the FIS report.

Special Flood Hazard Area (SFHA): Is the shaded area on a FIRM that identifies an area that has a 1% chance of being flooded in any given year (100-year floodplain).

Floodway: Is the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood without raising that water surface elevation by more than one foot.

Earthquakes

An earthquake is the abrupt shaking of the earth caused by the sudden breaking of rocks when they can no longer withstand the stresses, which build up deep beneath the earth's surface. The rocks tend to rupture along weak zones referred to as faults. When rocks break they produce seismic waves that are transmitted through the rock outward producing ground shaking. Earthquakes are unique multi-hazard events, with the potential to cause huge amounts of damage and loss. Secondary effects of a sudden release of seismic energy (earthquake) include: ground shaking, surface fault rupture, liquefaction, tectonic subsidence, slope failure, and various types of flooding.

The Intermountain Seismic Belt

The Intermountain Seismic Belt (ISB), is a zone of pronounced earthquake activity up to 120 miles wide extending in a north south direction 800 miles from Montana to northern Arizona. The Utah portion of the ISB trends from the Tremonton Cache Valley area south through the center of the state, along the Wasatch Front, and the southwest through Richfield and Cedar City concluding in St. George. "The zone generally coincides with the boundary between the Basin and Range physiographic province to the west and the Middle Rocky Mountains and Colorado Plateau physiographic provinces to the east" (Eldredge 6).

Secondary Earthquake Threats

The major secondary effects of earthquakes include: ground shaking, surface fault rupture, liquefaction, tectonic subsidence, avalanches, rock fall, slope failure, and various types of flooding. Other sections discuss landslides, and flooding therefore they will not be discussed under secondary effects of earthquakes yet importance needs to be given to the fact that earthquakes can increase the likelihood of flooding and landslides.

Ground Shaking

Ground shaking causes the most impact during an earthquake because it affects large areas and is the origin of many secondary effects associated with earthquakes. Ground shaking, which generally lasts 10 to 30 seconds in large earthquakes, is caused by the passage of seismic waves generated by earthquakes. Earthquake waves vary in both frequency and amplitude. High frequency low amplitude waves cause more damage to short stiff structures, where as low frequency high amplitude waves have a greater effect on tall (high-rise) structures. Ground shaking is measured using Peak Ground Acceleration (PGA). The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity.

Local geologic conditions such as depth of sediment and sediment make up, affect earthquake waves. Deep valley sediments increase the frequency of seismic waves relative to bedrock. In general, ground shaking increases with increased thickness of sediments" (Eldredge 8). Findings in recent geologic research done by Ivan Wong indicate that earthquakes in Salt Lake County would produce higher PGA values than previously expected near faults and areas of near surface bedrock.

Surface Fault Rupture

During a large earthquake fault movement may propagate along a fault plain to the surface, resulting in surface rupture along the fault plain. The Wasatch fault is a normal (mountain building) fault with regards to movement, meaning the footwall of the fault moves upward and the hanging wall moves in a down direction. Thus faulting is on a vertical plain, which results in the formation of large fault scarps. Surface fault rupture along the Wasatch fault is expected for earthquakes with magnitudes of 6.5 or larger. The largest probable earthquake that could strike the Uintah Basin region is an earthquake with an estimated magnitude between 7.0 and 7.5; an earthquake of this magnitude, based on current research, would create "surface fault rupture with a displacement of between 16 to 20 feet in height with break segments 12 to 44 miles long" (Eldredge 10). In historic time surface fault rupture has only occurred once in Utah; the 1934 Hansel Valley earthquake with a magnitude 6.6 produced 1.6 feet of vertical offset.

Surface fault rupture presents several hazards, anything built on top of the fault or crossing the fault has a high potential of destroyed in the event of displacement. Foundations will be cracked, building torn apart, damage to roads, utility lines, pipelines, or any other utility line crossing the fault. It is almost impossible to design anything within reasonable cost parameters to withstand an estimated displacement of 16 to 20 feet.

Picture 1.1 Displacement in excavation near Rose Wagner Performing Arts Center.

Surface fault rupture doesn't occur on a single distinct plain; instead it occurs over a zone often several hundred feet wide known as the zone of deformation. This zone of deformation occurs mainly on the down thrown side of the main fault trace. Tectonic subsidence, caused by antithetic faults moving in the opposite direction of the main fault, slide down hill on the main fault scarp creating grabens (down dropped blocks) within the zone of deformation.

Liquefaction

Soil liquefaction occurs when water-saturated cohesion less sandy soils is subject to ground shaking. When liquefaction occurs soils behave more like a viscous liquid (quicksand) and lose they're bearing capacity and shear strength. Two conditions must be met in order for soils to liquefy: (1) the soils must be susceptible to liquefaction (sandy, loose, water-saturated, soils typically between 0 and 30 feet below the ground surface) (2) ground shaking must be strong enough to cause susceptible soils to liquefy (lips). The loss of shear strength and bearing capacity due to liquefaction causes buildings to settle or tip and light buoyant structures such as buried storage tanks and empty swimming pools to float upward. Liquefaction can occur during earthquakes of magnitude 5.0 or greater.

Lateral Spread

Soils, once liquefied, can flow on slopes with angles of .5 to 5 percent this movement of liquefied soils is known as lateral spread. "The surficial soil layers break up and sections move independently, and are displaced laterally over a liquefied layer" (Eldredge 10). Liquefaction can cause damage in several ways, with lateral spreading being one of the most common. Displacement of three (3) or more feet may occur and be accompanied by ground cracking and vertical displacement. Lateral spreading causes roads, buildings, buried utilities, and any other buried or surface structure to be pulled apart.

Various Flooding Issues Related to Earthquakes

Earthquakes could cause flooding due to the tilting of the valley floor, dam failure and seiches in lakes and reservoirs. Flooding can also result from the disruption of rivers and streams. Water tanks, pipelines, and aqueducts may be ruptured, or canals and streams altered by ground shaking, surface faulting, ground tilting, and land sliding.

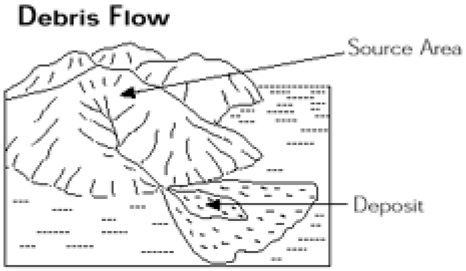
Seiches

Standing bodies of water are susceptible to earthquake ground motion. Water in lakes and reservoirs may be set in motion and slosh from one end to the other, much like in a bathtub. This motion is called a seiche (pronounced “saysh”). A seiche may lead to dam failure or damage along shorelines.

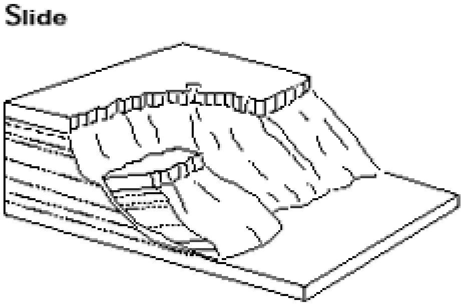
Landslides

Landslides are a “down slope movement of a mass of rock, earth, or debris”. Landslides, often referred to as mass wasting or slope failures, are one of the most common natural disasters. (Cruden 36). Slope failures can vary considerably in shape, rate of movement, extent, and effect on surrounding areas. Slope failures are classified by there types of movement, and types of material. The types of movement are classified as falls, slides, topples, and flows. “The types of material include rock, debris (coarse grained soil) and earth (fine grained soil)” (Eldredge 17). “Types of slope failures then are identified as rock falls, rock slides, debris flows, debris slides, and so on” (Eldredge 17). Slope failures occur because of either an increase in the driving forces (weight of slope and slope gradient) or a decrease in the resisting forces (friction, or the strength of the material making up a slope). “Geology (rock type and structure), topography (slope gradient), water content, vegetative cover, and slope aspect are important factors of slope stability” (Eldredge 18).

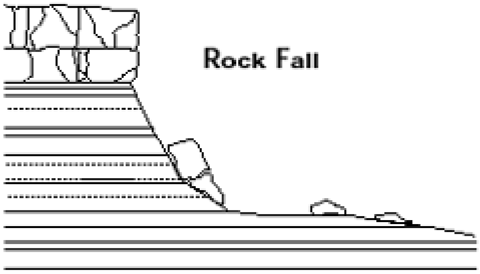
Three Common Types of Landslides in Utah



Debris flows consist of sediment-water mixtures that flow down a streambed or hillside, commonly depositing sediment at canyon mouths in fan like deposits know as alluvial fans.



Slides are down slope movements of soil or rock on slopes.



Rock falls consist of rock(s) falling from a cliff or cut slope and are very common in the canyon country of southern Utah.

Conditions That Make Slopes More Susceptible to Landslides

- Discontinuities: faults, joints, bedding surfaces.
- Massive Materials over soft materials.
- Orientations of dip slope: bedding plans that dip out of slope.
- Loose structure and roundness.
- Adding weight to the head of a slide area: rain, snow, landslides, mine waste piles, buildings, leaks from pipes, sewers, and canals, construction materials fill materials.
- Ground shaking: earthquakes or vibrations.
- Increase in lateral spread caused by mechanical weathering.
- Removal of lateral support.
- Human activities: cut and fill practices, quarries, mine pits, road cuts, lowering of reservoirs.
- Removing underlying support: under cutting of banks in a river.

- Increase in pore water pressure: snow melt, rain, and irrigation.
- Loss of cohesion.

Wildfire

Identifying Hazards

A wildfire is an uncontrolled fire spreading through vegetative fuel often exposing or consuming structures. Wildfires often begin unnoticed and spread quickly and are usually sighted by dense smoke. Wildfires are placed into two classifications Wildland and Urban-Wildland Interface. Wildland fires are those occurring in an area where development is essentially nonexistent, except for roads, railroads, or power lines. Urban-Wildland Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. URWIN areas are divided into three subclasses.

- **Occluded**
  Occluded interface, are areas of wildlands within an urban area for example a park bordered by urban development such as homes.

- **Intermixed**
  Mixed or intermixed interface areas contain structures scattered throughout rural areas covered predominately by native flammable vegetation.

- **Classic**
  Classic interface areas are those areas where homes press against wildland vegetation along a broad front.

When discussing wildfires it is important to remember that fires are part of a natural process and are needed to maintain a healthy ecosystem. Three basic elements are needed for a fire to occur (1) a heat source (2) oxygen and (3) fuel. Major ignition sources for wildfire are lightning and human causes such as arson, recreational activities, burning debris, and carelessness with fireworks. On average, 65 percent of all wild fires started in Utah can be attributed to human activities. Once a wildfire has started, vegetation, topography and weather are all conditions having an affect wildfire behavior.

Severe Weather

For the purpose of this mitigation plan the term severe weather is used to represent downbursts, lightening, heavy snowstorms, blizzards, avalanches, hail, and tornados.

Downbursts

A downburst is a severe localized wind, blasting from a thunderstorm. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts fall into two categories by size. Microbursts, which cover and area less than 2.5 miles in diameter, and macrobursts, which cover an area with a diameter larger 2.5 miles.

Lightening

During the development of a thunderstorm, the rapidly rising air within the cloud, combined with the movement of the precipitation within the cloud, causes electrical charges to build. Generally, positive charges build up near the top of the cloud, while negative charges build up near the bottom. Normally, the earth's surface has a slight negative charge. However, as the negative charges build up near the base of the cloud, the ground beneath the cloud and the area surrounding the cloud becomes positively charged. As the cloud moves, these induced positive charges on the ground follow the cloud like a shadow. Lightening is a giant spark of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. In the initial stages of development, air acts as an insulator between the positive and negative charges. When the potential between the positive and negative charges becomes to great, there is a discharge of electricity that we know as lightning.

Heavy Snowstorms

A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period. According to the official definition given by the U.S. Weather Service, the winds must exceed 35 miles per hour and the temperature must drop to 20° F or lower. All winter storms make driving extremely dangerous.

Blizzards

A blizzard is a snowstorm with sustained winds of 40 miles per hour (mph) or more or gusting winds up to at least 50 mph with heavy falling or blowing snow, persisting for one hour or more, temperatures of ten degrees Fahrenheit or colder and potentially life-threatening travel conditions. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and creates a diminution of visual range.

Avalanches

Avalanches are a rapid down-slope movement of snow, ice, and debris. Snow avalanches are a significant mountain hazard in Utah, and nationally account for more deaths each year than earthquakes. Avalanches are the result of snow accumulation on a step slope and can be triggered by ground shaking, sound, or a person. Avalanches consist of a starting zone, a track, and a run-out zone. The starting zone is where the ice or snow breaks loose and starts to slide. The Track is the grade or channel down which an avalanche travels. The run-out zone is where an avalanche stops and deposits the snow.

The two main factors affecting avalanche activity include weather and terrain, large frequent storms combined with steep slopes result in avalanche danger. Additional factors that contributing to slope stability are amount of snow, rate of accumulation, moisture content, snow crystal types and the wind speed and direction. In Utah, the months of January through April have the highest avalanche risk.

Topography plays a vital role avalanche dynamics. Slope angles between 30 to 45 degrees are optimum for avalanches with 38 degrees being the bulls-eye. Slopes with and angle above 45 degrees continually sluff eliminating large accumulation. The risk of avalanches decreases on slope angles below 30 degrees.

Types of Avalanches Common in Utah:

Dry or slab avalanches: occur when a cohesive slab of snow fractures as a unit and slides on top of weaker snow, breaking apart as it slides. Slab avalanches occur when additional weight is added quickly to the snow pack, overloading a buried weaker layer. Dry snow avalanches usually travel between 60-80 miles per hour, reaching this speed within 5 seconds of the fracture, resulting in the deadliest form of snow avalanche.

Wet avalanches: occur when percolating water dissolves the bonds between the snow grains in a pre-existing snow pack, this decrease the strength of the buried weak layer. Strong sun or warm temperatures can melt the snow and create wet avalanches. Wet avalanches usually travel about 20 miles per hour.

Hail Storms

Hailstones are large pieces of ice that fall from powerful thunderstorms. Hail forms when strong updrafts within the convection cell of a cumulonimbus cloud carries water droplets upward causing them to freeze. Once the droplet freezes, it collides with other liquid droplets that freeze on contact. These rise and fall cycles continue until the hailstone becomes too heavy and falls from the cloud.

Tornados

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Tornados often occur at the edge of an updraft or within the air coming down from a thunderstorm. Tornadoes can have wind speeds of 250 miles per hour or more, causing a damage zone of 50 miles in length and 1 mile wide. Most tornados have winds less than 112 miles per hour and zones of damage less than 100 feet wide

Waterspout

Waterspouts are simply tornadoes that form over warm water. This typically occurs in Utah during a cold fall or late winter storms.

Scale

Tornadoes are classified by wind damage using the Fujita Scale. The National Weather Service has used the Fujita Scale since 1973. This scale uses numbers from 0 through 5 with higher numbers assigned based on the amount and type of wind damage.

Fujita Scale

Category F0	Gale tornado (40-72 mph)	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
Category F1	Moderate tornado (73-112 mph)	Moderate damage. The lowers limit is the beginning of hurricane wind speed; peel surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
Category F2	Significant tornado (113-157 mph)	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
Category F3	Severe tornado (158-206 mph)	Severe damage. Roofs and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
Category F4	Devastating tornado (207-260 mph)	Devastating damage. Well-constructed houses leveled; structure with weak foundation blown off some distance; cars thrown and large missiles generated.
Category F5	Incredible tornado (261-318 mph)	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobiles-size missiles fly through the air in excess of 100 yards; trees debarked; incredible phenomena will occur.

Drought

Drought is a normal recurrent feature of climate, although many, in Utah, erroneously consider it a rare and random event. It occurs in virtually all-climatic zones, while its characteristics vary significantly from one region to another. Droughts, simple put, are cumulative hazards, which result from long periods of below normal precipitation. Drought is a temporary aberration and differs from aridity since the latter is restricted to low rainfall regions and is a permanent feature of climate.

The State or Utah, uses the Palmer Drought Severity Index or (PDSI) to quantify the existence of a drought. Using the PDSI, drought is expressed as a negative number. Much of the basis, used by the State, to determine drought years, or drought periods, comes from the PDSI. In addition, the PDSI is used by the State Climatologist, the National Geophysical Data Center of NOAA, and the National Drought Mitigation Center.

For the most part droughts no longer affect the availability of drinking water, thus it no longer places peoples lives at risk, and the same cannot be said for a individual’s livelihood. Numerous water projects throughout the state have placed enough water in storage to insure drinking water. Prolonged droughts have a significant affect on agricultural and agribusinesses, within the state dependent on irrigation water. Droughts also stress wildlife, and heighten the risk of wildfire.

Dam Failure

Dam failures result from the failure of a man made water impoundment structure, which often results in catastrophic down grade flooding. Dam failures are caused by one or a combination of the following: “breach from flooding or overtopping, ground shaking from earthquakes, settlement from liquefaction, slope failure, internal erosion from piping, failure of foundations and abutments, outlet leaks or failures, vegetation and rodents, poor construction, lack of maintenance and repair, misuse, improper operation, terrorism, or a combination of any of these” (Eldredge 46). The Utah State Engineer has been charged with regulating non-federal dams in the State dams since 1919. “In the late 1970's Utah started its own Dam Safety Section within the State of Utah Engineers Office to administer all non-federal dams in response to the Federal Dam Safety Act (PL-92-367)” (Eldredge 46).

The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, the size, height, volume, and incremental risk/damage assessments or dams are all variables used to assign dam hazard ratings in Dam Safety’s classification system. Using the hazard ratings systems developed by the Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years.

Problem Soils

Problem soils and rock constitute a widespread geologic hazard in Utah, covering approximately 18 to 20 percent of the state, and underlie many urbanized areas. The nine types of problem soil and rock in Utah are:

- Expansive Soil
- Collapsible Soil
- Limestone and Karst Terrain
- Gypsiferous Soil
- Soil Subject to Piping
- Dunes
- Peat
- Mine Subsidence
- Sodium Sulfate

Expansive Soil and Rock

Clay minerals found in soils and rock expand and contract due to changes in moisture content. The most common clay mineral associated with expansive soils in Utah is montmorillonite, “which expands up to 2,000 times its original size, and can exert pressures up to 11,000 pounds per square foot” (Eldredge 30). The cracks created by the expansion and contraction process create a positive feed back mechanism that allows more water to enter during the next storm cycle. Problems associated with expansive materials are cracked foundations, heaving and cracking of road surfaces, failure of wastewater disposal systems, and broken water lines.

Collapsible Soil

Collapsible soil causes ground-surface subsidence when loose, dry, low density deposits decrease in volume when saturated for the first time since deposition. Frequently the water introduced into these soils is from human sources such as irrigation, water impoundment, lawn watering, and alterations to natural drainages, and/or wastewater disposal.

Limestone and Karst Terrain

Closed depressions, caverns, and streams that abruptly disappear underground are characteristics of karst terrain. Limestone, dolomite, and gypsum are all common in the Six County region and susceptible to dissolution by ground water and surface water thus forming karst terrain. Karst features affect surface and subsurface drainage causing a collapse of the ground surface and often the contamination of ground water. The cavernous nature of the terrain allows surface or subsurface sources of pollution from landfills, waste water disposal systems, and buried gasoline tanks to enter the groundwater system.

Gypsiferous Soil

Gypsum is a primary component in some rocks, and the soils derived from them. Gypsiferous deposits, when wetted, are subject to settlement, causing sinkholes similar to those found in karst terrains. Weathered gypsum forms sulfuric acid and sulphate, which reacts with certain types of cement often weakening foundations. Gypsum is also a week material with a low bonding strength.

Piping

Piping is a type of subsurface erosion caused by ground water moving along a permeable layer in unconsolidated materials and exiting at a free face, which intersects the unconsolidated layer. The movement of underground water removes fine-grained particles (silts and clay) creating subsurface voids, which act like channels directing the movement of water. These channels increase in size, as more and more water is collected, until the walls and roof can no longer support the weight and collapse. Over time this process forms a gully, which further concentrates erosion.

Dunes

Dunes form when sand derived from weathered rock or an unconsolidated deposit is blown by the wind into mounds or ridges. Migrating dunes can bury roads, and structures, clog waste and storm water systems, and cause contamination of local ground water.

In Utah, three types of material commonly form dunes: silica, gypsum, and oolites.

Silica Dunes comprised mainly of silica, are typically found along the western side mountain ranges in western Utah.

Gypsum Dunes are principally derived from the evaporation of playas and are found in Great Salt Lake Desert and along the lee side of many playas in the basins west of Delta.

Oolitic Dunes are composed of calcium carbonate, which is generally precipitated around brine shrimp fecal pellets. Oolitic dunes form in shallow water areas of the Great Salt Lake and are reworked by wind during low water lake cycles.

Many inactive or vegetated dunes in Utah are being reactivated by development and motorized recreation. Once dunes are denuded of there vegetation they begin to migrate once again.

Mine Subsidence

Utah has a long history of mining and there are numerous mines within Utah. Mining removes rock and leaves voids that, if not supported, can collapse and cause subsidence of the ground surface and sinkholes. Subsidence can occur in both active and abandoned mines.

Peat

Peat consists of partially decomposed plant remains. Peat usually accumulated in areas of shallow ground water and near standing water where oxygen depletion limits organic decay. Hazards associated with peat can include subsidence when water is removed, oxidations, and compression and settlement under. Peat deposits are considered a localized hazard occurring primarily along the shores of the Great Salt Lake, Utah Lake, and low lying areas formerly occupied by Lake Bonneville. Mountainous areas commonly have localized small areas of peat, forming in head scarps created by landslides and behind glacial moraines. (Eldredge 33)

Sodium Sulfate

Sodium Sulfate is derived from the evaporation of playas and for the weathering of bedrock. “Soils with high concentrations of water-soluble sulfates exhibit an expansive phenomenon resembling that of expansive clays and frost heave.” (Eldredge 33)

Critical Facilities
Duchesne County

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft.	Replacement Value (Estimated)	Contents Value *
Critical Facilities											
Altamont Fire Dept	AGRC	X									
Duchesne Fire Dept	AGRC	X									
Ft. Duchesne Fire Dept	AGRC	X									
Fruitland Fire Dept	AGRC	X									
South Myton Fire Dept	AGRC	X									
Tabiona Fire Dept	AGRC	X									
Duchesne County Sheriff	AGRC	X									
Roosevelt Police Dept	AGRC	X									
Uintah Basin Medical Center	AGRC	X	X			X	X				
Roosevelt Fire Dept.	AGRC	X									
Neola Fire Dept.	AGRC	X									
Care Facilities											
Stewarts Care Center	AGRC	X	X				X				
Schools											
East School Duchesne	AGRC		X				X				
Duchesne District Office	AGRC		X				X				
Altamont School	AGRC		X				X				
Altamont High School	AGRC		X				X				
Duchesne High School	AGRC		X				X				
Duchesne School	AGRC		X				X				
Ioka School	AGRC		X				X				
Myton School	AGRC		X				X				
Neola School	AGRC		X				X				
Union High School	AGRC		X				X				
Roosevelt Middle School	AGRC		X				X				
Tabiona School	AGRC		X				X				
Con Amore Train Ctr	AGRC		X				X				
Hazardous Material Storage Sites											
Chevron Pipe Line Myton Station	RCRA						X				
Duchesne City Corp	RCRA						X				
Chevron Pipe Line Altamont Station	RCRA						X				

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft.	Replacement Value (Estimated)	Contents Value *
Chevron Pipe Line Hanna Station	RCRA						X				
Chevron Pipe Line Bluebell Station	RCRA						X				
Pennzoil Company (Seagull)	RCRA						X				
Moon Lake Electric	RCRA						X				
NL Baroid Roosevelt Service Center	RCRA						X				
Altamont Gas Plant	RCRA						X				
Petro-Way INC #1	RCRA						X				
Desert Drain Oil	RCRA						X				
National Oilwell	RCRA						X				
Atkinson Storage Altamont	RCRA						X				
Rocket Sanitation	RCRA						X				
Koch Hydrocarbon Cedar Rim	RCRA						X				
Koch Services	RCRA						X				
Chevron USA Inc Duchesne Terminal	RCRA						X				
MI Drilling Fluids	RCRA						X				
GWEC Altonah Gas Plant	RCRA						X				
Darryl B Taylor Transportation	RCRA						X				
US Forest Service Stockmore Ranger station	RCRA						X				
Bluebell Recovery	RCRA						X				
Power Substations											
Moon Lake Plant	AGRC	X			X		X				
Pole Creek Plant	AGRC	X			X		X				
Roosevelt	AGRC	X			X		X				
Duchesene	AGRC	X			X		X				
Pleasant Valley Moon Lake REA	AGRC	X			X		X				
Upalco	AGRC	X			X		X				
Tabiona Chevron Pipeline Sub	AGRC	X			X		X				
Myton	AGRC	X			X		X				
Pariette	AGRC	X			X		X				
Companies Employing Greater than 50 People											
Flying J Outfitters	AGRC					X	X				
Uintah Basin Medical Ctr	AGRC					X	X				
Utah State University	AGRC					X	X				

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft	Replacement Value (Estimated)	Contents Value *
UBET Wireless	AGRC					X	X				
IGA Foodliner	AGRC					X	X				
Darryl Taylor Transportation	AGRC					X	X				
Sand Star Family Entertainment	AGRC					X	X				
Uintah Basin Medical Clinic	AGRC					X	X				
Stewart’s Care & Rehab	AGRC					X	X				
Inland Production Co	AGRC					X	X				
UBTA Network & Internet SVC	AGRC					X	X				
Duchesne School District	AGRC					X	X				
Uintah Basin Applied Tech Ctr	AGRC					X	X				
Inland Production	AGRC					X	X				
Frontier Motel	AGRC					X	X				
Duchesne County Sheriff	AGRC					X	X				
Uinatah Basin Telephone	AGRC					X	X				
Stewart’s Thriftway	AGRC					X	X				
Moon Lake Electric Assn Inc	AGRC					X	X				
Davis Jubilee IGA	AGRC					X	X				
Burdick Paving Corp	AGRC					X	X				
Basin Western Inc	AGRC					X	X				

Daggett County

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft.	Replacement Value (Estimated)	Contents Value *
Critical Facilities											
Daggett County Medical Center	AGRC	X	X			X	X				
Daggett County Fire Department	AGRC	X									
Manila Fire Department	AGRC	X									
Dagget Administration Building	AGRC	X									
Daggett County Sheriff Dep.	AGRC	X									
Schools											
Daggett County School District	AGRC		X				X				

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft	Replacement Value (Estimated)	Contents Value *
Manila High School	AGRC		X				X				
Hazardous Materials Storage Sites											
US Forest Service Lucerne Valley	RCRA			X			X				
US Bureau of Rec. Flaming Gorge Dam	RCRA			X			X				
Power Substations											
Flaming Gorge	AGRC	X			X		X				
USBR Flaming Gorge Plant	AGRC	X			X		X				
Companies Employing Greater Than 25 People											
Daggett County Health Dept.	AGRC					X	X				
US Post Office	AGRC					X	X				
US Forest Service Ranger Station	AGRC					X	X				
US Bureau of Reclamation	AGRC					X	X				
Daggett County Jail	AGRC					X	X				
Uintah Basin Public Health Dept	AGRC					X	X				
Utah State University	AGRC					X	X				

Uintah County

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft.	Replacement Value (Estimated)	Contents Value *
Critical Facilities											
Uintah County Admin Building	AGRC	X									
Avalon Fire Dept.	AGRC	X									
Jensen Fire Dept.	AGRC	X									
Vernal Fire Dept.	AGRC	X									
Ute Indian Tribe	AGRC	X									
Lapoint Fire Dept	AGRC	X									
Naples Fire Dept	AGRC	X									
Randlett Fire Dept	AGRC	X									
Vernal Fire Dept	AGRC	X									

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft	Replacement Value (Estimated)	Contents Value *
Ashley Valley Medical Center	AGRC	X	X			X	X				
Ft. Duchesne Fire Department	AGRC	X									
Vernal City Police Dept	AGRC	X									
BIA Police	AGRC	X									
Naples City Police Dept	AGRC	X									
Uintah County Sheriff’s Dept	AGRC	X									
Health Dept	AGRC	X	X			X	X				
Care Facilities											
Vernal Care Center	AGRC	X	X				X				
Beehive Homes of Vernal	AGRC	X	X				X				
Schools											
Ft. Duchesne School	AGRC		X				X				
Lapoint School	AGRC		X				X				
Uintah County School Dist	AGRC		X				X				
Vernal School	AGRC		X				X				
Ute Indian Tribe School	AGRC		X				X				
Utah State University Branch	AGRC					X	X				
Applied Technology Center	AGRC						X				
Hazardous Material Storage Sites											
Vernal Avenue TCE Plume	RCRA						X				
American Gilsonite	RCRA						X				
Great Lake Timber Company	RCRA						X				
Ouray Utah Haz Waste Site	RCRA						X				
Murray’s Disposal Service	RCRA						X				
US EPA Abandoned Waste Response	RCRA						X				
BIA Uintah & Ouray Agency	RCRA						X				
AMF Tuboscope	RCRA						X				
Dowell	RCRA						X				
Industrial Mechanisms	RCRA						X				
Chevron Resources	RCRA						X				
Wheeler Machinery	RCRA						X				
Schlumberger Well Services	RCRA						X				
Western Company	RCRA						X				
Dowell Schlumberger Inc	RCRA						X				
Nowcam Services	RCRA						X				
Baker Oil Tools	RCRA						X				
J & Sons Drum Cleaners	RCRA						X				

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft	Replacement Value (Estimated)	Contents Value *
Westrock Warehouse	RCRA						X				
PAMCO	RCRA						X				
Halliburton	RCRA						X				
Oil Field Rental	RCRA						X				
H and H Bico Rental	RCRA						X				
Chevron Service Station #73272	RCRA						X				
NATCO	RCRA						X				
Weatherford US	RCRA						X				
Smith Detroit Allison	RCRA						X				
Questar Pipeline	RCRA						X				
West Hazmat Trucking	RCRA						X				
NL Petroleum Service	RCRA						X				
AZ Grant International	RCRA						X				
Miller Packers Inc.	RCRA						X				
Pacificorp	RCRA						X				
Perry Motors Company	RCRA						X				
West End Laundromat	RCRA						X				
USFS Vernal Ranger District	RCRA						X				
Crop Air Inc	RCRA						X				
Colorado Interstate Gas	RCRA						X				
Bowen Tools Inc	RCRA						X				
Paraho Commercial Shale Oil	RCRA						X				
Pipe Renewal Service	RCRA						X				
Natural Gas Pipeline Co	RCRA						X				
Northwest Pipeline	RCRA						X				
Power Substations and Plants											
La Point Generating Station	AGRC	X			X						
USBR Vernal	AGRC	X			X						
Bonanza	AGRC	X			X						
Ashley	AGRC	X			X						
Naples	AGRC	X			X						
Maeser	AGRC	X			X						
Chevron Resources	AGRC	X			X						
Companies Employing Greater than 50 People											
Ashley Valley Medical Ctr	AGRC					X					
Wal-Mart Discount	AGRC					X					
JC Penny Co	AGRC					X					
S F Phosphates	AGRC					X					

Name or Description Of Asset	Sources Of Information	Critical Facility	Vulnerable Populations	Hazardous Material	Infrastructure	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (sq. ft	Replacement Value (Estimated)	Contents Value *
Halliburton Energy	AGRC					X					
Smith’s Food & Drug	AGRC					X					
J West	AGRC					X					
Deseret Generation Co-op	AGRC					X					
J West Oil Field	AGRC					X					
J West Transportation	AGRC					X					
Uintah Care Ctr	AGRC					X					
Colorado Outward Bound	AGRC					X					
Uintah School District	AGRC					X					
Bureau of Land Management	AGRC					X					
White Pine Ear Nose & Throat	AGRC					X					
Ute Head Start Program	AGRC					X					
Gold Cross Ambulance Svc	AGRC					X					
Davis Jubilee IGA	AGRC					X					
American Gilsonite	AGRC					X					
Ute Plaza Supermarket	AGRC					X					
Christensen’s Departments Store	AGRC					X					
BJ Services Co	AGRC					X					
K Mart Discount Stores	AGRC					X					
Target Trucking Inc.	AGRC					X					
Bob’s Big Boy Restaurant	AGRC					X					
LDS Church	AGRC					X					

RCRA - Hazardous Waste Sites in Utah, locations were determined from addresses furnished by the Utah Department of Environmental Quality.

AGRC – State Automated Geographic Reference Center, houses GIS data for the state of Utah.

Environmental Considerations

Natural disasters are naturally occurring phenomena. They play an integral part in maintaining balance in our world. Meteorological, geological, or hydrological processes have shaped Utah for millions of years and will continue to shape the valley for millions more years. These unique phenomena only cause disasters when they affect humans and their structure. Modern engineering has made it possible to prevent damage from natural hazards, however the economic and environmental costs can be rather high. Tampering with the natural systems also can create an imbalance in the natural environment. The effects of many of these imbalances are still unknown. It is better to live will a small amount of risk, respect the natural process where appropriate, than to construct mitigation at every chance. Nature provides it's own mitigation measures that need to be identified, protected and/or strengthened. To ensure that our environment is not harmed through mitigation measures all applicable city codes; county codes, state and federal laws pertaining to the environment must be followed. The majority of the proposed mitigation programs in this plan will be funded through federal programs, thus tied to federal funding.

"44 CFR 10.8(d)(2)(iii) excludes this rule from the preparation of an environmental assessment or environmental impact statement, where the rule relates to actions that qualify for categorical exclusions under 44 CFR 10.8(d)(2)(iii), such as the development of plans under this section" (44 Code).

The following acts will be taken into consideration and will be incorporated when needed while organizing and implementing the PDM plan; Clean Air Act, Clean Water Act, Endangered Species Act, Floodplain Management, National Historic Preservation Act.

Clean Air Act (CAA) 1970: The Clean Air Act is the comprehensive Federal Law that covers the entire country under the Environmental Policy Act (EPA) regulating air emissions from area, stationary, and mobile sources. This law sets limits or National Ambient Air Quality Standards (NAAQS) on how much of a pollutant can be in the air anywhere in the United States, this controls the emissions of air pollutants. These limits ensure that all Americans have the same basic health and environmental protections. Maximum pollutant standards were set and states may have stronger pollution controls on an individual basis, but not weaker pollution controls than those set for the whole country. Each state explains how it will do its job under the Clean Air Act by developing a mandated "state implementation plan" (SIP) that has to be approved by EPA. The 1977 amendment was to set new dates for areas of the country that failed to meet the initial deadlines for achieving NAAQS. The 1990 amendments addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxics. This act required that facilities with large amounts of certain hazardous chemicals to have special emergency planning requirement. Based on a facilities potential threat or risk from chemical spills, fires, explosions, etc. a Risk Management Plan (RMP) is prepared that includes hazard identification, assessments, design and maintenance of a safe facility, necessary steps to prevent releases and ways to minimize the consequences from an accidental release (Clean Air).

Clean Water Act (CWA): The Federal Water Pollution Control Act Amendments of 1972 came about because of the growing awareness for controlling water pollution. As amended in 1977, this law became known as the Clean Water Act whose mission is to establish the basic structure for regulating discharges of pollutants into the waters of the United States, and to reduce and maintain the chemical, biological, and physical veracity. The act gave the Environmental Policy Act (EPA) the authority to set wastewater standards for industry. The act also required that each state adopt water quality standards, act to protect wetlands, and limit industrial and municipal discharges into navigable waters unless permitted. It funded the construction of wastewater treatment plants for nearly every city in the United States, under construction grant programs from the EPA and recognized the need for planning for future problems that posed a threat from nonpoint source pollution (Clean Water).

Clean Water Act, Section 404-Wetland Preservation: This act regulates activities in wetland areas and authorizes EPA to restrict or prohibit the use of an area as a disposal site for dredged or fill material if the discharge will have unacceptable adverse affects on municipal water supplies, shellfish beds and fishery areas, wildlife and/ or recreational areas. A permit must be issued that is based on regulatory guidelines developed in coincidence with the U.S. Army Corps of Engineers and the EPA (CWA Sec. 404).

Endangered Species Act of 1973: This act provides a plan for the protection of threatened and endangered plants and animals and the habitats in which they are found. Congress finds and declares that various species of fish, wildlife, and plants in the United States have been caused to become extinct, or are so depleted in numbers they are in danger of becoming extinct, as a result of economic development and expansion without adequate concern for conservation. Aesthetic, ecological, educational, historical, recreational, and scientific importance come from these species and are a value to our nation and its people. The U.S. will conserve, to a practicable extent, the species that face extinction and will encourage the States through federal assistance to develop and maintain conservation programs. The reason for the Act is to provide a means in which ecosystems with endangered and threatened species will be conserved. It is also declared that all state and local agencies resolve water resource issues in connections with conservation of endangered species (Endangered).

Floodplain Management Policy: The main points of the policy are to reduce the loss of life and property and the disruption of societal and economic pursuits caused by flooding or facility operations as well as to restore, sustain, and enhance the natural resources, ecosystems, and other functions of the floodplains. Activities will search for a balance between the, sometimes competing, uses of floodplains in a way that makes the most benefit to society. To pursue and encourage appropriate use of floodplains and to avoid long and short term negative impacts associated with the inhabitants and modification of floodplains and to avoid direct and indirect support of floodplain development, whenever there is a practicable alternative. **"**Functions (Natural) of floodplains include natural moderation of floods; fish, wildlife, and plant resources and habitat; groundwater recharge; and water quality maintenance. Uses of floodplains include storm water management; erosion control; open space; natural beauty, opportunity for scientific study, outdoor education, recreation, and cultural preservation; and compatible economic utilization of floodplain resources by human society" (Floodplain, Reclamation).

National Historic Preservation Act of 1966: This act was found and declared by Congress because "the spirit and direction of the Nation are founded upon and reflected in its historic heritage…the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people." Some of the other main points of the act include the awareness of historic properties that are being lost or substantially altered. The preservation will continue a legacy of cultural, educational, aesthetic, inspirational, economic, and energy benefits for future generations. The knowledge of historic resources and "the encouragement of their preservations will improve the planning and execution of Federal and federally assisted projects and will assist economic growth and development. The act would like to use measures that will foster conditions in which historic resources can exist in productive harmony with present and future generations (National).

Section 106 of NHPA "requires all Federal agencies to take into account the effects of their actions on historic properties, and provide ACHP with a reasonable opportunity to comment on those actions and the manner in which Federal agencies are taking historic properties into account in their decisions" beginning at the early stages of planning to mitigate any adverse effects on historic properties (Section 106).

The Richter Magnitude Scale

The Richter Magnitude Scale

Seismic waves are the vibrations from earthquakes that travel through the earth; they are recorded on instruments called seismographs. Seismographs record a zig-zag trace that shows the varying amplitude of ground oscillations beneath the instrument. Sensitive seismographs, which greatly magnify these ground motions, can detect strong earthquakes from sources anywhere in the world. The time, locations, and magnitude of an earthquake can be determined from the data recorded by seismograph stations.

The Richter magnitude scale was developed in 1953 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquake. On the Richter scale, magnitude is expressed in the whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy that the amount associated with the preceding whole number value.

At first, the Richter Scale could be applied only to the records from instruments of identical manufacture. Now, instruments are carefully calibrated with respect to each other. Thus, magnitude can be computed from the record or any calibrated seismograph.

Earthquakes with magnitude of about 2.0 or less are usually called micro earthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes such as the 1964 Good Friday earthquake in Alaska have magnitudes of 8.0 or higher.
Description of Richter Scale from USGS Earthquake Hazards Program

Modified Mercalli Intensity and PGA Equivalents

MMI	Acceleration (%g) PGA	Perceived Shaking	Potential Damage
I	<0.17	Not Felt	None
II	0.17-1.4	Weak	None
III	0.17-1.4	Weak	None
IV	1.4-3.9	Light	None
V	3.9-9.2	Moderate	Very Light
VI	9.2-18	Strong	Light
VII	18-34	Very Strong	Moderate
VIII	34-65	Severe	Moderate to Heavy
IX	65-124	Violent	Heavy
X	>124	Extreme	Very Heavy
XI	>124	Extreme	Very Heavy
XII	>124	Extreme	Very Heavy

Table expressing relationship of peak horizontal ground acceleration (PGA) to Modified Mercalli Intensity (MMI) adapted after (Wald et al., 1999).

The map shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

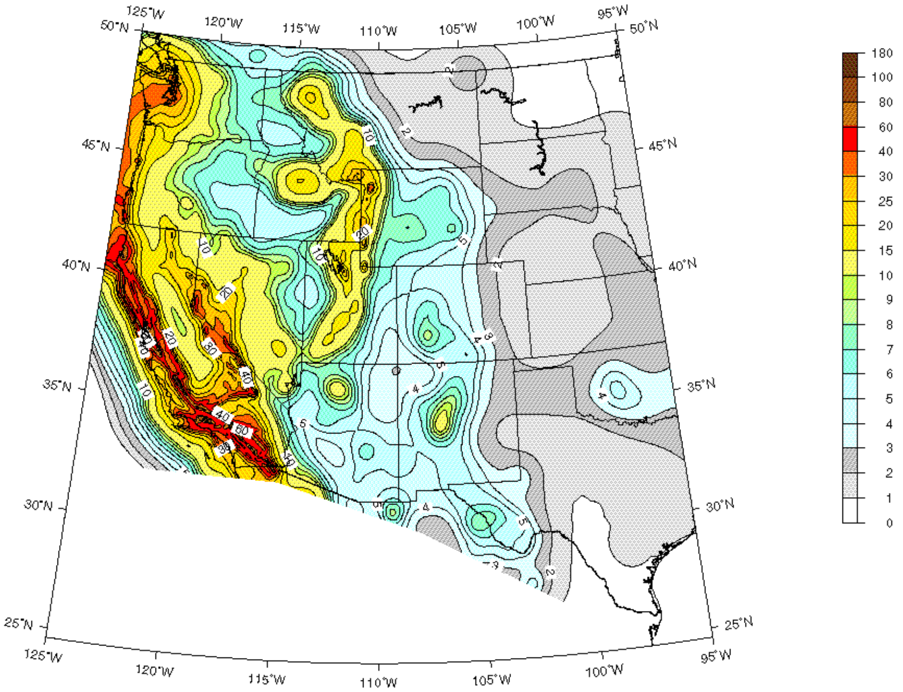
Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). For example, In an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

%g= Ground Surface Acceleration/ Rate of Acceleration due to Gravity

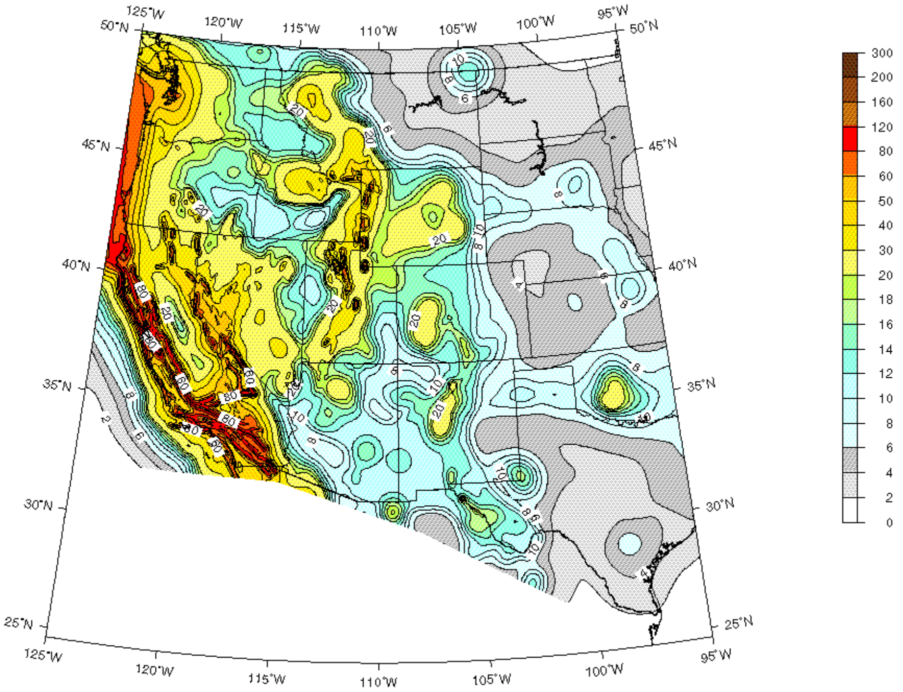
%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%

Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev



Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev



Building Code Effectiveness Grading Report

The Building Code Effectiveness Grading Report was implemented in 1995 to evaluate current building codes in a particular community and determine how well the community enforces its building codes. This program assigns each municipality a grade of 1 to 10 with one showing excellent commitment to building code enforcement. Insurance Services Office Inc, developed and uses the rating classifications 1-3, 4-7, 8-9, 10. Insurance Services Office Inc. gives insurers BCEGS classifications, BCEGS advisory Credits, and related underwriting information. The concept of the Building Code Effectiveness Grading Reports (BCEGS) is for those communities with effective, well-enforced building codes. These communities should sustain less damage in the event of a natural disaster, and insurance rates can reflect that. The prospect of lessening natural hazard related damage and ultimately lowering insurance costs provides an incentive for communities to enforce their building codes rigorously. In addition, FEMA uses these scores to give higher credits in competitive grant programs to those communities with lower scores.

Building Code Effectiveness Grading Report			
City	**County**	**BCEGS Res/Com**	**Date**
Uintah CO	Uintah	4/4	2003
Vernal	Uintah	2/2	2001
Manila	Daggett	4/4	2003
Duchesne	Duchesne	Unclassified	1999
Duchesne CO	Duchesne	Unclassified/3	2003
Roosevelt	Duchesne	Unclassifed/5	2001

Explanation of FEMA Hazard Profile

A hazard profile was created for each hazard in each county within Uintah Basin Association of Governments jurisdiction. These profiles including potential severity or magnitude, frequency, location, seasonal pattern, duration, and speed of onset, were developed based on a model suggested by FEMA Region VIII. The information within each field of the table was derived by the Counties participating in the mitigation planning process based on GIS risk analysis, history of occurrence, and expert advice.

FEMA Hazard Profile

Frequency	Possible
Severity	Catastrophic
Location	A large magnitude earthquake would produce ground shaking felt throughout the entire region. Surface fault rupture is expected in areas of known historic fault movements, for earthquake with a magnitude 6.5 or greater.
Seasonal Pattern	None
Duration	Actual ground shaking will be under one minute yet after shocks may occur for weeks after.
Speed of Onset	No warning

Frequency:

- Highly Likely
  Near 100% probability in next year.
- Likely
  Between 10% and 100 % probability in the next year, or at least one chance in 10 year period.
- Possible
  Between 1% and 10% probability in the next year, or at least one chance in next 100 years.
- Unlikely
  Less than 1% probability in the next 100 years.

Severity or Magnitude:

- Catastrophic
  - Multiple fatalities if event were to occur
  - Complete shutdown of facilities for 30 days or more
  - More than 50 percent of property is severely damaged

- Critical
    - Injuries and/or illnesses results in permanent disability
    - Complete shutdown or critical facilities for at least 2 weeks
    - More than 25 percent of property is severely damaged
- Limited
    - Injuries and/or illnesses result in permanent disability
    - Complete shut down of critical facilities for more than one week
    - More than 10 percent of property is severely damaged
- Negligible
    - Injuries and/or illnesses are treatable with first aid
    - Minor quality of life lost
    - Shutdown of critical facilities and services for 24 hours or less
    - Less than 10 percent of property is severely damaged

Location:
Areas most likely to be affected or the sectors most likely to be affected.

Seasonal Pattern:
The particular season the event is most likely to occur. Examples include tornado season and hurricane season.

Duration:
The amount of time between when an event starts to when the event ends. For example the ground shaking caused by an earthquake is only a minute (where as a hurricane event can be several days.)

Speed of Onset:
Probable amount of warning time before an event occurs.

- Minimal or no warning time
- 6 to 12 hours warning time
- 12 to 24 hours warning time
- More than 24 hours warning

Warning time is vital as it allows people to seek safe locations or shelters and prepare their property in hopes of reducing damages.

Flood

Prevention
- Planning and zoning
- Floodplain open space preservation
- Building construction regulations
- Regulation of other facilities (critical)
- Stormwater management

Property Protection
- Relocation
- Acquistion
- Building Elevation
- Floodproofing
- Lifeline protection
- Flood insurance

Natural Resource Protection
- Wetland protection
- Erosion and sediment control

Emergency Services
- Flood threat recognition
- Warning dissemination
- Flood response
- Critical facilities protection
- Health and safety maintenance
- Post-Disaster recovery and mitigation

Structural Projects
- Reserviors/impoudments
- Levees
- Diversions
- Channel and drainage modifications
- Channel and basin maintenance

Public Information
- Flood hazard Maps

Earthquake

Prevention
- Planning and zoning
- Building construction regulations
- Regulation of other facilities (critical)

Property Protection
- Non-Structural Methods
- Retrofit upgrades
- Earthquake insurance

Natural Resource Protection
- Identified fault rupture zones
- Identified secondary impact

Emergency Services
- Earthquake threat recognition
- Emergency planning for secondary impact
- Emergency response (mutual aid, CERT)
- Critical facilities protection
- Health and safety maintenance
- Post-Disaster recovery and mitigation

Structural Projects
- Rebuild or retrofit critical facilities higher seismic code

- Map information
- Outreach projects
- Real estate disclosure
- Library
- Technical Assistance
- Environmental education

Dam Failure

Prevention

- Dam failure inundation maps
- Planning, zoning, open space preservation in risk area
- Building codes with elevation based on dam failure
- Dam safety inspections
- Rigorous dam maintenance schedule
- Draining dam when conditions are unsafe

Property Protection

- Acquisition of structures in inundation path
- Flood Insurance

Natural Resource Protection

- Prohibit development in high-risk areas.

Emergency Services

- Monitor condition dam
- Warning and evacuation plans based on dam failure
- Develop and conduct dam failure emergency exercise

Structural Projects

- Dam improvements, spillway enlargements
- Remove unsafe dams

Public Information

- Seismic maps; liquefaction, faults, zones
- Map information
- Outreach projects
- Real estate disclosure
- Library
- Technical Assistance
- Education

Wildfire

Prevention

- Zoning ordinances to reflect fire risk zones
- Restrict development areas near fire protection and water resource
- Planning to include; spacing of buildings, firebreaks, on-site water storage, wide roads, multiple accesses
- Code standards for roof materials and fire protection systems
- Maintenance programs to clear dead and dry brush
- Regulations on open fires
- Open space around structures

Property Protection

- Retrofitting roofs, add spark arrestors
- Create and maintain defensible space
- Insurance
- Eliminate ladder fuels
- Install sprinkling systems
- Develop fire resistant plans
- Have home addresses displayed
- Clean out rain gutter

Public Information

- Develop outreach materials on dams, dam failure and community emergency plan for dam failure

Landslides

Prevention

- Monitor and evaluate areas after wildfire
- Install ground monitoring instruments on landslides for movement
- Restrict development in landslide-prone areas
- Establish codes (grading, construction, excavation), in landslide-prone areas
- Slope grading

Property Protection

- Control and monitor surface and groundwater drainage
- Control building in areas of landslides
- Evaluate property maintenance in areas of landslides (over watering)
- Avoid ground level windows that face upslope

Natural Resource Protection

- Complete a watershed management plan
- Limit use of ATV's in areas of landslides to manage erosion
- Evaluate impact of wildfire in areas of landslides
- Restrict development in landslide-prone areas
- Maintain natural vegetation

Emergency Services

- Monitor and warning systems

Natural Resource Protection

- Prohibit development in high-risk areas
- Understand impact of non-native vegetation
- Promote tread soft ATV use
- Develop watershed management plan
- Maintain watershed
- Establish and promote fuel reduction

Emergency Services

- Mutual aid agreements for fire fighting
- Participate in State Wildfire Suppression Fund
- Develop and exercise local wildfire response plan and evacuation plans

Structural Projects

- Construct wildfire fuel breaks
- Install heliport water stations
- Tree and underbrush thinning in critical areas
- Increase number of fire hydrants
- Install water tanks

Public Information

- Develop maps for wildfire hazard area
- Wildfire information mailout to high risk residents
- Develop urban wildfire "how to protect your home from wildfires" book
- Newspaper article on wild fires
- Presentation on wildfires at community meetings
- Develop wildfire displays for display in public building

- Evacuation plans and exercises

Structural Projects

- Build buttress, retaining walls other engineered structures
- Install subsurface drainage materials
- Remove landslide materials
- Constructing Debris Basins
- Control rock falls, catch fences, tie back walls, rock bolts, cut benches and berms

Public Information

- Updated maps of landslide areas
- Real estate disclosure
- Develop outreach material (newsletters, articles, displays)
- Notice to homeowners in landslide areas detailing hazard

Drought

Prevention

- Establish economic incentives for water conservation
- Encourage water conservation
- Develop early warning system, monitoring
- Implement water metering and leak detection programs
- Develop early warning system, monitoring program

Property Protection

- Evaluate potential wildfire due to drought
- Identify secondary affects from drought
- Real estate disclosure of high hazard wild fire area.

Severe Weather

Prevention

- Early warning and notification systems
- Building codes to address wind and snow load
- Properly ground structures for lightning
- Public education for severe weather conditions
- Restrict development in areas of avalanche

Property Protection

- Structural tie down of roofs for high winds
- Restrict development in areas of avalanche
- Monitor NWS weather warnings and watches

Natural Resource Protection

- Evaluate impact of severe weather
- Restrict development in areas of avalanche

Emergency Services

- Monitor NWS weather warnings and watches
- Develop plans and exercises for severe weather related incidents

Structural Projects

- Install sheds over roads below avalanche terrain
- Install drift fences along snow drift areas
- Install avalanche fencing along ridgelines

Natural Resource Protection

- Legislation to protect stream flow
- Protect water aquifers

Emergency Services

- Alert procedures for water quality issues
- Create inventory of pumps, filters, other equipment
- Establish water hauling program
- List livestock watering location
- Establish hay hotline
- Fund water system improvements (wells, systems)
- Lower well intakes
- Develop drought contingency plan
- Issue emergency permits for water use

Structural Projects

- Redesign or create new reservoir storage
- Provide pumps and piping for distribution

Public Information

- Develop drought education material
- Water conservation outreach material
- Other outreach for awareness

Public Information

- Develop outreach document on avalanche safety
- Become and NWS Storm Ready Community
- Promote lightning safety week
- Develop cold weather safety materials

Problem Soils

Prevention

- Planning and zoning restrictions and regulations
- Open space
- Building codes
- Drain system maintenance

Property Protection

- Insurance
- Remove Soil
- Ensure rain gutters extend away from structures

Natural Resource Protection

- Leave area as open space

Emergency Services

- Identify structures impacted by problem soils

Structural Projects

- Presoak and/or compact soils
- Install drain fields
- Bring in fill
- Remove soils

Public Information

- Develop information on problem soils
- Outreach materials on problem soil mitigation

FEDERAL EMERGENCY MANAGEMENT AGENCY

HAZUS-MH: Earthquake Event Report

Region Name: *Daggett County 2500 Year Event*

Earthquake Scenario: *Daggett County 2500 Year Event*

Print Date: *October 20, 2003*

Disclaimer:
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General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Utah

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 721.94 square miles and contains 1 census tracts. There are over 0 thousand households in the region and has a total population of 921 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 0 thousand buildings in the region with a total building replacement value (excluding contents) of 88 (millions of dollars). Approximately 100.00 % of the buildings (and 94.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 503 and 66 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 0 thousand buildings in the region which have an aggregate total replacement value of 88 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 41% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

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

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 3 schools, 2 fire stations, 1 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 5 dams identified within the region. Of these, 2 of the dams are classified as ‘high hazard’. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in Tables 2 and 3.

The total value of the lifeline inventory is over 569.00 (millions of dollars). This inventory includes over 103 kilometers of highways, 10 bridges, 0 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	10	5.40
	Segments	6	390.40
	Tunnels	0	0.00
		Subtotal	**395.80**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segmens	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	3	16.00
	Runways	3	91.40
		Subtotal	**107.40**
		Total	**503.20**

Table 3: Utility System Lifeline inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Waste Water	Facilities	1	65.30
	Pipelines	0	0.00
		Subtotal	**65.30**
Natural Gas	Facilities	1	1.10
	Pipelines	0	0.00
		Subtotal	**1.10**
OIL Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**66.30**

Earthquake Scenario

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

Scenario Name	Daggett County 2500 Year Event
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	
Probabilistic Return Period	2,500
Longitude of Epicenter	0.00
Latitude of Epicenter	0.00
Earthquake Magnitude	7.00
Depth (Km)	0
Rupture Length (Km)	0.00
Rupture Orientation (degrees)	0.00
Attenuation Function	

Building Damage

Building Damage

HAZUS estimates that about 341 thousand buildings will be at least moderately damaged. This is over 37.00 % of the total number of buildings in the region. There are an estimated 9 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.11	0	0.08	0	0.11	0	0.16	0	0.26
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.11	0	0.08	0	0.11	0	0.16	0	0.22
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	116	35.19	115	45.05	166	66.94	61	73.74	7	72.6
Single Family	213	64.60	140	54.79	82	32.83	22	25.95	3	26.8
Total	**330**		**256**		**249**		**83**		**10**	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.01	0	0.01	0	0.01
MH*	116	35.19	115	45.05	166	66.94	61	73.74	7	72.68
Precast	0	0.00	0	0.00	0	0.00	0	0.01	0	0.02
RM*	30	8.97	11	4.31	18	7.21	10	11.95	1	7.94
Steel	0	0.04	0	0.03	0	0.04	0	0.04	0	0.11
UM*	3	0.97	3	1.21	4	1.61	2	2.94	1	12.15
Wood	181	54.72	126	49.31	60	24.06	9	11.16	1	6.92
Total	**330**		**256**		**249**		**83**		**10**	

*Note:

RM	Reinforced Masonry
URM	Unreiforced Masonry
MH	Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 6: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Least Moderate Damage > 50%**	**Complete Damage > 50%**	**Functionality > 50% at day 1**
Hospitals	0	0	0	0
Schools	3	0	0	0
EOCs	0	0	0	0
PoliceStations	1	0	0	0
FireStations	2	0	0	0

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	6	0	0	6	6
	Bridges	10	0	0	10	10
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	3	0	0	3	3
	Runways	3	0	0	3	3

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	0	0	1	1
Natural Gas	1	0	0	1	1
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 9 : Expected Utility System Pipeline Damage

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	0	0	0
Waste Water	0	0	0
Natural Gas	0	0	0
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	340	0	0	0	0	0
Electric Power		340	340	340	340	340

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region’s total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 46.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (1 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 921 will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Residential	1	0	0	0
	Single Family	1	0	0	0
	Total	**2**	**0**	**0**	**0**
2 PM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**1**	**0**	**0**	**0**
5 PM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**1**	**0**	**0**	**0**

Economic Loss

The total building-related economic loss estimated for the earthquake is $7.06 (millions of dollars), which represents % of the total replacement value of the region’s buildings. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 7.06 (millions of dollars); 7 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 90 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.05	0.05	0.00	0.02	0.11
	Capital-Related	0.00	0.02	0.05	0.00	0.00	0.08
	Rental	0.17	0.08	0.02	0.00	0.01	0.27
	Relocation	0.02	0.01	0.00	0.00	0.00	0.02
	Subtotal	**0.18**	**0.15**	**0.12**	**0.00**	**0.03**	**0.49**
Capital Stock Loses							
	Structural	0.81	0.40	0.07	0.00	0.06	1.34
	Non_Structural	2.85	1.01	0.13	0.00	0.13	4.12
	Content	0.84	0.15	0.06	0.00	0.06	1.11
	Inventory	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**4.49**	**1.56**	**0.26**	**0.00**	**0.26**	**6.57**
	Total	**4.67**	**1.71**	**0.38**	**0.00**	**0.29**	**7.06**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	390	0	0.00
	Bridges	5	0	2.38
	Tunnels	0	0	0.00
	Subtotal	**395.80**	**0.10**	
Railways	Segments	0	0	0.00
	Bridges	0	0	0.00
	Tunnels	0	0	0.00
	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Light Rail	Segments	0	0	0.00
	Bridges	0	0	0.00
	Tunnels	0	0	0.00
	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	16	3	21.45
	Runways	91	0	0.00
	Subtotal	**107.40**	**3.40**	
	Total	**503.20**	**3.60**	

Table 14: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Communication	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Natural Gas	Pipelines	0.00	0.00	0.00
	Facilities	1.10	0.00	0.00
	Subtotal	**1.07**	**$0.00**	
Oil Systems	Pipelines	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Potable Water	Pipelines	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Waste Water	Pipelines	0.00	0.00	0.00
	Facilities	65.30	0.00	0.00
	Subtotal	**65.27**	**$0.00**	
	Total	**66.34**	**$0.00**	

Table 15. Indirect Economic Impact
(with outside aid)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	0	-2.50
Second Year			
	Employment Impact	0	0.00
	Income Impact	0	-7.61
Third Year			
	Employment Impact	0	0.00
	Income Impact	0	-9.79
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	0	-9.79
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	0	-9.79
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	0	-9.79

Appendix A: County Listing for the Region

Daggett,UT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Utah					
	Daggett	921	83	4	88
Total State		**921**	**83**	**4**	**88**
Total Region		**921**	**83**	**4**	**88**

FEDERAL EMERGENCY MANAGEMENT AGENCY

HAZUS-MH: Earthquake Event Report

Region Name: *Duchesne County 2500 Year Event*

Earthquake Scenario: *Duchesne County 2500 Year Event*

Print Date: *October 20, 2003*

Disclaimer:
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General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Utah

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3,251.34 square miles and contains 4 census tracts. There are over 4 thousand households in the region and has a total population of 14,371 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 780 (millions of dollars). Approximately 99.00 % of the buildings (and 80.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 950 and 130 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 780 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 55% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

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

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 42 beds. There are 16 schools, 2 fire stations, 1 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 38 dams identified within the region. Of these, 11 of the dams are classified as ‘high hazard’. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in Tables 2 and 3.

The total value of the lifeline inventory is over 1,080.00 (millions of dollars). This inventory includes over 174 kilometers of highways, 80 bridges, 0 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	80	34.90
	Segments	28	843.80
	Tunnels	0	0.00
		Subtotal	**878.70**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segmens	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	2	10.70
	Runways	2	60.90
		Subtotal	**71.60**
		Total	**950.30**

Table 3: Utility System Lifeline inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Waste Water	Facilities	2	130.50
	Pipelines	0	0.00
		Subtotal	**130.50**
Natural Gas	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
OIL Systems	Facilities	4	0.40
	Pipelines	0	0.00
		Subtotal	**0.40**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**130.90**

Earthquake Scenario

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

Scenario Name	Duchesne County 2500 Year Event
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	
Probabilistic Return Period	2,500
Longitude of Epicenter	0.00
Latitude of Epicenter	0.00
Earthquake Magnitude	7.00
Depth (Km)	0
Rupture Length (Km)	0.00
Rupture Orientation (degrees)	0.00
Attenuation Function	

Building Damage

Building Damage

HAZUS estimates that about 1,722 thousand buildings will be at least moderately damaged. This is over 30.00 % of the total number of buildings in the region. There are an estimated 92 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	2	0.08	1	0.08	1	0.09	1	0.12	0	0.17
Commercial	30	1.05	3	0.23	5	0.43	3	0.64	1	1.00
Education	1	0.03	0	0.00	0	0.00	0	0.00	0	0.00
Government	2	0.07	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	3	0.12	1	0.10	2	0.18	1	0.23	0	0.35
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	551	19.17	335	29.10	606	53.83	340	67.46	65	70.0
Single Family	2,283	79.47	812	70.49	512	45.47	159	31.54	26	28.4
Total	**2,873**		**1,153**		**1,126**		**504**		**92**	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	8	0.03	0	0.01	0	0.02	0	0.02	0	0.04
MH*	529	18.43	335	29.06	606	53.79	340	67.41	65	69.94
Precast	5	0.15	0	0.04	1	0.09	1	0.20	0	0.32
RM*	313	10.87	60	5.21	117	10.38	82	16.20	11	11.68
Steel	10	0.04	0	0.01	0	0.03	0	0.07	0	0.11
UM*	50	1.75	16	1.35	24	2.11	18	3.48	11	12.02
Wood	1,956	67.89	739	64.09	374	33.18	61	12.18	5	5.28
Total	**2,873**		**1,153**		**1,126**		**504**		**92**	

*Note:

RM	Reinforced Masonry
URM	Unreiforced Masonry
MH	Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 42 hospital beds available for use. On the day of the earthquake, the model estimates that only 42 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 6: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Least Moderate Damage > 50%**	**Complete Damage > 50%**	**Functionality > 50% at day 1**
Hospitals	1	0	0	1
Schools	16	0	0	2
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	2	0	0	0

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	28	0	0	28	28
	Bridges	80	2	0	80	80
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	2	0	0	2	2
	Runways	2	0	0	2	2

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	2	0	0	1	2
Natural Gas	0	0	0	0	0
Oil Systems	4	0	0	1	4
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 9 : Expected Utility System Pipeline Damage

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	0	0	0
Waste Water	0	0	0
Natural Gas	0	0	0
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	4,559	0	0	0	0	0
Electric Power		4,559	4,559	4,559	4,559	4,559

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 1 ignitions that will burn about 0.00 sq. mi 0.00 % of the region’s total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 40.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (28 households to be displaced due to the earthquake. Of these, 6 people (out of a total population of 14,371 will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	1	0	0	0
	Industrial	0	0	0	0
	Residential	13	2	0	0
	Single Family	14	3	0	1
	Total	**28**	**5**	**1**	**1**
2 PM	Commercial	11	3	0	1
	Commuting	0	0	0	0
	Educational	5	1	0	0
	Hotels	0	0	0	0
	Industrial	3	1	0	0
	Residential	3	0	0	0
	Single Family	3	1	0	0
	Total	**25**	**6**	**1**	**2**
5 PM	Commercial	10	3	0	1
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	2	0	0	0
	Residential	5	1	0	0
	Single Family	6	1	0	0
	Total	**23**	**5**	**1**	**1**

Economic Loss

The total building-related economic loss estimated for the earthquake is $52.09 (millions of dollars), which represents % of the total replacement value of the region's buildings. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 52.09 (millions of dollars); 8 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 78 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.27	0.85	0.07	0.02	1.21
	Capital-Related	0.00	0.11	0.76	0.05	0.02	0.94
	Rental	1.15	0.43	0.43	0.03	0.00	2.04
	Relocation	0.11	0.03	0.02	0.00	0.00	0.16
	Subtotal	**1.26**	**0.83**	**2.05**	**0.16**	**0.05**	**4.35**
Capital Stock Loses							
	Structural	5.71	2.13	1.23	0.50	0.65	10.22
	Non_Structural	18.93	5.69	2.56	1.29	0.58	29.04
	Content	5.17	0.83	1.11	0.79	0.37	8.28
	Inventory	0.00	0.00	0.04	0.12	0.04	0.20
	Subtotal	**29.80**	**8.66**	**4.93**	**2.70**	**1.65**	**47.73**
	Total	**31.07**	**9.49**	**6.98**	**2.85**	**1.69**	**52.09**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	844	0	0.00
	Bridges	35	1	2.09
	Tunnels	0	0	0.00
	Subtotal	**878.70**	**0.70**	
Railways	Segments	0	0	0.00
	Bridges	0	0	0.00
	Tunnels	0	0	0.00
	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Light Rail	Segments	0	0	0.00
	Bridges	0	0	0.00
	Tunnels	0	0	0.00
	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	11	2	21.25
	Runways	61	0	0.00
	Subtotal	**71.60**	**2.30**	
	Total	**950.30**	**3.00**	

Table 14: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Communication	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Natural Gas	Pipelines	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Oil Systems	Pipelines	0.00	0.00	0.00
	Facilities	0.40	0.04	9.46
	Subtotal	**0.39**	**$0.04**	
Potable Water	Pipelines	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Waste Water	Pipelines	0.00	0.00	0.00
	Facilities	130.50	8.30	6.36
	Subtotal	**130.54**	**$8.30**	
	Total	**130.93**	**$8.33**	

Table 15. Indirect Economic Impact
(with outside aid)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.79
Second Year			
	Employment Impact	0	0.00
	Income Impact	(1)	-2.42
Third Year			
	Employment Impact	0	0.00
	Income Impact	(2)	-3.11
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	(2)	-3.11
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(2)	-3.11
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(2)	-3.11

Appendix A: County Listing for the Region

Duchesne,UT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Utah					
	Duchesne	14,371	628	152	780
Total State		**14,371**	**628**	**152**	**780**
Total Region		**14,371**	**628**	**152**	**780**

HAZUS-MH: Earthquake Event Report

FEDERAL EMERGENCY MANAGEMENT AGENCY

Region Name: *Uintah County 2500 year Event*

Earthquake Scenario: *Uintah County 2500 Year Event*

Print Date: *October 20, 2003*

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Utah

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 4,492.86 square miles and contains 5 census tracts. There are over 8 thousand households in the region and has a total population of 25,224 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 7 thousand buildings in the region with a total building replacement value (excluding contents) of 1,199 (millions of dollars). Approximately 99.00 % of the buildings (and 80.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,469 and 284 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 7 thousand buildings in the region which have an aggregate total replacement value of 1,199 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 66% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

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

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 29 beds. There are 10 schools, 2 fire stations, 3 police stations and 1 emergency operation facilities. With respect to HPL facilities, there are 32 dams identified within the region. Of these, 12 of the dams are classified as ‘high hazard’. The inventory also includes 9 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in Tables 2 and 3.

The total value of the lifeline inventory is over 1,753.00 (millions of dollars). This inventory includes over 349 kilometers of highways, 62 bridges, 0 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	62	26.30
	Segments	32	1,182.30
	Tunnels	0	0.00
		Subtotal	**1,208.60**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	1	15.10
	Tunnels	0	0.00
		Subtotal	**15.10**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segmens	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	1	1.10
		Subtotal	**1.10**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	6	32.00
	Runways	7	213.20
		Subtotal	**245.30**
		Total	**1,469.90**

Table 3: Utility System Lifeline inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Waste Water	Facilities	1	65.30
	Pipelines	0	0.00
		Subtotal	**65.30**
Natural Gas	Facilities	3	3.20
	Pipelines	0	0.00
		Subtotal	**3.20**
OIL Systems	Facilities	2	0.20
	Pipelines	0	0.00
		Subtotal	**0.20**
Electrical Power	Facilities	2	215.60
		Subtotal	**215.60**
Communication	Facilities	5	0.50
		Subtotal	**0.50**
		Total	**284.80**

Earthquake Scenario

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

Scenario Name	Uintah County 2500 Year Event
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	
Probabilistic Return Period	2,500
Longitude of Epicenter	0.00
Latitude of Epicenter	0.00
Earthquake Magnitude	7.00
Depth (Km)	0
Rupture Length (Km)	0.00
Rupture Orientation (degrees)	0.00
Attenuation Function	

Building Damage

Building Damage

HAZUS estimates that about 2,138 thousand buildings will be at least moderately damaged. This is over 28.00 % of the total number of buildings in the region. There are an estimated 58 buildings that will be completely destroyed. The definition of the ‘damage states’ is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	23	0.74	14	0.62	18	1.15	9	1.85	2	2.81
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	2	0.05	1	0.05	1	0.09	1	0.14	0	0.20
Industrial	6	0.19	4	0.20	6	0.37	3	0.61	1	0.99
Religion	1	0.04	1	0.03	1	0.05	0	0.07	0	0.09
Residential	427	13.50	394	17.81	521	32.51	188	39.23	22	37.8
Single Family	2,705	85.47	1,799	81.29	1,054	65.83	278	58.10	34	58.1
Total	**3,165**		**2,212**		**1,602**		**478**		**59**	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	11	0.02	0	0.02	1	0.04	0	0.05	0	0.10
MH*	346	10.94	339	15.30	485	30.30	177	37.09	21	35.55
Precast	5	0.10	2	0.08	3	0.21	3	0.54	0	0.78
RM*	392	12.35	145	6.55	236	14.71	131	27.30	10	17.67
Steel	11	0.04	1	0.04	2	0.15	2	0.42	0	0.63
UM*	43	1.36	42	1.88	54	3.34	33	6.83	16	27.14
Wood	2,357	74.31	1667	75.33	800	49.92	125	26.13	9	16.03
Total	**3,165**		**2,212**		**1,602**		**478**		**59**	

*Note:

RM	Reinforced Masonry
URM	Unreiforced Masonry
MH	Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 29 hospital beds available for use. On the day of the earthquake, the model estimates that only 29 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 6: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Least Moderate Damage > 50%**	**Complete Damage > 50%**	**Functionality > 50% at day 1**
Hospitals	1	0	0	1
Schools	10	0	0	0
EOCs	1	0	0	1
PoliceStations	3	0	0	0
FireStations	2	0	0	0

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	32	0	0	32	32
	Bridges	62	0	0	62	62
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	6	0	0	6	6
	Runways	7	0	0	7	7

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	0	0	1	1
Natural Gas	3	0	0	1	3
Oil Systems	2	0	0	1	2
Electrical Power	2	0	0	1	2
Communication	5	0	0	1	5

Table 9 : Expected Utility System Pipeline Damage

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	0	0	0
Waste Water	0	0	0
Natural Gas	0	0	0
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	8,187	0	0	0	0	0
Electric Power		8,187	8,187	8,187	8,187	8,187

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 1 ignitions that will burn about 0.02 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 8 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 34.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (104 households to be displaced due to the earthquake. Of these, 26 people (out of a total population of 25,224 will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	1	0	0	0
	Industrial	1	0	0	0
	Residential	14	2	0	0
	Single Family	33	6	1	1
	Total	**49**	**8**	**1**	**2**
2 PM	Commercial	21	5	1	1
	Commuting	0	0	0	0
	Educational	8	2	0	0
	Hotels	0	0	0	0
	Industrial	4	1	0	0
	Residential	3	0	0	0
	Single Family	7	1	0	0
	Total	**43**	**9**	**1**	**2**
5 PM	Commercial	19	4	1	1
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	2	1	0	0
	Residential	5	1	0	0
	Single Family	13	2	0	0
	Total	**40**	**8**	**1**	**2**

Economic Loss

The total building-related economic loss estimated for the earthquake is $105.80 (millions of dollars), which represents % of the total replacement value of the region's buildings. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 105.80 (millions of dollars); 11 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 68 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.46	2.67	0.20	0.17	3.50
	Capital-Related	0.00	0.19	2.26	0.13	0.03	2.62
	Rental	2.08	1.23	1.58	0.03	0.09	5.02
	Relocation	0.20	0.04	0.08	0.01	0.02	0.34
	Subtotal	**2.28**	**1.93**	**6.60**	**0.37**	**0.30**	**11.48**
Capital Stock Loses							
	Structural	10.13	2.11	4.13	1.38	0.67	18.42
	Non_Structural	35.78	7.91	7.88	3.63	1.38	56.58
	Content	10.56	1.67	3.86	2.03	0.71	18.84
	Inventory	0.00	0.00	0.16	0.31	0.02	0.48
	Subtotal	**56.48**	**11.69**	**16.02**	**7.35**	**2.78**	**94.32**
	Total	**58.76**	**13.62**	**22.62**	**7.72**	**3.08**	**105.80**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,182	0	0.00
	Bridges	26	0	0.30
	Tunnels	0	0	0.00
	Subtotal	**1208.60**	**0.10**	
Railways	Segments	15	0	0.00
	Bridges	0	0	0.00
	Tunnels	0	0	0.00
	Facilities	0	0	0.00
	Subtotal	**15.10**	**0.00**	
Light Rail	Segments	0	0	0.00
	Bridges	0	0	0.00
	Tunnels	0	0	0.00
	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	1	0	0.00
	Subtotal	**1.10**	**0.00**	
Ferry	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0	0	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	32	7	22.04
	Runways	213	0	0.00
	Subtotal	**245.30**	**7.10**	
	Total	**1469.90**	**7.10**	

Table 14: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Communication	Facilities	0.50	0.05	10.55
	Subtotal	**0.49**	**$0.05**	
Electrical Power	Facilities	215.60	13.35	6.19
	Subtotal	**215.60**	**$13.35**	
Natural Gas	Pipelines	0.00	0.00	0.00
	Facilities	3.20	0.25	7.89
	Subtotal	**3.20**	**$0.25**	
Oil Systems	Pipelines	0.00	0.00	0.00
	Facilities	0.20	0.01	6.68
	Subtotal	**0.20**	**$0.01**	
Potable Water	Pipelines	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Waste Water	Pipelines	0.00	0.00	0.00
	Facilities	65.30	0.00	0.00
	Subtotal	**65.27**	**$0.00**	
	Total	**284.76**	**$13.67**	

Table 15. Indirect Economic Impact
(with outside aid)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	(23)	-14.36
Second Year			
	Employment Impact	0	0.00
	Income Impact	(25)	-15.69
Third Year			
	Employment Impact	0	0.00
	Income Impact	(26)	-16.18
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	(26)	-16.18
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(26)	-16.18
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(26)	-16.18

Appendix A: County Listing for the Region

Uintah,UT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Utah					
	Uintah	25,224	955	244	1,199
Total State		**25,224**	**955**	**244**	**1,199**
Total Region		**25,224**	**955**	**244**	**1,199**

Glossary of Terms

Abutment (dam) - the valley side against which a dam is constructed.

Acre-foot of water - approximately 326,000 gallons of water, or approximately a football field covered by one foot of water.

Active Faults - An active fault is defined as a fault displaying evidence of displacement along one or more of its traces during Holocene time (about the last 11,000 years).

Aftershocks - earthquakes during the seconds, hours, days to months following a larger earthquake (main shock) in the same general region.

Alluvial fan - a cone-shaped deposit of stream sediments, generally deposited at the base of a mountain where a stream encounters flatter terrain.

Amplitude (seismic waves) - the maximum height of a wave crest or depth of a trough. Amount the ground moves as a seismic wave passes, as measured from a seismogram.

ATV All Terrain Vehicle

Avalanche path - the area in which a snow avalanche runs; generally divided into starting zone, track, and runout zone.

Basin and Range physiographic province - consists of north-south-trending mountain ranges separated by valleys, bounded by the Rocky Mountains and the Colorado Plateau to the east and the Sierra-Cascade Mountains to the west (includes western Utah).

Bearing capacity - the load per unit area which the ground can safely support without excessive yield.

Bedrock - solid in-place rock, sometimes exposed and sometimes concealed beneath the soil.

Collapsible soil (hydrocompaction) - loose, dry, low-density soil that decreases in volume or collapses when saturated for the first time following deposition.

Critical Areas - Environmentally sensitive areas which include wetlands fish and wildlife habitat conservation areas; geologically hazardous areas; areas with a critical recharging effect on aquifers used for potable water; and frequently flooded areas. Critical areas have measurable characteristics which, when combined, create a value for or potential risk to public health, safety and welfare.

Critical/Essential Facilities - Structures meeting one or more of the following criteria:

- Fire stations, police stations, storage facilities for vehicles/equipment needed after a hazard event, and emergency operation centers.
- Hospitals, nursing homes, and housing which is likely to contain occupants who may not be sufficiently mobile to avoid injury or death as a result of a hazardous event
- Public and private utility facilities, which are vital to maintaining or restoring normal services to, damaged areas after a hazardous event.
- Structures or facilities that produce, store, or use highly flammable, explosive, volatile, toxic and/or water reactive materials

Debris flow - involves the relatively rapid, viscous flow of surficial material that is predominantly coarsegrained.

Debris slide - involves predominantly coarse-grained material moving mainly along a planar surface.

Delta - a deposit of sediment formed at the mouth of a river where it enters an ocean or lake.

Earth flow - involves fine-grained material that slumps away from the top or upper part of a slope, leaving a scarp, and flows down to form a bulging toe.

Earthquake - a sudden motion or trembling in the earth as fracture and movement of rocks along a fault release stored elastic energy.

Earthquake Fault Zone - earthquake fault zones are regulatory zones around active faults. The zones are used to prohibit the location of critical facilities and structures designed for human occupancy from being built astride an active fault. Earthquake Fault Zones are plotted on topographic maps at a scale of 1-inch equals 2,000 feet. The zones vary in width, but average about one-quarter mile wide.

Earthquake induced Seiches - Earthquake generated water waves causing inundation around shores or lakes and reservoirs.

Epicenter - the point on the earth's surface directly above the focus of an earthquake.

Erosion - the removal of earth or rock material by many types of processes, for example, water, wind, or ice action.

Expansive soil and rock - soil and rock which contain clay minerals that expand and contract with changes in moisture content.

Fault - A -break in the earth along which movement occurs.

Fault segment - section of a fault that behaves independently from adjacent sections.

Fault zone - an area containing numerous faults.

FEMA - The Federal Emergency Management Agency was authorized under Section 404 of the Stanford Act. Provides funding for hazard mitigation projects that are cost-effective and comply with existing post-disaster mitigation programs and activities. These projects cannot be funded through other programs to be eligible.

Fill - material used to raise the surface of the land generally in a low area.

Fire-resistant vegetation - plants that do not readily ignite and burn when subjected to fire because of inherent physiological characteristics of the species such as moisture content, fuel loading, and fuel arrangement.

Flood plain - an area adjoining a body of water or natural stream that has been or may be covered by flood water.

Flood way - An area of land immediately adjacent to a stream or river channel that, in times of flooding, becomes an enlarged stream or river channel and carries the floodwater with the highest velocity.

Floodplain - an area adjoining a body of water or natural stream that has been or may be covered by floodwater.

Floodplain (100 year) - Floodplains that have the potential to flood once every 100 years or that has a one percent chance of flooding equal to or in excess of that in any given year.

Fluvial - concerning or pertaining to rivers or streams.

Focus - the point of origin of an earthquake within the earth, and the origin of the earthquake's seismic waves.

Formation (geologic) - a mappable rock unit consisting of distinctive features/rock types separate from units above and below.

Frequency (seismic waves) - the number of complete cycles of a seismic wave passing a point during one second.

Fuel (fire) - vegetation, building material, debris, and other substances that will support combustion.

Fuel break - a change in fuel continuity, type of fuel, or degree of flammability of fuel in a strategically located strip of land to reduce or hinder the rate of fire spread.

Fuel type - a category of vegetation used to indicate the predominate cover of an area.

Glacial moraine - debris (sand to boulders) transported and deposited by glacial ice along a glacier's sides or terminus.

Graben - a block of earth downdropped between two faults.

Gradient (slope) - a measure of the slope of the land surface.

Ground failure - a general term referring to any type of ground cracking or subsidence, including landslides and liquefaction-induced cracks.

Ground shaking - the shaking or vibration of the ground during an earthquake.

Ground water - that portion of subsurface water which is in the zone of saturation.

Gypsiferous deposits - soil or rock containing gypsum, which can be subject to dissolution.

Gypsum - a mineral composed of hydrated calcium sulfate. A common mineral of evaporites.

Hazard Mitigation Plan - The plan resulting from a systematic evaluation of the nature and extent of vulnerabilities posed by a hazard present in society that includes the strategies needed to minimize future vulnerability to hazards.

Hazard Mitigation - Any action taken to reduce or permanently eliminate the long-term risk to human life and property and the environment posed by a hazard.

HAZUS - Hazard United States. Earthquake Loss estimation software using GIS databases developed by FEMA.

Head (landslide) - the upper parts of the slide material along the contact between the disturbed material and the main scarp.

Holocene - geologic epoch covering the last 10,000 years (after the last Ice Age).

Igneous rocks - rocks formed by cooling and hardening of hot liquid material (magma), including rocks cooled within the earth (for example, granite) and those that cooled at the ground surface as lavas (such as basalt).

Impermeable - materials having a texture that does not permit water to move through.
Intermountain seismic belt - zone of pronounced seismicity, up to 120 miles wide and 800 miles long, extending from Arizona through central Utah to northwestern Montana.

Lacustrine - concerning or pertaining to lakes.

Lake Bonneville - a large, ancient lake that existed 30,000 to 12,000 years ago and covered nearly 20,000 square miles in Utah, Idaho, and Nevada. The lake covered many of Utah's valleys, and was almost 1,000 feet deep in the area of the present Great Salt Lake.

Lake Bonneville sediments - sediments deposited by Lake Bonneville, found in the valleys, which range from gravels and sands to clays.

Landslide - a general term for a mass of earth or rock, which moves down slope by flowing, spreading, sliding, toppling, or falling (see slope failure).

Lateral spread - lateral down slope displacement of soil layers, generally several feet or more, above a liquefied layer.

Levee (flood) - a berm or dike used to contain or direct water, usually without an outlet or spillway.

Liquefaction - sudden large decrease in shear strength of a cohesionless soil (generally sand or silt) caused by collapse of soil structure and temporary increase in pore-water pressure during earthquake ground shaking.

Magnitude (earthquake) - a quantity characteristic of the amplitude of the ground motion of an earthquake. The most commonly used measurement is the Richter magnitude scale; a logarithmic scale based on the motion that would be measured by a standard type of seismograph 60 miles from the earthquake's epicenter.

Metamorphic rocks - rocks formed by high temperatures and/or pressures (for example, quartzite formed from sandstone).

Middle Rocky Mountains physiographic province - consists of mountainous terrain of high relief, extending from northern Utah to Wyoming, Idaho, and Montana (includes the Wasatch Range and Uinta Mountains in Utah).

Modified Mercalli intensity (MMI) - the most commonly used intensity scale in the U.S.; it is a measure of the severity of earthquake shaking at a particular site as determined from its effect on the earth's surface, man, and man's structures.

Montmorillonite - a clay mineral characterized by expansion upon wetting and shrinking upon drying.

Natural vegetation - native plant life existing on a piece of land before any form of development.

Normal fault - fault caused by crustal extension in which relative movement on opposite sides is primarily vertical; for example, the Wasatch fault.

Oolite - spherical grains of carbonate sand with a brine shrimp fecal pellet nucleus.
Outlet (dam) - a conduit through which controlled releases can be made from the reservoir.

Peat - unconsolidated surficial deposit of partially decomposed plant remains.

Period (geologic) - a standard (world-wide) geologic time unit.

Permeability - the capacity of a porous rock or soil for transmitting a fluid.

Physiographic province - a region whose pattern of relief features or landforms differs significantly from that of adjacent regions.

Piping (problem soil and rock) - a weak incoherent layer in unconsolidated deposits that acts as a channel directing the movement of water. As the layer becomes saturated it conducts water to a free face (cliff or stream bank for example) that intersects the layer, and material exits out a "pipe" formed in the free face. Piping can occur in a dam as the result of progressive development of internal erosion by seepage.

Pore space - the open spaces in a rock or soil between solid grains. The spaces may be filled with gas (usually air) or liquid (usually water).

Porosity - the ratio of the volume of pore space in rock or soil to the volume of its mass, expressed as percentage.

Probable Maximum Flood (PMF) - a flood that would result from the most severe combination of critical meteorological and hydrologic conditions possible in a region.

Probable Maximum Precipitation (PMP) - the maximum amount and duration of precipitation that can be expected to occur on a drainage basin.

Problem soil and rock - geologic materials that are susceptible to volumetric changes, collapse, subsidence, or other engineering geologic problems.

Project Impact - An initiative of the Federal Emergency Management Agency intended to modify the way in which the United States handles natural disasters. The Goal of Project Impact from a Federal Government perspective is to reduce the personal and economic costs of hazard events by bringing together the private and public sector to better enable the citizens of a community to protect themselves from natural hazards.

Quaternary - a geologic time period covering the last 1.6 million years.

Recurrence interval - the length of time between occurrences of a particular event (an earthquake, for example).

Rock fall- abrupt free fall or down slope movement, such as rolling or sliding, of loosened blocks or boulders from an area of bedrock. The rock-fall runout zone is the area below a rock-fall source which is at risk from falling rocks.

Rock topple - forward rotation movement of a rock unit(s) about some pivot point.

Runout zone (avalanche) - where a snow avalanche slows down and comes to rest (deposition zone). For large avalanches, the runout zone can include a powder- or wind-blast zone that extends far beyond the area of snow deposition.

Sand boil (earthquake) - deposit of sandy sediment ejected as water and sand to the surface, formed when ground shaking has caused liquefaction at depth.

Scarp - a relatively steeper slope separating two more gentle slopes. Scarps can form as result of earthquake faulting.

Sediment - material that is in suspension, is being transported, or has been moved from its site of origin by water, ice, or wind, and has come to rest on the earth's surface either above or below the sea level.

Sedimentary rocks - rocks formed from loose sediment such as sand, mud, or gravel deposited by water, ice, or wind, and then hardened into rock (for example, sandstone); or formed by dissolved minerals precipitating out of solution to form rock (for example, tufa).

Seiche - a standing wave generated in a closed body of water such as a lake or reservoir. Ground shaking, tectonic tilting, sub aqueous fault rupture, or landsliding into water can all generate a seiche.

Seismic waves - vibrations in the earth produced during earthquakes.

Seismicity - seismic or earthquake activity.

Sensitive clay - clay soil that experiences a particularly large loss of strength when disturbed. Deposits of sensitive clay are subject to failure during earthquake ground shaking.

Shear strength - the internal resistance that tends to prevent adjacent parts of a solid from "shearing" or sliding past one another parallel to the plane of contact. It is measured by the maximum shear stress that can be sustained without failure.

Shear stress - a stress causing adjacent parts of a solid to slide past one another parallel to the plane of contact.

Slope failure - a general term referring to any type of natural ground movement on a sloping surface (see landslide).
Slump - a slope failure that slides along a concave rupture surface. Generally slumps do not move very far from the source area.

Snow avalanche - a rapid down slope movement of a mass of snow, ice, and debris.

Stafford Act Robert T. Stafford Disaster Relief and emergency Assistance Act, PL 100-707, signed into law November 23 1988: amended the Disaster Relief Act of 1974, PL 93-288

Starting zone (avalanche) - where the unstable snow or ice breaks loose and starts to slide.
Subsidence - a settling or sinking of the earth's crust.

Surface fault rupture (surface faulting) - propagation of an earthquake-generated fault rupture to the ground surface, displacing the surface and forming a scarp.

Tectonic subsidence - subsidence (down dropping) and tilting of a basin on the down dropped side of a fault during an earthquake.

Toe (landslide) - the margin of disturbed material most distant from the main scarp.

Track (avalanche) - the slope or channel down which a snow avalanche moves at a fairly uniform speed.

Unconsolidated basin fill - uncemented and nonindurated sediment, chiefly clay, silt, sand, and gravel, deposited in basins.

Urban area - a geographical area, usually of incorporated land, covered predominately by engineered structures including homes, schools, commercial buildings, service facilities, and recreational facilities.

Urban/Wildland Interface (Urwin) - a geographical area where two different environments, wildland and urban residential, meet and affect each other.

Velocity (ground motion) - the rate of displacement of an earth particle caused by passage of a seismic wave.

Wasatch fault - a normal fault that extends over 200 miles from Malad City, Idaho to Fayette, Utah, and trends along the western front of the Wasatch Range.

Watershed - the area of land above a reference point on a stream or river, which contributes runoff to that stream.

Weathering - a group of processes (such as the chemical action of air, rain water, plants, and bacteria and the mechanical action of temperature changes) whereby rocks on exposure to the weather change in character, decay, and finally crumble into soil.
Wildfire - uncontrolled fire burning in vegetation.

Wildland area - a geographical area of unincorporated land covered predominately by natural vegetation.

Wildland Urban Interface - Wildland vegetation and forested areas adjacent to or intermingled with residential developments.

Zone of deformation (earthquake) - the width of the area of surface faulting over which earth materials have been disturbed by fault rupture, tilting, or subsidence.

List of Acronyms and Recognized Abbreviations

AGRC	Automated Geographic Reference Center
AOG	Association of Governments
Assoc.	Association
ATV	All Terrain Vehicle
Bldg.	Building
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
Bur.	Bureau
CEM	Comprehensive Emergency Management
Corp.	Corporation
CRS	Community Rating System
Dept.	Department
DESHS	Division of Emergency Services and Homeland Security
Div	Division
DMA 2000	Disaster Mitigation Act of 2000
DOT	Department of Transportation
DNR	Division of Natural Resources
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute

FEMA	Federal Emergency Management Agency
FFSL	Forestry Fire and State Lands
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FS	Forest Service
GIS	Geographic Information Systems
HAZMAT	Hazardous Materials
HAZUS MH	Hazards United States
ICS	Incident Command System
LEPC	Local Emergency Planning Committee
MSL	Mean Sea Level
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
OSHA	Occupational Safety and Health Administration
PDM	Pre-Disaster Mitigation
PDSI	Palmer Drought Severity Index
SCS	Soil Conservation Service
SEUALG	Southeastern Utah Association of Local Governments
SLC	Salt Lake City
SPI	Standardized Precipitation Index
SWSI	Surface Water Supply Index
UGS	Utah Geological Survey
URWIN	Urban-Rural Wildland Interface Zone

USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UT.	Utah
WFRC	Wasatch Front Regional Council

RESOLUTION NO. #6

A RESOLUTION ADOPTING THE UINTAH BASIN ASSOCIATION OF GOVERNMENTS PRE-DISASTER HAZARD MITIGATION PLAN AS REQUIRED BY THE FEDERAL DISASTER MITIGATION AND COST REDUCTION ACT OF 2000.

WHEREAS, President William J. Clinton signed H.R. 707, the *Disaster Mitigation and Cost Reduction Act of 2000*, into law on October 30, 2000.

WHEREAS, the Disaster Mitigation Act of 2000 requires all jurisdictions to be covered by a Pre-Disaster Hazard Mitigation Plan to be eligible for Federal Emergency Management Agency post-disaster funds,

WHEREAS, Uintah Basin Association of Governments (UBAOG) has been contracted by the State of Utah to prepare a Pre-Disaster Mitigation Plan covering all of the jurisdictions in the UBAOG Area, and

WHEREAS, the UBAOG Executive Council approved UBAOG Staff to write the plan on October 2002, and

WHEREAS, Manila Town is within the UBAOG Area, and

WHEREAS, Manila Town is concerned about mitigating potential losses from natural disasters before they occur, and

WHEREAS, the plan identifies potential hazards, potential loses and potential mitigation measures to limit loses, and

WHEREAS, Manila Town has determined that it would be in the best interest of the community as a whole to adopt the Pre-Disaster Hazard Mitigation Plan as it pertains to the Town, therefore

BE IT RESOLVED BY MANILA TOWN THAT:

The attached “Uintah Basin Association of Governments Pre-Disaster Mitigation Plan” be adopted to meet the requirements of the Disaster Mitigation and Cost Reduction Act of 2000.

This Resolution shall be effective on the date it is adopted.

DATED this 9th day of July, 2004.

Chuck Dickison, Mayor
Manila Town

ATTEST:

, Recorder

A new federal law was passed to try and reduce the cost of natural disasters. Local governments now have to plan ways to reduce the impacts of disasters in order to be eligible for certain types of federal disaster assistance. With the counties and cities help communities can have a plan in place that will make them eligible for mitigation grants to address hazards identified in the plan. Please answer the following questions about your town, city, or county.

HAZARD PROFILE

HAZARD:

- ☐ Avalanche
- ☐ Dam Failure
- ☐ Drought
- ☐ Earthquake
- ☐ Flash flooding
- ☐ Flooding
- ☐ Infestation
- ☐ Landslide
- ☐ Soil Subsidence
- ☐ Tornado
- ☐ Wildfire
- ☐ Winter/Summer Storms
- ☐ Other

HISTORY (please include History information for all hazards on an attached page):

- ☐ Year
  - ⇒
- ☐ Location
  - ⇒
- ☐ Event Description
  - ⇒
- ☐ Response and Recovery Costs
  - ⇒
- ☐ Comments
  - ⇒

MITIGATION PROJECTS:

- ☐ Present
  - ⇒ Hazard___________________________________
  - ⇒ Location____
  - ⇒ Year____________________________________
  - ⇒ Reason____

- ☐ Potential
  - ⇒ Hazard___________________________________
  - ⇒ Location____
  - ⇒ Year____________________________________

ORDINANCES (please attach a copy):

- ☐ Storm water management

- ☐ Zoning
- ☐ Stream maintenance
- ☐ Subdivisions
- ☐ Erosion control
- ☐ Floodplain management
- ☐ Natural hazards

Current Building Codes:

⇒ Date of update________________________________

⇒ Which codes are used____

National Flood Insurance Program:
Currently in Good Standing with the NFIP?

Previous Hazard Mitigation Plan:

⇒ Date published________________________________

⇒ Date of update________________________________

Fire Insurance Rating (ISO):

⇒

Flood Hazard Identification Study
Uintah Basin Association of Governments

By:
United States Army Corps of Engineers
Utah Division of Emergency Services and Homeland Security

August 1, 2003

Introduction

The US Army Corps of Engineers Sacramento District completed this flood hazard identification study through a contract with the seven Associations of Governments. Funding was provided under the USACE Planning Assistance to States Program (Section 22). The intent of the study is to aid in detailing natural hazards associated with fluvial process for entities within each AOG currently unmapped as part of the National Flood Insurance Program or mapped as D zone areas.

Acknowledgements

The following agencies aided in preparation, interpretation, and completion of this flood hazard investigation study.

Utah Associations of Governments
Uintah Basin Association of Governments
Sacramento District Corps of Engineers
Utah Division of Emergency Services and Homeland Security

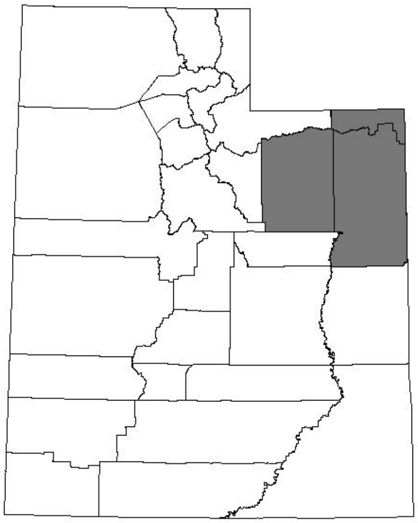
Scope of Work

This study will evaluate and identify areas with a high flood hazard and identify potential mitigation solutions. The areas evaluated in this study include the three unincorporated counties of Daggett, Duchesne, and Uintah. Municipalities within the three counties were studied if they met the following criteria:

1. Jurisdiction has not been mapped by FEMA,
2. Jurisdiction mapped by FEMA as a Zone D, area of undetermined flood hazard.

Fluvial hazards within the cities and towns of Dutch John, Manila, Altamont, Roosevelt, Tabiona, Ballard, and Naples were studied.

Description of the Study Area



Uintah Basin Association of Government UBAG serves the following counties and municipalities with this counties: Daggett, Duchesne, and Uintah. The three counties in the study area are very rural, with the total population of the Uintah Basin being only 40,516. Each counties population is: Daggett 921, Duchesne 14,371, and Uintah 25,244. The principle draining in the area is the Green River with the Duchesne and White Rivers as major tributaries. The Uintah basin is divided into two drainages—the North Slope and the south slope of the Uinta Mountains. Elevations in the basin range from 13,528 feet and Kings Peak in the Uinta Mountains to 4,600 feet along the green river near it's excite from Uintah County.

The Uinta Mountain range is unique, being the only major range of mountains in North America running east and west. The Uintah Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, arêtes, cirques, and glacial troughs. Lateral and terminal moraines often form natural dams, creating over a thousand small lakes that dot the region.

Numerous small streams exit the north and south slope of the Uinta range. These include such streams as the Sheep Creek, Carter Creek, Currant Creek, Red Creek, Rock Creek, Yellowstone, Whiterocks, and Strawberry River.

Discussion, Data, and Observations

Data presented in this study are from the following sources:

- Daggett County Emergency Response Plan
- Uintah County Emergency Response Plan
- Duchesne County Emergency Response Plan
- City of Naples Storm Water Master Plan
- State Water Plan
- Utah State Water Plan Uintah Basin (December, 1999)

In addition to incorporating existing studies and plans completed in the area, this flood hazard study also contains information from technical experts familiar with the study area. The mitigation projects are purely suggested actions, which based on past experience, will reduce or eliminate the identified fluvial hazard. These mitigation recommendations in no way represent the only measure to attain fluvial mitigation. In many cases the proposed or best solution is simply avoidance. This method of mitigation is implemented through the use of zoning, and represents in most cases the lowest cost mitigation measure.

Disclaimer

The information provided in this study was developed from a number of sources including:

- Past USACE studies done within the region and drainage basins,
- Personal knowledge,
- Limited onsite visits,
- Map interpolations,
- Current GIS work.

Even though care was taken to ensure a measure of correctness and field checks were preformed on the information and data gathered, it is important to note this flood hazard study is presented "as is". The United States Army Corps of Engineers, Division of Emergency Service and Homeland Security, or any other agency assisting in completion of this study cannot accept any responsibilities for errors, omissions, or accuracy. There are no warranties, which accompany this product. Users are cautioned to field verify information provided in this product before making any decisions. In no way does the mapping presented in this study take the place of a regulatory FEMA Flood Insurance Rate Map (FIRM), or replace any flood hazard identification product developed by FEMA / National Flood Insurance Program (NFIP).

Need For Additional Research

Additional research should be conducted to better map communities currently mapped as a FEMA Zone D, or currently unmapped communities, and communities with out dated Flood Insurance Rate Maps. Communities would benefit from knowing peak flows and stages on tributaries of concern.

How Communities Where Ranked

The communities within this study were ranked based on a committee's evaluation. The evaluation committee consisted of the:

- Utah State Floodplain Program Manager
- Utah State Hazard Mitigation Officer,
- Natural Hazard Mitigation Planner,
- U.S. Army Corp of Engineers,
- State Earthquake Program Manager.

This committee researched each of the twenty-nine counties and all 269 incorporated areas within the State of Utah. Each jurisdiction was assigned one of five ratings: Very High, High, Moderate, Low, or Not Rated. These <u>ratings in no way reflect actual flood threat.</u> The ratings were assigned based on the following variables:

- Perceived flood threat based on topography, past flooding occurrences, and experience of committee members.
- Participation in the National Flood Insurance Program (NFIP).
- Past studies included, but not limited to, regulatory FEMA/NFIP Flood Insurance Studies (FIS), other flood studies, and reconnaissance reports.
- Population growth within the jurisdiction.
- If the community is mapped by FEMA/National Flood Insurance Program NFIP), and type of map which identifies high, moderate and low flood threats

Ratings were used to set the scope of work for each community within this study**.** Information on excluded communities was added were available.

A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years.

Daggett County
- Flaming Gorge
- Long Park

Duchesne County
- Cliff Lake
- Browns Draw
- Starvation
- Twin Pots
- Moon Lake
- East Timothy
- Red Creek
- Chepeta Lake
- Stillwater
- Big Sand Wash

Uintah County
- Brough
- Whiterocks
- East Park
- Paradise Park
- Bullock Draw
- Lapoint
- Montes Creek
- Cottonwood

Daggett County

COUNTY	CITY/TOWN	POPULATION	STATE MAP LOCATION	NFIP STATUS	THREAT (or NSFHA-eligible)
Daggett	**Unincorporated**	413		**Not Participating**	Green River & Tribs
Daggett	**Dutch John**	200	D8	**Not Participating**	Dutch John Canyon
Daggett	**Manila**	308	D8	**Not Participating**	Sheep Creek Canal

Daggett County Flood and Dam failure History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flash Flood Daggett	June 10, 1965	Palisades Campground	7 deaths	Source Sheep Creek
Flood Daggett Presidential	1983	County wide	Damage to culverts and roads. The one lane bridge over Green River was destroyed	Source Birch, Red, Crouse, and Pat Creeks.

(All dollar values for given are for year of disaster)

Daggett County Flood Mitigation Goals -

Goal 1 Reduce Risk of Potential Flooding

Unincorporated Daggett County – Problem Identification: Daggett is one of the smallest counties in the state both in terms of population and size. However, almost half of its residents live in the unincorporated county making that population one of the largest percentages in the state. The County does not participate in the National Flood Insurance Program. No major rivers threaten existing urban development. Therefore, no structural flood control projects are warranted at this time. Flood sources include the Green River, Sheep, Carter, Pott Creeks, and their tributaries, and other potential flood sources such as Flaming Gorge Reservoir.

Objective: Minimize future flood damage in the unincorporated County

Action: Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent

(100 ft minimum setback or greater) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

Timeframe:
Funding:
Estimated Cost: Minimal – almost nothing.
Staff:

Dutch John – Problem Identification: Dutch John, one of Utah's smallest communities, does not participate in the National Flood Insurance Program. No major rivers threaten Dutch John. Dutch John Canyon Creek and the other unnamed drainages would; however, pose threats during a major flood event.

Objective: Minimize future flood damage in Dutch John.

Alternative Action: A structural mitigation project for this community could be a deflector levee from the canyon mouth, extending west past all development for distance of about a mile.

Timeframe:
Funding:
Estimated Cost: The preliminary cost for the levee project would be about $250,000.
Staff:

Alternative Action: A nonstructural project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

Timeframe:
Funding:
Estimated Cost: minimal.
Staff:

Manila – **Problem Identification:** Manila does not participate in the National Flood Insurance Program. No major rivers flow through or threaten Manila. However, flooding could be experienced from the Sheep Creek Canal if overtopped or if failure were to occur. The drainages surrounding Manila in the unincorporated county create a less severe flood threat from time to time.

Objective: Minimize future flood damage in Manila.

Alternative Action: In light of several canal failures around the state, a stability study of the Sheep Creek Canal could be conducted. If study findings reveal deficiencies, perform all remedial measures identified. Also, all new development could be permitted a safe distance away from the unnamed drainages surrounding Manila.

Timeframe:
Funding:
Estimated Cost: A detailed canal stability study could be up to $50,000.
Staff:

Alternative Action: A nonstructural project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

Timeframe:
Funding:
Estimated Cost: minimal.
Staff:

Duchesne County

COUNTY	CITY/TOWN	POPULATION	STATE MAP LOCATION	NFIP STATUS	THREAT (or NSFHA-eligible)
Duchesne	**Unincorporated**	7798		**Not Participating**	Duchesne River and Tributaries
Duchesne	**Altamont**	178	E7	**Not Participating**	Unnamed drainages east & west of town
Duchesne	Duchesne	1408	E7	D-490055 - 2/4/88	
Duchesne	Myton	539	E7	490056 - 2/4/88	
Duchesne	**Roosevelt**	4299	E7	**Not Participating**	Cottonwood Creek and tributary
Duchesne	**Tabiona**	149	E6	**Not Participating**	Duchesne River and Tributaries

Duchesne County Flood and Dam failure History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flood Duchesne	September 13, 1940	Duchesne	Damage in Indian Canyon and roads flooded	Source: Indian Canyon
Flood Duchesne	August 7, 1941	Mountain Home	Destroyed bridges washed out road over Kofford wash in caused damage in Rock Creek	
Flood Duchesne	August 7, 1945	Strawberry Creek area	Damage to roads, ranches, and irrigation diversions near Strawberry Creek.	Source Strawberry Creek.
Flood Duchesne	August 1, 1953	Sowers Canyon	Damage to farm house and 200 acres of farmland	

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flood Duchesne	August 5, 1957	Tabiona/Hanna	Damage to homes, roads, farms, and crops	Farm Creek
Flood Duchesne	September 2, 1960	Hanna	Flood homes and damaged approximately 100 acres of farmland	
Flood Duchesne	August 11, 1969	Duchesne	Damage to town due to flooding	Source Strawberry Creek and Indian Creek.
Flood Duchesne Presidential	1983	County Wide	Damage to roadways, stream embankments, blockage of culverts, and bridges.	Source Yellowstone River, Strawberry River, Duchesne River, and Red Creek.
Flood Duchesne Presidential				

(All dollar values for given are for year of disaster)

Duchesne County Flood Mitigation Goals -

Goal 1 Reduce Risk of Potential Flooding

Unincorporated Duchesne County - Problem Identification: Well over 50 percent of the population lives in unincorporated areas of the county – one of the highest percentages in the state – many in the vicinity of Roosevelt. The highest point in the state, Kings Peak at 13,528 ft is located in northern Duchesne County, making the Duchesne Watershed a significant resource. These high mountain watersheds provide much needed water but also pose flood threats from time to time. The County does not participate in the National Flood Insurance Program, therefore flood studies are not available. Flood threats include the Duchesne River and its numerous tributaries. Other potential flood sources include Starvation and other reservoirs.

Objective: Minimize future flood damage in the unincorporated County

Action: Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback or greater) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

Timeframe:
Funding:
Estimated Cost: Minimal – almost nothing.
Staff:

Altamont – Problem Identification: Altamont does not participate in the NFIP. This community and Mt. Evans just to the southeast appear to have a moderate flood threat from unnamed channels in the immediate vicinity.

Objective: Minimize future flood damage in Altamont.

Alternative Action: A structural mitigation project for this community could be a deflector levee around the community, extending south on both sides past existing development. The overall length would be about a mile.

Timeframe:
Funding:
Estimated Cost: The preliminary cost for the levee project would be about $250,000.
Staff:

Alternative Action: Zoning to prevent development of structures near all drainages would be prudent (100 ft minimum setback or greater). The cost of modifying city ordinances to include these is minimal and the benefits substantial (although this would not reduce the flood threat to existing structures).

Timeframe:
Funding:
Estimated Cost: Minimal – almost nothing**.**
Staff:

Roosevelt – Problem Identification: This community does not participate in the NFIP. Although Cottonwood Creek runs through the north and east parts of town, the channel appears to be very incised and, as a result, would only pose a flood threat during major events. (There is also a tributary through the south side of town that the same would hold true for.)

Objective: Minimize future flood damage in Roosevelt.

Alternative Action: Maintaining the channel clear of debris and snags would be a very low cost method of minimizing flood damages in Roosevelt.

Timeframe:

Funding:

Estimated Cost: Minimal – city crews and equipment could be used when they are available.

Staff:

Alternative Action: Zoning to prevent development of structures near all drainages would be prudent (100 ft minimum setback or greater). The cost of modifying city ordinances to include these is minimal and the benefits substantial (although this would not reduce the flood threat to existing structures).

Timeframe:

Funding:

Estimated Cost: Minimal – almost nothing**.**

Staff:

Tabiona – Problem Identification: This community is the smallest incorporated town in Duchesne County with 149 residents. It does not participate in the NFIP. Tabiona is bounded by flood threats from virtually every side. The Duchesne River runs along the southwest side of town and two tributaries are located to the east and to the west – all posing flood threats.

Objective: Minimize future flood damage in Tabiona.

Alternative Action: Given the relatively few number of existing structures, flood proofing may be a viable alternative – especially for those structures with a history of being flooded. Zoning to prevent new structures from being built in the floodplain would be very helpful and cost effective.

Timeframe:

Funding:

Estimated Cost: $10k - $30k for the average home to flood proof.

Staff:

Alternative Action: A structural mitigation project for this community could be a deflector levee on the east side of the community, extending north and south past existing development. The overall length would be about a mile.

Timeframe:

Funding:

Estimated Cost: The preliminary cost for the levee project would be about $250,000.

Staff:

Uintah County

COUNTY	CITY/TOWN	POPULATION	STATE MAP LOCATION	NFIP STATUS	THREAT (or NSFHA-eligible)
Uintah	**Unincorporated**	15664		490147 – 2/1/86(L)	Green River, Ashley Creek, and Tribs
Uintah	**Ballard**	566	E7	**Not Participating**	NSFHA-eligible
Uintah	**Naples**	1300	E8	**Not Participating**	Ashley Creek Tribs
Uintah	Vernal	7714	E8	490149 - 3/18/86(M)	

Uintah County Flood and Dam failure History

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flash Flood Uintah	September 1, 1909	Ashley River near Vernal	1 death	Man crossing Ashley Creek with a wagon
Flash Flood Uintah	July 4, 1925	Five Mile Canyon near Vernal	1 death	Child swept from automobile
Flood Uintah	August 9, 1941	Vernal/Jensen	Approximately $75,000 to crops was caused by heavy rain and hail. Red Wash bridge damaged	
Flood Uintah	August 25, 1955	Lapoint	$3,000 in damage to bridges and roads	
Flood Uintah	July 30, 1956	Jensen	$25,000 damage to farmlands and crops	
Flood Uintah	June 10, 1965	Maeser/Ouray	Damage to homes, crops, and waterlines	Source: Ashley Creek, Dry Fork, The Green, White, and Duchesne Rivers.

Hazards	Date	Location	Critical Facility or Area Impacted	Comments
Flood Uintah Presidential	1983	County Wide	Limited flooding in Vernal, damage to roads, and bridges	Source Ashley and Deep Creeks and the Green River.
Flood Uintah Presidential				

(All dollar values for given are for year of disaster)

Uintah County Flood Mitigation Goals -

Goal 1 Reduce Risk of Potential Flooding

Unincorporated Uintah County - Problem Identification: Well over half of its residents – 62 percent live in the unincorporated county – many in the area surrounding Vernal - making that population one of the highest percentages in the state. Flood sources include the Green River, Ashley Creek, and their tributaries. Other potential flood sources include Steinaker and Red Fleet and smaller Reservoirs.

Objective: Minimize future flood damage in the unincorporated County.

Action: Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback or greater) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

Timeframe:
Funding:
Estimated Cost: Minimal.
Staff:

Ballard – Problem Identification: While not participating in the NFIP, this community does not appear to be subject to flood threats from any rivers, creeks, or streams and is; therefore, probably eligible for a NSFHA designation.

Objective: Minimize future flood damage in Ballard.

Action: Identify Ballard as a NSFHA-eligible community.

Timeframe:
Funding:
Estimated Cost: Minimal
Staff:

Naples – Problem Identification: This community does not participate in the NFIP. It does have a relatively serious flood threat as evidenced by the many washes that run through it to the Ashley Creek on the east side. The county floodplain map identifies the flood threat on both sides of Naples in the unincorporated area. It can be assumed that a similar (or probably greater) threat exists for the town itself.

Objective: Minimize future flood damage in Naples.

Alternative Action: Because there are multiple drainages, a levee would likely not be viable. Flood proofing of individual structures; however, may be a viable alternative – especially for those structures with a history of being flooded.

Timeframe:
Funding:
Estimated Cost: $10k - $30k for the average home to flood proof.
Staff:

Alternative Action: An alternative action would be zoning to prevent new structures from being built in the floodplain would be very helpful and cost effective. However it would NOT reduce flood damages to existing development.

Timeframe:
Funding:
Estimated Cost: Minimal.
Staff:

Daggett County Mitigation Strategies

Note: Countywide in this document refers to a mitigation strategy benefiting the cities, towns and communities of: Dutch John and Manila

Wildfire

County-Wide

Problem Identification: Continuing non-compliance with existing building and fire codes.

Goal 1- Priority High

Objective 1.1 -Decrease non-compliance with existing building and fire codes.

Action: Develop and enforce current local, state and national codes.
Time Frame: Ongoing
Funding: Local, state and federal grants
Estimated Cost: Unknown
Staff: Local, state and federal agencies
Background: Implement and enforce rules, regulations and codes.

Problem Identification: Specific areas of the county are susceptible to wildland fire danger.

Goal 2- Priority High

Objective 2.1 - Reduce the threat of Wildfire

Action: Complete a community fire plan for the entire County with the assistance of the Regional State Fire Warden, local Fire Chief, USFS and BLM.
Time Frame: next fiscal year
Funding: Local, state, federal
Estimated Cost: Minimal
Staff: Regional State Fire Warden, local, state and federal agencies (ie. BLM, USFS)
Background: There have been repeated wildfires in the county; the majority of wildfires have started on federal lands. The fire in 1977 took the lives of 3 firefighters. The 2002 Mustang fire caused the entire Dutch John area to be evacuated the cost was 1.5 million dollars. This fire effected the county, the cost to the county was not just the money to extinguish the fire, the economic impact still lingers presently. The cost to the Bridger Valley

Electric power company was approximately $250,000; several other power companies also lost money. There was also a cost to the pipeline companies. The county is able to address the private lands and educate the public, however they have no control over the Federal agencies and how they manage the land.

Landslide

County-Wide

Problem Identification: Potential landslides Highway 44 & 191

Goal 1- Priority High

Objective 1.1 - Reduce landslide impact on Hwy 44 and 191, the potential for damage to either Hwy. 44 or 191 would necessitate a plan to reroute traffic and repair the damage to the highway. Damage repair would be coordinated as needed.

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Action: Assess the probability of landslides and identify specific area at risk. Determine hazard and refer to UDOT
. **Time Frame:** According to UDOT.
Funding: According to UDOT funding.
Estimated Cost: Undetermined
Staff: UDOT
Background: Rocks that falls on highway 44 cause a danger to motorists from falling as well as a hazard in the road, the problem will be referred to UDOT.

Problem Identification: Potential risk to structures in mountainous areas that could be damaged by landslides.

Goal 2- Priority Medium

Objective 2.1 - Reduce potential landslide risk on commercial and residential structures on upper elevations.

Action: Assessing possibility of landslides.
Time Frame: 5 years
Funding: USFS
Estimated Cost: Unknown
Staff: USFS
Background: Soil surveys and other engineer surveys are needed.

Earthquake

County-Wide

Problem Identification: Unknown number of seismically unsafe structures around the county.

Goal 1- Priority Medium

Objective 1.1 - Have a study done to determine seismic resistance of structures within the county ie. elementary school, high schools, public buildings, and highways. etc.

> **Action:** Structural and non-structural earthquake hazard assessment.
> **Time Frame:** 3 to 4 years
> **Funding:** Unknown
> **Estimated Cost:** Unknown
> **Staff:** Unknown
> **Background:** Contact DESHS earthquake program specialist. Several seismographic tests have been done within the county most likely for oil.

Problem Identification: Residents uneducated about earthquakes.

Goal 2- Priority Medium

Objective 1.2 - Public Awareness

> **Action:** Conduct pubic awareness campaign. Enhance earthquake instructions in school.
> **Time Frame:** Ongoing
> **Funding:** Federal and state grants, local sources.
> **Estimated Cost:** Minimal
> **Staff:** LEPC, volunteers and school administration.
> **Background:** Contact DESHS earthquake program specialist.

Goal 2- Priority Medium

Objective 2.1 – Verify Building Codes are updated

> **Action:** Check with Planning and Zoning on building codes.
> **Time Frame:** Ongoing
> **Funding:** Local sources.
> **Estimated Cost:** Minimal

Staff: County and Town Planning and Zoning.
Background: It is unclear if earthquake building codes are in place.

Flood

County-Wide

Problem Identification: There is not enough flood information on flood areas in Daggett County to identify the problem at this time.

Goal 1- Priority Medium

Objective 1.1 - Identify flood prone areas in County

Action: County flood mapping of potential flood areas.
Time Frame: Unknown
Funding: FEMA
Estimated Cost: Undetermined
Staff: State and FEMA personnel.
Background: Contact DESHS flood map specialist.

Action: Join NFIP
Time Frame: Immediate
Funding: None required
Estimated Cost: None
Staff: County Emergency Management and State Floodplain Office
Background: Daggett County has yet to be mapped with Special Flood Hazard Areas. Flood insurance is not available in the County because the County has yet to join NFIP.

Problem Identification: Possible flood because of the 2002 Mustang Fire, high spring run off, or thunderstorms due to lack of vegetation.

Goal 2- Priority High

Objective 2.1 - To reduce the threat of flood in the Dutch John area that may occur because of the Mustang Fire.

Action: Flood Ordnance
Time Frame: Ongoing
Funding: FEMA, state flood plan manager and local.
Estimated Cost: Minimal
Staff: County Emergency Management, County Commission, and State DES.
Background: The Mustang 2002 Fire could cause flooding or mudslides to the residents of Dutch John, there was a flash flooding last summer at Littlehole due to no vegetation to hold backwater. High run off in the spring could cause flooding. Contact DESHS flood map specialist.

Problem Identification: Control flooding in Town of Manila flooding occurs from heavy rains and fast moving thunderstorms.

Goal 3- Priority Medium

Objective 3.1 - To reduce the threat of flood of the Manila.

Action: Technical Analysis on the irrigation canals
Time Frame: Ongoing
Funding: FEMA, state and local.
Estimated Cost: Unknown.
Staff: : Unknown
Background: There has been flooding in the Town of Manila in the past due to heavy rains and high run off in the spring.

Objective 3.2- Reduce debris in Sheep Creek Canal.

Action: Develop a debris removal plan
Time Frame: 3 months to 2 years (depending on funding)
Funding: Local, State and Federal grants
Estimated Cost: Unknown
Staff: Town of Manila, Sheep Creek Irrigation
Background: The canal is used as a storm drain during high water debris such as weeds; garbage and trees back up canal causing flooding. The canal needs to be kept free of obstructions.

Objective 3.3- Reduce debris in Sheep Creek Canal.

Action: Public Education
Time Frame: 2 years
Funding: Local state and federal grants
Estimated Cost: Unknown
Staff: Town of Manila, Sheep Creek Irrigation
Background: The canal is used as a storm drain during high water, the tourists throw garbage in the canal causing flooding of canal.

Objective 3.4- - Identify flood prone areas in Manila.

Action: Flood mapping of potential flood areas in Manila.
Time Frame: Unknown (depending on funding)
Funding: FEMA grants
Estimated Cost: Unknown
Staff: Unknown
Background: Flooding has happened in the past, we were unable to establish which areas were at risk.

Objective 3.5: Design master storm drainage plans for residential areas.

Action: Design master storm drainage plans to handle storm water runoff in residential areas.
Time Frame: 5 years, (depending on funding)
Funding: Grants
Estimated Cost: Unknown
Staff: Unknown
Background: Engineers need to design master storm drainage plans for the residential areas as well as new subdivisions.

Drought

County-Wide

Problem Identification: Limited water supplies, increasing population and several years of drought place a strain on availability of community culinary water resources Water Storage

Goal 1 – Priority High

Objective 1.1 Excessive water used for landscaping

> **Action:** Develop and enforce policies to limit the amount of area that can be used as water requiring landscape.
> **Time Frame:** Ongoing
> **Funding:** minimal
> **Estimated Cost:** To be determined
> **Staff:** Special Service District
> **Background:** Daggett County has had several years of drought and has at time been unable to supply water to residents on the Manila side of the county.

Objective 1.2 - Develop more water storage tanks in several areas in the county.

> **Action:** Conduct feasibility study.
> **Time Frame:** 5 years
> **Funding:** Grants
> **Estimated Cost:** Unknown
> **Staff:** Unknown
> **Background:** Daggett County on the Manila side has had several years of drought and does not have enough storage to enable the water district to store spring run off for summer use. There have been several years that the water district was unable to supply water to residents due to not enough storage.

Problem Identification: Earthen irrigation systems throughout the County.

Goal 2- Priority Medium

Objective 2.1 - Upgrading irrigation systems.

Action: Improve canal in order to have better efficiency of water.
Time Frame: Unknown (depends on funding)
Funding: State and Federal grants and loans.
Estimated Cost: Unknown
Staff: NRCS, UACD, USU Extension, etc. Irrigation Company
Background: Several years of drought and a need for water conservation.

Problem Identification: There has not been enforcement of water law.

Goal 3 - Priority High

Objective 3.1 -The County has not enforced water law.

Action: Find out who is responsible to enforce the water law, then enforce it.
Time Frame: Unknown
Funding: Unknown
Estimated Cost: Unknown
Staff: County Commission and Special Service District.
Background: May start by litigation.

Problem Identification: Lack of public awareness of efficient water usage.

Goal 4 - Priority High

Objective 4.1 - Education

Action: Use several ways in educating the public on efficient water usage.
Time Frame: Ongoing
Funding: State, Federal grants, city and county funds, irrigation companies.
Estimated Cost: Minimal
Staff: LEPC, County, Town.
Background: Create programs to make the public aware. Use newsletters and the newspapers..

Insect Infestation

County-Wide

Problem Identification: Heavy infestations of Mormon crickets and grasshoppers.

Goal 1- Priority High

Objective 1.1 - Have government agencies develop better control methods on federal state and county grounds.

Action: Eradicate crickets and grasshoppers.

Time Frame: Ongoing.
Funding: Federal government.
Estimated Cost: Unknown
Staff: BLM and other federal and state agencies.
Background: The County has heavy infestation of crickets and grasshoppers, a particular type was created by the drought.

Problem Identification: The County has infestations of mosquitoes.

Goal 2 - Priority High

Objective 2.1 Reduce the impact of insects and West Nile Virus

Action: Spread insect bait and spray for mosquitoes

Time Frame: When required
Funding: Federal, State and County funds. Mosquito abatement funds (come from property tax).
Estimated Cost: Unknown
Staff: County Mosquito Abatement District
Background: Mosquito's are of particular concern to elderly residents because of the West Nile Virus, the virus has been identified in the counties that surround Daggett County namely Sweetwater Wy., Moffat Co., and Uintah Co. Ut.

Severe Weather

County-Wide

Problem Identification: Wind damage to property and resulting loss of power to facilities in the County.

Goal 1- Priority High

Objective 1.1 - Reduce power outages.

Action: Improve infrastructures to minimize power outages.
Time Frame: Ongoing
Funding: Unknown
Estimated Cost: Unknown
Staff: Local utilities.
Background: Contact utilities on current situation.

Problem Identification: Strong winds can cause trees to fall on power lines, causing power outages

Goal 2 – Priority High

Objective 2.1 Improve electrical power system reliability by reducing risk from damage by trees falling in windstorms.

Action: Prune trees back from power lines.
Time Frame: Unknown
Funding: Power Companies
Estimated Cost: Not determined, minimal to moderate
Staff: Power Companies
Background: The County has a history of severe windstorms and thunderstorm activity.

Problem Identification: Wind damage to crops and structures.

Goal 3- Priority Medium

Objective 3.1 - Reduce damage to crops and structures.

Action: Improve conditions to reduce soil erosion.
Time Frame: Ongoing
Funding: USDA and other government programs.
Estimated Cost: Unknown
Staff: NRCS, FSA
Background: Encourage people to sign up for assistance and education.

Problem Identification: The County has a history of damaging high winds.

Goal 4 – Priority High

Objective 4.1 Reduce damage to structures through strict adherence to building codes

Action: Ensure that High wind load requirement are established and are met by builders
Time Frame: Ongoing
Funding: Fees from Building permits
Estimated Cost: Minimal
Staff: Building Inspector
Background: Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events.