This section provides an overview of the hazards that could affect the State of Nevada, assesses the risk of such hazards, and compares the potential losses throughout the State to determine priorities for mitigation strategies.

The requirements for risk assessment are described below:

DMA 2000 REQUIREMENTS: RISK ASSESSMENT OVERVIEW

Risk Assessment

Requirement §201.4(c)(2): The State plan **must** include a risk assessment that provides a factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the State to compare potential losses throughout the State and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments.

Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

3.1 OVERVIEW OF A RISK ASSESSMENT

A risk assessment requires the collection and analysis of hazard-related data to enable the State to identify and prioritize mitigation actions that will reduce losses from potential hazards. There are five risk assessment steps in the hazard mitigation planning process, as outlined below.

Step 1: Identify and Screen Hazards

Hazard identification is the process of recognizing natural and human-caused events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of sufficient magnitude to cause damage. Human-caused hazards result from human activity and include technological hazards and terrorism. Technological hazards are generally accidental or result from events with unintended consequences (for example, an accidental hazardous materials release.) Terrorism is defined as the calculated use of violence (or threat of violence) to attain goals that are political, religious, or ideological in nature. Even though a particular hazard may not have occurred in recent history in the study area, all hazards that may potentially affect the study area are considered; hazards that are unlikely to occur, or for which the risk of damage is accepted as very low, are then eliminated from consideration. Once the hazards were screened, a vulnerability rating was assigned to each identified hazard based on the profiling process.

Step 2: Profile Hazards

Hazard profiling is accomplished by describing hazards in terms of history, magnitude, duration, frequency, location, and probability. Hazards are identified through collection of historical and anecdotal information, review of existing plans and studies, and preparation of hazard maps of the study area. Hazard maps are used to determine the geographic extent of hazards and define the approximate boundaries of areas at risk.

Step 3: Identify Assets

Assets are defined as population, buildings, and critical facilities and infrastructures that may be affected by hazard events.

Step 4: Assess Vulnerabilities

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The assessment provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing the State to focus attention on areas with the greatest risk of damage.

Step 5: Analyze Potential Losses

The final stage of the risk assessment process provides a general overview of vulnerable populations, structures, and critical facilities in potential hazardous areas. This information provides groundwork for decisions about where the mitigation strategies would be most effective.

3.1.1 Disaster History

The following data is from the FEMA Disaster website, which contains past presidential declarations of disaster, emergency, and fire management assistance for the State of Nevada. The following information can be found at http://www.fema.gov/news/disasters_state.fema?id=32#em.

Major Disaster Declarations

Year	Date	Disaster Types	Active	Disaster Number
2006	02/03	Severe Storms and Flooding	☐	1629
2005	03/07	Heavy Rains and Flooding	☐	1583
2004	08/26	Wildland Fire	☐	1540
1999	07/20	Severe Storms and Flash Flooding	☐	1281
1997	01/03	Severe Storms/Flooding	☐	1153
1986	02/28	Severe Storms, Flooding	☐	759
1984	09/06	Heavy Rains, Flooding	☐	723
1981	08/28	Severe Storms, Flooding	☐	645
1969	04/19	Flooding	☐	258
1965	01/18	Severe Storms, Heavy Rains, Flooding	☐	187
1963	02/14	Flooding	☐	142
1962	02/22	Flooding	☐	121
1956	08/31	Flooding	☐	63
1955	12/24	Flooding	☐	48
1955	06/21	Flooding	☐	36
1954	07/14	Earthquake	☐	19

Emergency Declarations

Year	Date	Disaster Types	Active	Disaster Number
2005	09/13	Hurricane Katrina Evacuation*	☑	3243
2005	02/23	Snow	☐	3204
2005	02/17	Snow	☐	3202
1977	06/11	Drought	☐	3041

Fire Management Assistance Declarations

Year	Date	Incident	Disaster Number
2006	11/11	Pinehaven Fire	2679
2006	08/24	Mud Fire	2670
2006	08/12	Verdi Fire	2664
2006	06/27	Linehan Fire Complex	2650
2006	06/27	Oregon Fire	2649
2006	06/26	Suzie Fire	2648
2005	08/29	Chance Fire	2581
2005	08/22	Vor-McCarty Fire	2578
2005	07/16	Carlin Fire	2568
2005	07/16	Contact Fire	2567
2005	06/24	Good Springs Fire	2563
2004	08/25	Andrew Fire	2550
2004	07/26	Robbers Fire	2536
2004	07/14	Waterfall Fire	2531
2004	06/30	Verdi Fire Complex	2524
2003	09/29	Boltair 2 Fire	2499
2003	07/15	Robb Fire	2479
2003	07/11	Red Rock Fire	2476
2003	06/17	Highway-50 Fire (Formerly Spooner Fire)	2469
2002	07/17	Lost Cabin Fire	2446
2002	07/15	Gate Fire Complex	2441
2002	07/14	Gondola Fire	2438
2002	06/09	Pioche Fire	2420
2001	08/09	Antelope Fire	2371
2001	07/05	Ten Mile Fire	2366
2001	01/13	Spring Creek Fire	2356
2000	08/01	Arrow Creek Wildfire	2316
2000	06/30	Reno Fire Complex	2312
1999	08/25	Red Rock Fire	2271
1999	08/05	Osino Fire	2268
1999	08/05	Unionville Fire	2267
1999	07/03	Mira Loma Fire	2265

1999	06/24	Lemon Valley Fire	2264
1996	08/26	Ruby Complex	2190
1996	08/13	Lee Fire	2188
1996	08/05	Belli Ranch Fire	2185
1996	06/24	Autumn Hills Fire	2183
1994	08/04	Crystal Fire	2106
1983	07/19	Silver City Fire	2045
1981	08/09	Little Valley Fire	2042
1979	06/11	Pea Vine Peak Fire	2032

Katrina is included in this emergency declaration listing on the basis that it is a "reverse" declaration. Katrina resulted in the expenditure of funds and manpower by Nevada due to thousands of people being evacuated to Nevada from Louisiana. Note: A "reverse" declaration occurs when FEMA requests aid from states which are not in an emergency situation.

3.2 IDENTIFYING HAZARDS

The requirements for hazard identification, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Identifying Hazards

Requirement §201.4(c)(1): The State risk assessment **shall** include an overview of the type … of all hazards that can affect the State … .

Element

Does the **new or updated** plan provide a description of the type of **all natural hazards** that can affect the State?

If the hazard identification omits (without explanation) any hazards commonly recognized as threats to the State, this part of the plan cannot receive a Satisfactory score.

Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

3.2.1 Hazard Mitigation Rating Overview

The Nevada Hazard Mitigation Planning Committee used the hazard mitigation ratings developed by the 2002 Hazard Mitigation Steering Committee. These ratings used seven criteria to prioritize the potential risks and hazards of the State of Nevada. These seven criteria include the following:

Criterion One: Magnitude

Magnitude refers to the physical and economic impact of the event. Magnitude factors are represented by:

1. Size of event
2. Life threatening nature of the event
3. Economic impact of the event
4. Threat to property
    a. Public Sector
    b. Private Sector
    c. Business and Manufacturing
    d. Tourism
    e. Agriculture
5. Value:

a. Very Low	Handled by community
b. Low	Handled at city/town level
c. Medium	Handled at county level
d. High	State must be involved
e. Very High	Federal declaration needed

Criterion Two: Duration

Duration refers to the length of time the disaster affects the State and its citizens. Some disaster incidents have far-reaching impact beyond the actual event occurrence such as the September 11, 2001 event. Duration factors include the following:

1. Length of physical duration during emergency phase
2. Length of threat to life and property
3. Length of physical duration during recovery phase
4. Length of time affecting individual citizens and community recovery
5. Length of time affecting economic recovery, tax base, business and manufacturing recovery, tourism, threat to tax base and threat to employment

Value:

1	Very Low	Critical facilities and/or services lost for 1 to 3 days
2	Low	Critical facilities and/or services lost for 4 to 7 days
3	Medium	Critical facilities and/or services lost for 8 to 14 days
4	High	Critical facilities and/or services lost for 15 to 20 days
5	Very High	Critical facilities and/or services lost for more than 20 days

Criterion Three: Economic Impact

Distribution of the event refers to the depth of the effects among all sectors of the community and State, including both the geographic area affected as well as distribution of damage and recovery of the economy, health and welfare, and the State/community infrastructure. Distribution factors include the following:

1. How widespread across the state are the effects of the disaster?
2. Are all sectors of the community affected equally or disproportionately?
3. How will the distribution of the effects prolong recovery from the disaster event?

Value:

1	Very Low	Community –Only the immediate community or part of a town/city is affected
2	Low	City/Town – entire town/city is affected
3	Medium	County – effects are felt at the county level
4	High	State – the entire state will be affected by the event
5	Very High	Federal effects are felt nationwide (e.g. Hurricane Katrina-sized)

Criterion Four: Area Affected

Area affected refers to how much area is physically threatened and potentially impaired by a disaster risk. Area affected factors include of the following:

1. Geographic area affected by primary event
2. Geographic, physical, and economic areas affected by primary risk and potential secondary effects.

Value:

1	Very Low	Community
2	Low	City/Town
3	Medium	County
4	High	State
5	Very High	Federal

Criterion Five: Frequency

The frequency of the risk refers to the historic and predicted rate of recurrence of a hazardous event (generally expressed in years, such as the 100 year flood).

Value:

1	Very Low	Occurs less than once in 1,000 years
2	Low	Occurs less than once in 100 to once in 1,000 years
3	Medium	Occurs less than once in 10 to once in 100 years
4	High	Occurs less than once in 5 to once in 10 years
5	Very High	Occurs more frequently than once in 5 years

Criterion Six: Degree of Vulnerability

The degree of vulnerability refers to how susceptible the population, community infrastructure and state resources are to the effects of the risk. Vulnerability factors include the following:

1. History of the impact of similar events
2. Mitigation steps taken to lessen impact
3. Community and State preparedness to respond to and recover from the event

Value:

1	Very Low	1 to 5% of property in affected area severely damaged
2	Low	6 to 10% of property in affected area severely damaged
3	Medium	11 to 25% of property in affected area severely damaged
4	High	26 to 35% of property in affected area severely damaged
5	Very High	36 to 50% of property in affected area severely damaged

Criterion Seven: State and Community Priorities

State and community priorities refer to the importance placed on a particular risk by the citizens and their elected officials. Priorities factors consist of the following:

1. Long term economic impact on portions of the State or community
2. Willingness of the State or community to prepare for and respond to a particular risk
3. More widespread concerns over one particular risk than other risks
4. Cultural significance of the threat associated with a risk.
5. Potential for long term community or cultural disruption presented by the hazard
6. Matrix Prioritization of Hazards Results

Value:

1	Very Low	Advisory
2	Low	Considered for further planning in the future
3	Medium	Prompt action necessary
4	High	Immediate action necessary
5	Very High	Utmost immediacy

3.2.2 Vulnerability Ratings

Using the above criteria, the 2002 Hazard Mitigation Steering Committee shaped the following descriptions for vulnerability ratings.

- **High Risk Hazard:** Event has most likely occurred in the past and/or is likely to occur in the future. Of substantial magnitude, with loss and financial impact to the State considered beyond the State's available resources and ability to respond.

- **Moderate Risk Hazard:** Event has most likely occurred in the past and/or is likely to occur in the future. Of moderate magnitude, which may or may not be considered beyond the State's available resources and ability to respond.

- **Low Risk Hazard:** Event has a very low occurrence rating and not likely to cause major damage to property or loss of lives in the future. Not likely to exceed the State's available resources or ability to respond.

- **No Substantial Risk Category:** Event would be considered a State/local emergency incident within the jurisdiction's response capability and needing no additional resources to respond.

- **Special Risk Category:** A hazard with an identified mitigation plan or lead agency that provides the expertise to provide mitigation strategies.

Table 3-1
Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Avalanche	**Yes**	Avalanches affect a small portion of the State—Tahoe, Lee Canyon, and Ruby Mountains.
Coastal Storm	No	Nevada is not located in an area prone to coastal storms.
Coastal Erosion	No	Nevada is not located in an area prone to coastal erosion.
Dam Failure	**Yes**	There have been no federal declarations due to dam failure; however, Nevada has several high-hazard dams.
Drought	**Yes**	Statewide drought declarations were issued in 2002 and 2004.
Earthquakes	**Yes**	Nevada ranks as the third State in frequency of large earthquakes over the last 150 years.
Expansive Soils	**Yes**	This hazard is prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. Expansive soils have caused damage in the Reno-Sparks area.
Extreme Heat	**Yes**	While extreme temperatures are known to occur, prolonged heat waves with high humidity are rare. Although Las Vegas Valley is known for its high temperatures, Northern Nevada has temperatures that reach 100 degrees plus in the summer months. This hazard can affect the entire State.
Flood	**Yes**	Flash floods and other flood events occur regularly during thunderstorms, cloudbursts, and snow-melt.
Hail- and Thunderstorms	**Yes**	The entire State is susceptible to thunderstorms which cause flooding and wildfire.
Hurricane	No	Nevada is not located in an area prone to hurricanes.
Land Subsidence	**Yes**	This hazard is extreme due to the alluvial aquifer in the southern part of the State. Since much of the water is underground, Nevada will continue to experience this problem as new development progresses.
Landslide	**Yes**	In Nevada, rockslides are more common than the normal landslide seen in other areas. They tend to be localized; however, this hazard can occur with earthquakes, major storms, floods, and melting ice and snow.

Hazard Type	Should It Be Profiled?	Explanation
Severe Winter Storm	**Yes**	Nevada's higher elevations regularly experience rain, snow, and freezing rain. Normally Nevada can handle winter storms except on the few occasions when these storms are severe.
Tornado	**Yes**	Although tornados in Nevada are rare, they do occur. Nevada ranks 44th out of 50 states in tornado occurrences.
Tsunami/ Seiche	**Yes**	Lake Tahoe could have 10-meter-high waves generated by an earthquake under or adjacent to the lake.
Volcano	**Yes**	Nevada is downwind from potential volcanic eruptions, most importantly Mammoth Lakes, Mt. Lassen, and Mt. Shasta, California. Major eruptions could cause ash fall in Nevada.
Wildfire	**Yes**	The terrain, vegetation and weather conditions in the State of Nevada are favorable for the ignition and rapid spread of wildland fires.
Windstorm	**Yes**	Many counties in Nevada are susceptible to severe and strong winds. Previous events have caused property damage.
Other Epidemic	**Yes**	This hazard could cause an extreme economic downturn for the State of Nevada particularly in the casino industry.
Other Hazmat	**Yes**	All Hazardous Material Events preparedness, planning, response and mitigation efforts are addressed separately from this plan under the State Emergency Response Commission and the Department of Conservation and Natural Resources.
Other Infestations	**Yes**	Infestations impact Nevada's economy through the destruction of crops and natural resources. Also, they can assist in the dispersion of wildfires.
Other Terrorism/WMD	**Yes**	All Terrorism/WMD preparedness, planning, response and mitigation efforts are addressed separately from this plan by the Office of Homeland Security.

3.2.3 Assigning Vulnerability Ratings

After assessing the information from the Nevada Local Hazard Risk Assessment Projections Survey, the Nevada Hazard Mitigation Planning Committee assigned ratings to the hazards most likely to occur in the State of Nevada. Table 3-2 shows the priority rating results.

Table 3-2
Priority Rating Results

High Risk Hazard	Moderate Risk Hazard	Low Risk Hazard
Wildfire	Extreme Heat	Landslide
Earthquake	Severe Winter Storm	Volcano
Flood	Windstorm	Land Subsidence
Dam Failure	Hail- and Thunderstorm	Tsunami/Seiche

No Substantial Risk Category	Special Risk Category
Avalanche	Drought
Expansive Soils	Terrorism/WMD
Tornado	Epidemic
	Infestation
	Hazardous Material Events

3.2.4 Risk Assessment References

The Nevada Hazard Mitigation Plan Subcommittee (Subcommittee) pursued the following steps to identify the hazards that may affect Nevada:

1. Data from historical and new accounts
2. Risk Analysis results from specific state agencies
    a. Nevada Division of Emergency Management
    b. Nevada Department of Transportation
    c. Nevada Bureau of Mines and Geology
    d. Nevada Division of Forestry
    e. Nevada Department of Conservation and Resources
    f. Individual Local Emergency Planning Committees
3. Risk analysis from FEMA-approved local and tribal mitigation plans
4. Risk analysis from Hazard Mitigation Survey from local and tribal jurisdictions without a hazard mitigation plan.
5. Incident reports and disaster documentation appropriated from State, regional, and local governments
6. Nevada Bureau of Mines and Geology information
7. Historical Emergency Incident Reports from the Federal Emergency Management Agency (FEMA) and the SARA Title III, State, Local and Regional Emergency Planning Committees
8. Existing data from the National Flood Insurance Program as it applies to the State of Nevada
9. Historical volcanic and earthquake data
10. National Weather Service severe weather data
11. Historical drought data and risk assessments
12. State of Nevada & county flood control district historical flood data
13. University of Nevada specialty lands and engineering libraries
14. Evaluation of business, industry and transportation links for the State of Nevada

15. Public and private water and power projects
16. Military presence in the State of Nevada
17. Nuclear and hazardous waste transportation and storage issue
18. Nevada Seismological Laboratory information
19. United States Geological Survey information
20. HAZUS

3.2.5 State Jurisdictions' Risk Assessment

The Hazard Mitigation Task Force reviewed the risk assessments found in the FEMA-approved local and tribal hazard mitigation plans. The task force integrated the information into each of the profiled hazards in the revised Nevada HMP (NHMP). The risk assessments came from the following information:

1. Risk Analysis from the 2004 Nevada State Hazard Mitigation Plan
2. Risk Analysis from the local jurisdictions Hazard Mitigation Plan
3. County by county UNR Risk Analysis

3.3 PROFILING HAZARDS

The requirements for profiling hazards, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Profiling Hazards

Requirement §201.4(c)(2)(i): The State risk assessment **shall** include an overview of the location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate … .

Element

Does the risk assessment identify the **location** (i.e. geographic area affected) of each natural hazard addressed in the **new or updated** plan?

Does the **new or updated** plan provide information on **previous occurrences** of each hazard addressed in the plan?

Does the **new or updated** plan include the **probability of future events** (i.e. chance of occurrence) for each hazard addressed in the plan?

Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

The specific hazards profiled in the Nevada HMP have been examined in a methodical manner based on the following factors:

- Nature
- History (Previous Occurrences)
- Location of future events
- Severity of future events
- Probability of future events

A Hazard Risk Assessment Survey was sent to County Emergency Managers and Tribal Entities. A blank Hazard Risk Assessment Survey is in Appendix E. The information from this survey together with the County Hazard Mitigation Plans was integrated into the profiled hazards in this section.

All of the identified hazards were profiled. However, a complete vulnerability assessment to include loss estimates to State facilities was only conducted for the primary hazards: earthquake, flood and wildfire.

The Nevada Hazard Mitigation Planning Subcommittee agreed to provide mitigation goals and objectives to the five highest priority hazards. The other hazards were profiled for future consideration, but will not be included in Section Four mitigation goals and objectives.

Within each profiled hazard section, the counties or tribal communities are listed by county. The information was derived from the County's approved Hazard Mitigation Plan or the hazard mitigation survey completed by counties without an approved Hazard Mitigation Plan.

The profiled hazards are presented in Section 3.3 in alphabetical order. The order of presentation does not signify the level of importance or risk.

3.3.1 Avalanche *(No Substantial Risk Category)*

3.3.1.1 *Nature*

The following three variables interact to determine whether an avalanche is possible:

1) Terrain: the slope must be steep enough to avalanche.

2) Snow pack: the snow must be unstable enough to avalanche.

3) Weather: Weather is another important variable. Changing weather can quickly increase instability.

An avalanche occurs when a large mass of new dry snow detaches from a mountainside and slides or falls downward. Since the new snow layer is not compact, it could slide down to the base of the mountain.

3.3.1.2 *History*

Avalanche possibilities exist in Douglas and Washoe County although there have been no written records of avalanches occurring in these counties' populated areas. The Sierra Avalanche Center at this link http://sierraavalanchecenter.org/index.html provides forecast data to the Lake Tahoe-Sierra region.

Incline Village and Crystal Bay are under avalanche advisory during the winter. The Ruby Mountains in Elko County also have this risk, but only in unpopulated areas.

Avalanches can also occur in the Spring Mountains in Clark County.

3.3.1.3 *Location, Severity, and Probability of Future Events*

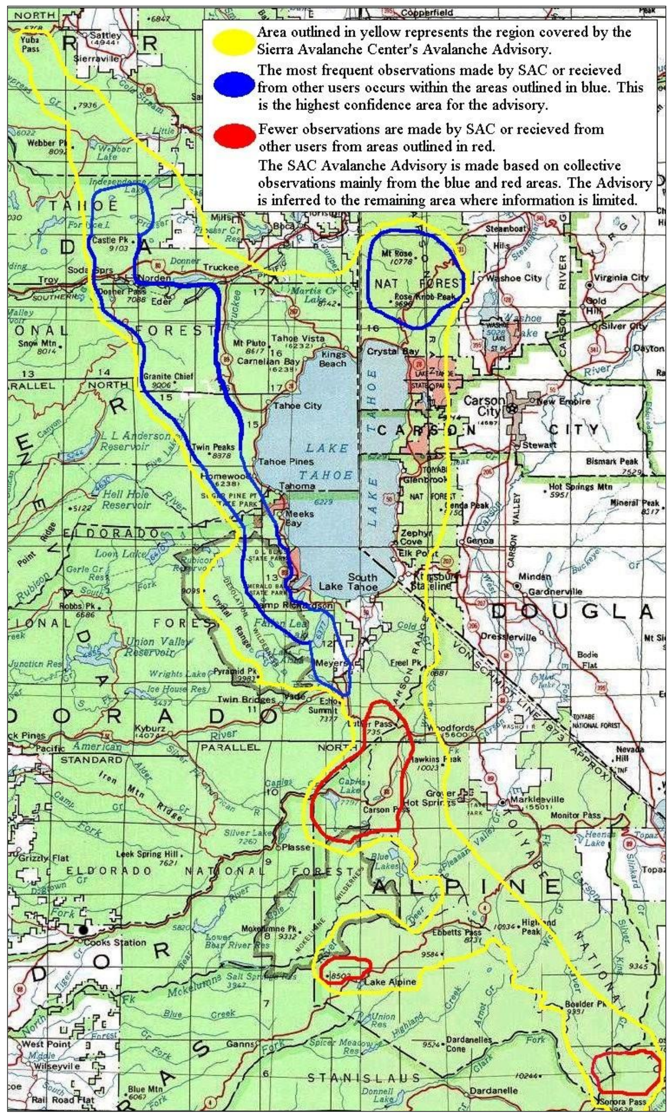


Figure 3-1 Map of Sierra Avalanche Center's Forecast Area

Transportation corridors have been constructed in anticipation of this hazard and are well maintained by State and local resources on heavily used roads such as Kingsbury road. If an avalanche does occur, it would mostly likely close roads leading through the Tahoe basin. The road closure would cause a long delay and/or detour for motorists. Because most avalanche events are located in unpopulated areas and fall under the ownership of the U.S. Forest Service, damage to current and future structures is minimal.

Avalanches are considered to be hazards with "no substantial risk" because they are likely to affect few people in Nevada. The avalanches that do occur will most likely be handled efficiently by ski resorts, local authorities, the Nevada Department of Transportation, and/or the U.S. Forest Service.

Due to the location and severity of this hazard, mitigation actions are relegated to the local jurisdictions where the hazards exist. The State will support local activities in lessening this hazard.

Avalanche Hazard Ratings by Local County/Communities:

County/Community/Tribe	High	Med.	Low
Washoe County	X		
Douglas County			X
Elko County			X
Clark County			X
Churchill County			X
Eureka County			X
Lincoln County			X
Nye County			X
Storey County			X
Ely County/ Shoshone Tribe			X
Duck Valley Tribe			X
South Fork Band (Tribe)			X
Washoe Tribe			X

3.3.2 Dam Failure *(High Risk Hazard)*

3.3.2.1 *Nature*

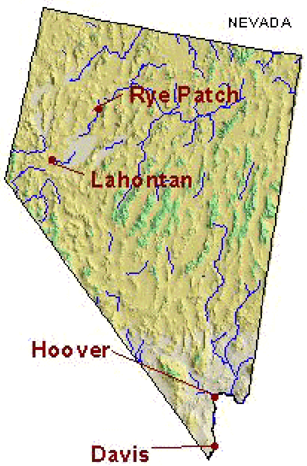


Figure 3-2 Nevada Dams. Courtesy of U.S. Department of Interior/ Bureau of Reclamation

Dam failures involve unintended releases or surges of impounded water resulting in downstream flooding. The high-velocity, debris-laden wall of water released from dam failures results in the potential for human casualties, economic loss, lifeline disruption, and environmental damage. Dam failures may involve either the total collapse of a dam, or other hazardous situations such as damaged spillways, overtopping from prolonged rainfall, or unintended consequences from normal operations. Severe storms with unusually high amounts of rainfall within a drainage basin, earthquakes, or landslides may cause or increase the severity of dam failure.

Factors causing dam failure may include natural or human-caused events, or a combination of both.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam. Piping, when internal erosion through the dam foundation occurs, is another factor in a dam failure. Structural deficiencies from poor initial design or construction, lack of maintenance or repair, or gradual weakening from aging are factors that contribute to this hazard.

3.3.2.2 *History*

Throughout the past century, dam failures have resulted in catastrophic events. Some of the largest disasters in the U.S. resulted from dam failures. In 1889, 2,209 people died when the South Fork Dam failed from overtopping due to excessive rainfall above Johnstown, Pennsylvania. Between 1918 and 1958, 33 major U.S. dam failures caused 1,680 deaths.

In Nevada, there have been no incidents resulting in dam failure declarations; however, the following incidents are on record:

- In 1984, the concrete liner of the Bishop Creek Dam in Elko County failed, resulting in a 25 cubic feet per second seep. The seep eventually removed approximately 800 cubic yards of material from the toe of the dam (Association of State Dam Safety Officials, 2002).

- In 1985, a mine tailings dam owned by the Olinghouse Mining Company failed from an embankment collapse due to over saturation in Wadsworth, Nevada. Tailings were reportedly deposited up to 1.5 km downstream

- In 2005, rainfall runoff overtopped the Schroeder Dam in Beaver Dam State Park located in eastern Nevada by one foot. The top surface of the dam was not damaged, but the downstream face of the dam was severely eroded. Erosion in several of the gullies may have reached as far as the core material. The dam was an earth-fill dam with a thirty-five foot concrete spillway on the east side. Prior to this event the dam was considered a low-hazard dam. Mitigation at this site is ongoing under declaration no. FEMA-NV-DR1583.

Figure 3-3 Schroeder Dam in Beaver Dam State Park. Erosion cut into the front face of the earthen dam.

Picture courtesy of Nevada Division of Emergency Management.

Many dams in Nevada suffer from encroachment of development onto the potential floodplains below dams. As a result, many dams fail to pass the Inflow Design Flood (IDF) inspection commensurate with their hazard potential and size (Association of State Dam Officials, 2002).

3.3.2.3 *Location, Severity, and Probability of Future Events*

The State of Nevada has approximately 600 public and privately owned dams. Many of these dams are dry storm-water detention facilities. About 130 of these dams are rated by the State of Nevada Department of Conservation and Natural Resources as High hazard. This hazard classification is based on life and/or property loss potential.

A listing of existing dams by County is found in Appendix I. The listing includes the national identification number, the state identification number, name, county where it is located, legal description, height, normal storage, tributary area, owner, hazard rating, written emergency action plan (EAP), and date of last inspection. The information was obtained through the Nevada Department of Conservation and Natural Resources, Division of Water Resources website http://water.nv.gov/Engineering/Dams/Dam_Query.cfm. Hazard designations for dams are assigned based on downstream hazard potential in the event of a dam failure (NAC 535.140). A high hazard designation (H) is assigned to a dam if there is reasonable potential for loss of life and/or extreme economic loss. A significant hazard designation (S) is assigned to a dam if there is a low potential for loss of life but an appreciable economic loss. Lastly, a low hazard designation (L) is assigned to a dam if there is a vanishingly small potential for loss of life and the economic loss is minor or confined entirely to the dam owner's own property. These hazard designations are initially determined at the time dam design plans are reviewed, however, hazard designations can and do change as downstream conditions alter as a result of development. The hazard designation is not dependant on type of dam and **in no way** reflects the safety or condition of the dam.

This hazard was discussed in 2004 while planning, but was not giving a priority rating. With the aging of the dams and levees, the subcommittee members agree this is a high risk for communities.

All counties but Esmeralda and Nye have a high hazard designated dam.

The information below shows that an awareness of the risk to dam failure is necessary for all counties is necessary as the data in their plan/survey depicts little concern for this hazard.

In the *Hazard Mitigation Survey* and *County Hazard Mitigation Plans,* Eureka, Clark, Douglas, and Washoe Counties considered this hazard as low risk. Clark County has over 60 dry storm water detention facilities to help with flash floods. Churchill County considered the hazard of failing dams as moderate risk. Churchill County mentioned that the Lahontan Dam is aging. This dam is watched closely by Churchill County officials.

In the *Tribal Hazard Mitigation Survey,* Duck Valley Indian Reservation and the South Fork Indian Reservation consider the hazard of dam failure a low risk. On the Wildhorse Reservation, there is a 38-year old dam. This structure is in good condition. On the South Fork Indian Reservation, there is a diversion dam for irrigation.

In the 2004 plan, the steering committee did recognize the WMD/Terrorism threat rating to all dams (including Hoover and Davis Dams) as potential terrorist targets. The list of dams and exact locations is designated sensitive information and will be attached only to the Master DMA 2000 Hazard Mitigation Plan on file at the Division of Emergency Management.

The Bureau of Reclamation, Lower-Colorado Region considers the following factors in declaring an emergency at Hoover Dam:

- Structural or slope stability problems during a post-earthquake inspection
- Identification of new cracks or settlement, abnormal seepage
- Instrumentation readings outside of normal range limits
- Potential landslides in the vicinity of the dams or appurtenant structures
- A situation at Hoover Dam in which the average daily water releases exceed 19,000 cubic feet per second for 30 days or more
- A situation where Lake Mead is expected to reach elevation 1219.61 feet (top of joint use) and the National Weather Service forecasts heavy rain or runoff.
- A situation where an earthquake occurs with a magnitude of 3.9 (Richter-Scale) or greater occurs within a distance of 15 miles from the dam.
- A situation wherein a technological (man-caused) emergency occurs within the vicinity of the dam that would impact normal dam and/or power plant operations. Such emergencies could include a facility fire, explosion, terrorist incident, hostage situation or toxic spill on the highway or dam crest.
- A situation wherein Glen Canyon Dam has an unusual event that impacts the structural

integrity of the Hoover dam or power plant.

Dam failure is considered a “high hazard.” The hazard itself is difficult to quantify because dams could fail from earthquakes, excessive rainstorms, landslides, or human-induced factors. But, the consequences can be severe on a local level.

At this time, the Division of Water Resources is in the process of developing emergency plans for all “high” and “significant” hazard rated dams in the State. Action items from these plans will be incorporated into this Plan upon their completion. The representatives on this subcommittee expect to increase the capability to mitigate these hazards by greater coordination between the Division of Water Resources, the Division of Emergency Management, Nevada Department of Transportation, and Nevada State Public Works. Additionally, it is anticipated that there will be greater opportunity to leverage funding from existing resources. The State of Nevada supports the Division of Water Resources efforts in mitigation action items related to this hazard.

Future iterations of this Plan will consider the risk from dam failures located outside the State which impact communities within Nevada. Due to similarities between flood and dam failures, the Subcommittee agreed to use the data available on Flood Vulnerability and Analysis of Potential Losses for both scenarios. Please see Section 3.3.8.4 for the Vulnerability and Assessment and Analysis if Potential Losses for both dam failures and flood hazards.

3.3.3 Drought *(Special Risk Category)*

3.3.3.1 *Nature*

Drought is a normal, recurrent feature of virtually all climatic zones, including areas of both high and low rainfall, although characteristics will vary significantly from one region to another. Many erroneously consider drought to be a rare and random event. It differs from normal aridity, which is a permanent feature of the climate in areas of low rainfall. Drought is a result of a natural decline in the expected precipitation over an extended period of time, typically one or more seasons in length. Other climatic characteristics, such as high temperature, high wind, and low relative humidity, impact the severity of drought conditions.

Drought can be defined using both conceptual and operational definitions. Conceptual definitions of drought are often used to assist in the widespread understanding of drought. Many conceptual definitions portray drought as a protracted period of deficient precipitation resulting in extensive damage to agricultural crops and the consequential economic losses. Operational definitions define the beginning, end, and degree of severity of drought. These definitions are often used to analyze drought frequency, severity, and duration for given periods of time. Such definitions often require extensive weather data on hourly, daily, monthly or other time scale and are used to provide a greater understanding of drought from a regional perspective. Four common definitions for drought are provided as follows:

- Meteorological drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scale.
- Hydrological drought is related to the effects of precipitation shortfalls on stream flows and on reservoir, lake, and groundwater levels.
- Agricultural drought is defined mainly in terms of soil moisture deficiencies relative to water demands of plant life, usually crops.
- Socioeconomic drought associates the supply and demand of economic goods or services with elements of meteorological, hydrological, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. This drought may also be called a water-management drought.

A drought's severity depends on numerous factors, including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. Due to its multi-dimensional nature, drought is difficult to define in exact terms and also poses difficulties in terms of comprehensive risk assessments.

Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.

3.3.3.2 *History*

In 2002 and 2004, the U.S. Department of Agriculture designated all seventeen counties in Nevada as drought affected. By 2004, Nevada and much of the southwestern U. S. were in the fifth year of prolonged drought.

In the past, individual counties have applied for drought assistance where the economy is generally dependent on water-related agricultural activities.

Droughts have been a major cause of economic loss and environmental damage throughout the history of the State of Nevada. Prolonged drought has caused crop failures, loss of livestock and wildlife, and shortage of potable water. Additionally, drought has caused insect infestations, dust storms, and urban-wildland interface fires. Please see the end of the following section (3.3.3.3) for more detailed information on the history by county.

Additional dialog with the Nevada Department of Agriculture will be necessary to determine the historical record of drought events resulting in emergency declarations throughout the State. In the following iteration of this Plan it is anticipated that such will be provided.

3.3.3.3. *Location, Severity, and Probability of Future Events*

The possibility of a prolonged drought exists in the State of Nevada and can affect the entire state. Normally, average rainfall is approximately 12 inches per year. According to the National Weather Service, drought conditions exist when the rain accumulation falls below the normal rainfall for an extended period of time.

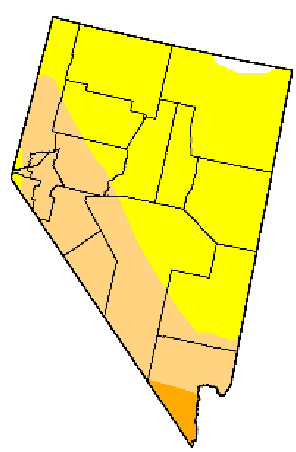
The State of Nevada Drought Plan was revised by the Division of Water Resources in 2003. The plan can be found at the following link: http://water.nv.gov/WaterPlanning/wat-plan/PDFs/July%202003%20Drought%20Plan.pdf

U.S. Drought Monitor
Nevada

March 6, 2007
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.9	99.1	35.7	2.1	0.0	0.0
Last Week (02/27/2007 map)	0.9	99.1	34.9	2.1	0.0	0.0
3 Months Ago (12/12/2006 map)	82.2	17.8	1.4	0.0	0.0	0.0
Start of Calendar Year (01/02/2007 map)	70.9	29.1	3.0	0.0	0.0	0.0
Start of Water Year (10/03/2006 map)	94.5	5.5	1.3	0.0	0.0	0.0
One Year Ago (03/07/2006 map)	94.2	5.8	1.9	0.0	0.0	0.0



Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

http://drought.unl.edu/dm

USDA National Drought Mitigation Center

Released Thursday, March 8, 2007
Author: Douglas Le Comte, CPC/NOAA

Figure 3-4 2007 Drought Monitor Map for Nevada from the National Weather Service

The data cutoff for Drought Monitor maps is Tuesday at 7 a.m. Eastern Standard Time.

The maps, which are based on analysis of the data, are released each Thursday at 8:30 a.m. Eastern Time.

Drought Hazard Rating by County/Community/Tribal Districts

County/Tribal Hazard Mitigation Plans	*Low*	*Moderate*	*High*	*No Data*
Douglas County	X			
Carson City		X		
Clark County		X		
Churchill County			X	
Eureka County			X	
Ely Shoshone Tribe			X	
Lincoln County			X	
Nye County			X	
Shoshone-Paiute Tribes of Duck Valley			X	
South Fork Band Tribe			X	
Storey County			X	
Washoe County			X	

Drought Hazard Rating by County/Community/Tribal Districts (continued)

County/Tribal Hazard Mitigation Plans	*Low*	*Moderate*	*High*	*No Data*
Elko County				X
Esmeralda County				X

Humboldt County	X
Lander County	X
Lyon County	X
Mineral County	X
Nye County	X
Pershing County	X
White Pine	X

In the *Hazard Mitigation Survey* and *County Hazard Mitigation Plans*, only Douglas County considered this risk as low. Carson City and Clark County considered this risk as moderate. In Carson City, this hazard would affect the water supply. In Clark County, this hazard could affect the entire county with insect infestations, fire hazard, and less water for municipal and industrial use.

Churchill, Eureka Lincoln, Nye, Storey, and Washoe Counties considered this risk as high. Churchill County mentioned that this hazard has happened every seven years and affects farm production. Eureka County indicated that this hazard caused lower water tables and dry range conditions in the county. Washoe County indicated that this hazard caused crop and livestock failure, increased dust storms, and fire.

In the *Tribal Hazard Mitigation Survey*, Ely Shoshone Tribe, Shoshone-Paiute Tribes of Duck Valley, and South Fork Band considered this hazard as high. Ely Shoshone Tribe considered the major risk for this hazard as the water loss. Shoshone-Paiute Tribes of Duck Valley mentioned that the reservation is already arid. The South Fork Band indicated that this hazard could cause dry vegetation, a low water table, and wildfires.

The National Weather Service provides a weekly drought monitor as shown in Figure 3-4 and a seasonal drought outlook in Figure 3-5 to helping the public in mitigating losses and maximizing economic gains. Since the drought outlook changes constantly and could change significantly before this report is revised, real-time current updates for these maps are available at: http://www.drought.unl.edu/dm/moitor.html

Drought is considered a hazard in a "special risk category" because its effects are mitigated through the drought plan has been handled by the Department of Conservation and Natural Resources, Division of Water Resources. Recently, however, this responsibility has transferred to the State Climate Office. Water conservation measures at the local level exist in almost every county in the State of Nevada.

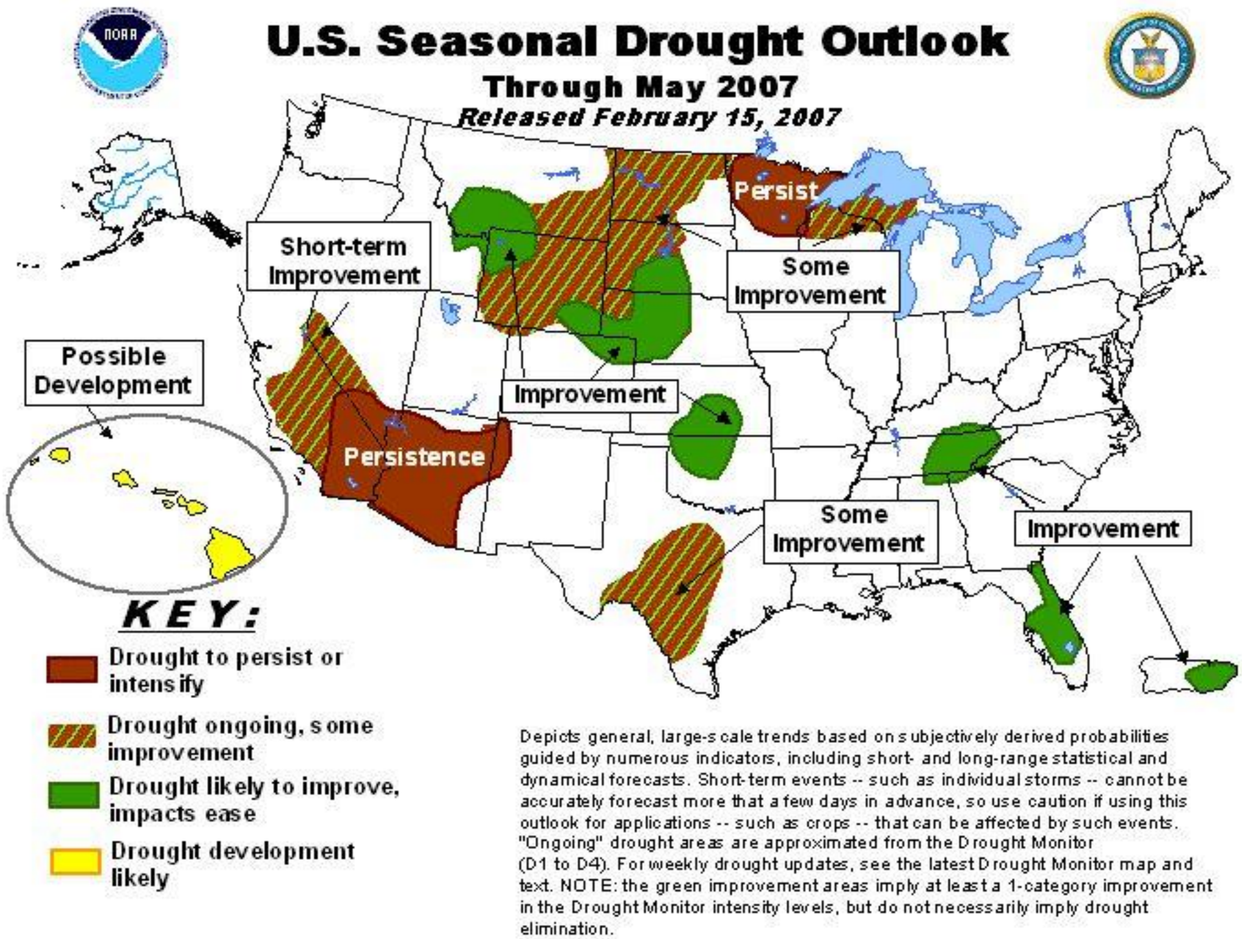


Figure 3-5 U.S. Seasonal Drought Outlook Through May 2007 from the National Weather Service

The State Climatologist prepared the following historical data about drought in each county. The data is not relevant to state declarations but will assist each county in its preparedness and response planning. It is noted that the data demonstrates the recurrence of drought and provides a basis for the probability of its continued occurrence throughout the state. Further research and analysis to determine the most prone and economically affected locations in the State will be determined and provided in the next iteration of this Plan.

The index used in these analyses was the Palmer Drought Severity Index (PDSI). The PDSI indicates the prolonged and abnormal moisture deficiency or excess. The index normally runs between –7 and 7. The scale for this index is in the following chart.

	Drought	Wetness
Extreme	-4 or less	4 or greater
Severe	-3.9 – -3.0	3.9 – 3.0
Moderate	-2.9 – -2.0	2.9 – 2.0
Mild	-1.9 – -1.0	1.9 – 1.0

Incipient	-0.99 – -0.51	0.99- 0.51
Normal	0.0 – 0.5	0.0 – 0.5

Historical Drought Data by County

Carson City:
Carson City County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Churchill County:

Churchill County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Clark County:

Clark County lies within Nevada's Extreme Southern climate division. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Extreme Southern division there was 23 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1996, 1997, and 2002. The worst year being **2002**, in this year every nine out of twelve months were below –4 with **August** peaking out at **–5.19**.

Douglas County:

Douglas County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Elko County:

Elko County lies within Nevada's Northeastern climate division 2. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northeastern division there was 93 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1929, 1931, 1934, 1954, 1992, and 2001. The worst year being **1934**, in this year every month was way below –4 with **August** peaking out at **–8.53**.

Esmeralda County:

Esmeralda County lies within Nevada's South Central climate division 3. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the South Central division there was 31 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1928, 1934, 1959, 1960, and 2002. The worst years being **1928** and **1934**, in these years seven out of twelve months were below –4 with **May 1934** peaking out at **–6.3**.

Eureka County:

Eureka County lies within Nevada's Northeastern climate division 2. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northeastern division there was 93 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1929, 1931, 1934, 1954, 1992, and 2001. The worst year being **1934**, in this year every month was way below –4 with **August** peaking out at **–8.53**.

Humboldt County:

Humboldt County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Lander County:

Lander County lies within Nevada's Northeastern climate division; division 2. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northeastern division there was 93 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1929, 1931, 1934, 1954, 1992, and 2001. The worst year being **1934**, in this year every month was way below –4 with **August** peaking out at **–8.53**.

Lincoln County:

Lincoln County lies mostly within Nevada's South Central climate division 3. The very southern portion of the county is in division four. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the South Central division there was 31 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1928, 1934, 1959, 1960, and 2002. The worst years being **1928** and **1934**, in these years seven out of twelve months were below –4 with **May 1934** peaking out at **–6.3**.

Lyon County:

Lyon County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Mineral County:

Mineral County lies within Nevada's South Central climate division 3. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the South Central division there was 31 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1928, 1934, 1959, 1960, and 2002. The worst years being **1928** and **1934**, in these years seven out of twelve months were below –4 with **May 1934** peaking out at **–6.3**.

Nye County:

Nye County lies mostly within Nevada's South Central climate division 3. The very southern portion of the county is in division four. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the South Central division there was 31 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1928, 1934, 1959, 1960, and 2002. The worst years being **1928** and **1934**, in these years seven out of twelve months were below –4 with **May 1934** peaking out at **–6.3**.

Pershing County:

Pershing County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Storey County:

Storey County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

Washoe County:

Washoe County lies within Nevada's Northwestern climate division 1. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northwestern division there were 110 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1931, 1934, 1947, 1954, 1955, 1959, 1988, 1992, 1994, and 2001-2004. The worst years being **1992, 2002, and 2003**, in these years 11 out of 12 months was below –4 with **July 1992 being the most severe** peaking out at **–6.12**.

White Pine County:

White Pine County lies within Nevada's Northeastern climate division 2. The drought data is reported from 1895 to the present by the National Climatic Data Center (NCDC).

In the Northeastern division there was 93 observed months in the time span from 1895—2006 that was rated as Extreme Drought; -4 or less. The major drought years in this division were 1924, 1926, 1928, 1928, 1929, 1931, 1934, 1954, 1992, and 2001. The worst year being **1934**, in this year every month was considerably below –4 with **August** peaking out at **–8.53**.

The drought data provided above suggests that Nevada will continue to experience these drought patterns in the foreseeable future. It is the State and local jurisdiction's responsibility to plan for theses events in order to minimize the impact. Communication and coordination with the State Climatologist, to include his participation in the Mitigation Planning Subcommittee, will promote the integration of their planning into the State Drought Plan. It is anticipated that the next reiteration of the NHMP will reflect the incorporation of these mitigation activities.

3.3.4 Earthquakes *(High Risk Hazard)*

3.3.4.1 *Nature*

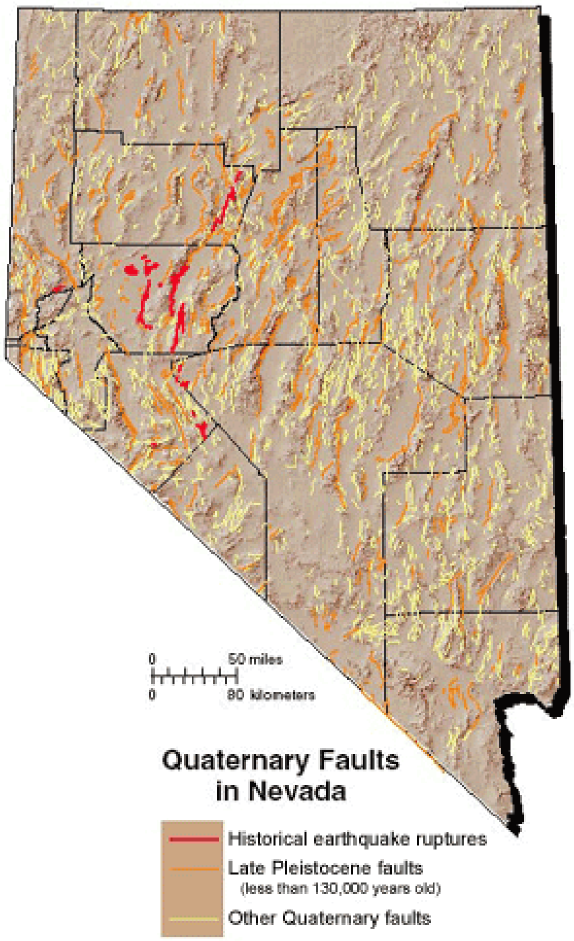


Figure 3-6 Quaternary Fault Map of Nevada. From Nevada Bureau Mines and Geology Special Publication 27

An earthquake is sudden shaking usually caused by rapid, subsurface fault movement. This releases strain accumulated within the Earth's crust. Earthquakes are one of the largest natural hazards and have the potential to create catastrophic, comprehensive disasters. The effects of an earthquake can be damaging far beyond the site of its occurrence and usually occur without warning. After just a few seconds, earthquakes can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, which is the vibration or shaking of the ground. Other potentially damaging effects include surface offset, landslides and rockfalls, and the ground becoming fluidized.

The severity of ground motion generally increases with the size of an earthquake and decreases with distance from the fault or epicenter. Ground motion causes waves in the Earth's interior, also known as body waves, and along the earth's surface, known as surface waves. There are two primary kinds of body waves. P (primary) waves are longitudinal or compressional waves similar in character to sound waves that cause back-and-forth oscillation along the direction of travel. S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side-to-side. There are also two kinds of surface waves: Raleigh waves, which cause a rolling motion like ocean waves and Love waves, which shake from side-to-side. Buildings and other structures need to be designed to withstand the shaking from earthquakes, and people need to be mindful of the potential threat from the contents of buildings being shaken down.

In addition to ground motion, several secondary hazards can occur from earthquakes, such as surface faulting. Surface faulting is the offset of the Earth's surface caused by movement along a fault. Displacements along faults during a single earthquake vary both in terms of length and width, but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 70 miles). Surface faulting can cause severe damage to buildings, highways, railways, pipelines, and tunnels.

Earthquake-related ground failure due to liquefaction is another secondary hazard. Liquefaction occurs when seismic waves pass through saturated granular soil, causing the granules to collapse into the empty spaces between grains. This causes water pore pressure to increase sufficiently to make the soil to behave like a fluid for a brief period. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet), and loss of bearing strength (structures sink into the ground or tip). Liquefaction can cause severe property damage.

Figure 3-7 Fault scarp in the Fairview Peak area, Nevada, formed by the December 16, 1954, earthquake. (Photograph from the National Geophysical Data Center.)

The effects of earthquake waves at the surface can be measured using the Modified Mercalli Intensity (MMI) Scale, which consists of rankings based on observed human behavior, building effects, and ground deformation. The size of an earthquake is measured by the earthquake magnitude Scale (M), which is based on the size and duration of seismic waves, accounting for distance from the event.

The Modified Mercalli Scale

The Modified Mercalli Scale (Roman numerals I-XII) is used to measure the intensity of an earthquake in a particular area. It differs from the magnitude scale, which measures the energy released by an earthquake.

I	Barely felt.
II	Felt by a few sensitive people, some suspended objects may swing.
III	Slightly felt indoors as though a large truck were passing.
IV	Felt indoors by many people, most suspended objects swing, windows and dishes rattle, and standing autos rock.
V	Felt by almost everyone, sleeping people are awakened, dishes and windows break.
VI	Felt by everyone, some are frightened and run outside, some chimneys break, some furniture moves, and slight damage.
VII	Considerable damage in poorly built structures, felt by people driving, most are frightened and run outside.
VIII	Slight damage to well-built structures, poorly built structures are heavily damaged.
IX	Underground pipes breaks, foundations of buildings are damaged and buildings shift off foundations, considerable damage to well-built structures.
X	Few structures survive, most foundations destroyed, water moved out of riverbanks and lakes, avalanches and rockslides, railroads rails are bent.
XI	Few structures remain standing, total panic, large cracks in the ground.
XII	Total destruction, objects thrown into the air, the land appears to be liquid and is visibly rolling like waves

3.3.4.2 *History*

The State of Nevada ranks in the top three states subject to the largest earthquakes over the last 150 years. Table 3-3 contains data of historic earthquakes from 1852-1998 with magnitudes of 5.5 or greater. Figure 3-8 shows the graphic representation of the seismicity record from 1852-2005. Geological young faults, which are located around the State, are sources of earthquakes.

Table 3-3

Nevada's Historic Earthquakes 1852-1998

EARTHQUAKES IN NEVADA WITH MAGNITUDES OF 5.5 OR GREATER

Year	Month	Day	Time GMT	North Latitude*	West Longitude*	Magnitude
1852?	?	?	?	39 30.00?	118 43.00?	7.3?
1857	Sep	03	?	39 18.00?	120 00.00?	6.2?
1860	Mar	15	1845	39 41.00?	119 25.00?	7.0?
1868	May	30	0511	39 21.00?	119 37.00?	6.0?
1869	Dec	27	0130	39 26.00?	119 34.00?	6.7?
1869	Dec	27	0550	39 30.00?	120 00.00?	5.5?
1869	Dec	27	0940	39 17.00?	119 42.00?	6.1?
1872	Mar	23	2141	40 00.00?	117 30.00?	5.5?
1873	Nov	05	1700	40 00.00?	118 00.00?	5.5?
1875	Apr	02	0200	39 30.00?	115 48.00?	5.5?
1887	Jun	03	1048	39 05.00?	119 46.00?	6.3?
1894	Nov	18	1049	39 12.00?	119 30.00?	5.5?
1905	Nov	11	2126	42 54.00	114 30.00	5.7
1910	Nov	07	1720	37 30.00	117 00.00	5.5
1910	Nov	19	0225	38 00.00	118 00.00	5.5
1910	Nov	21	2323	38 00.00	118 00.00	6.1
1910	Nov	22	0605	38 00.00	118 00.00	5.5
1914	Feb	18	1817	39 30.00	120 00.00	6.0
1914	Apr	24	0834	39 31.00	119 21.00	6.4
1915	Oct	03	0149	40 30.00	117 30.00	6.1
1915	Oct	03	0653	40 30.00	117 30.00	7.8
1916	Feb	03	0503	41 00.00	117 48.00	5.9
1916	Aug	03	1350	41 30.00	116 30.00	5.6
1916	Aug	03	1421	41 30.00	116 30.00	5.8
1932	Dec	21	0610	38 48.00	117 58.80	7.2
1932	Dec	25	0355	38 48.00	118 00.00	5.5
1933	Jan	05	0651	38 46.20	117 44.40	5.9
1933	Feb	13	2209	38 00.00	118 00.00	5.5
1933	Jun	25	2045	39 06.00	119 18.00	6.0
1933	Oct	27	1059	38 54.00	117 36.00	5.5
1934	Jan	30	1924	38 18.00	118 24.00	5.6
1934	Jan	30	2016	38 16.80	118 22.20	6.3
1934	Jan	30	2030	38 18.00	118 24.00	5.7
1934	Feb	09	0921	38 18.00	118 24.00	5.5
1934	Jun	23	1504	39 06.00	118 48.00	5.5
1939	May	11	1840	38 36.00	117 48.00	5.5
1942	Dec	03	0944	39 42.00	119 18.00	5.9
1942	Dec	17	1507	38 43.80	119 40.80	5.5
1943	Aug	09	0530	38 12.00	118 12.00	5.5
1948	Dec	29	1253	39 33.00	120 04.80***	6.0
1949	Feb	11	2105	36 58.98	117 48.30	5.6
1953	Sep	26	0334	39 31.80	119 58.80	5.5
1954	Jul	06	1113	39 17.40**	118 21.60**	6.6
1954	Jul	06	1118	39 25.20	118 31.80	5.5
1954	Jul	06	1149	39 25.20	118 31.80	5.7
1954	Jul	06	2207	39 12.00**	118 24.00**	6.0
1954	Aug	24	0551	39 21.00**	118 20.40**	6.8
1954	Aug	31	2220	39 36.00	118 12.00	5.8
1954	Sep	01	0518	39 36.00	118 12.00	5.5
1954	Dec	16	1107	39 12.00**	118 00.00**	7.3
1954	Dec	16	1111	39 40.20**	117 52.20**	6.9
1954	Dec	16	1416	39 30.00	118 00.00	5.8
1955	Nov	21	2025	39 25.20	118 04.80	5.5
1959	Mar	23	0710	39 36.00	118 04.20	6.3
1959	Jun	23	1435	38 55.20	118 53.40	6.3
1959	Jun	23	1504	39 06.00	118 48.00	5.5
1962	Aug	30	1335	41 48.00	118 48.00	5.8
1964	Mar	22	1630	38 42.00	118 48.00	5.5
1966	Aug	16	1802	37 27.78	114 09.06	6.0
1966	Sep	22	1857	37 22.14	114 10.98	5.8
1992	Jun	29	1014	36 43.26	116 17.64	5.6
1994	Sep	12	1223	38 48.50	119 38.30	5.9

* In degrees and decimal minutes
** From Doser (1986)
*** In California next to the Nevada border.

The above information is from the Mackay School of Mines, University of Nevada, Reno Map 119 Earthquakes in Nevada 1852 – 1998 by Diane M. and Craig M. de Polo, Nevada Bureau of Mines and Geology.   Published in 1999

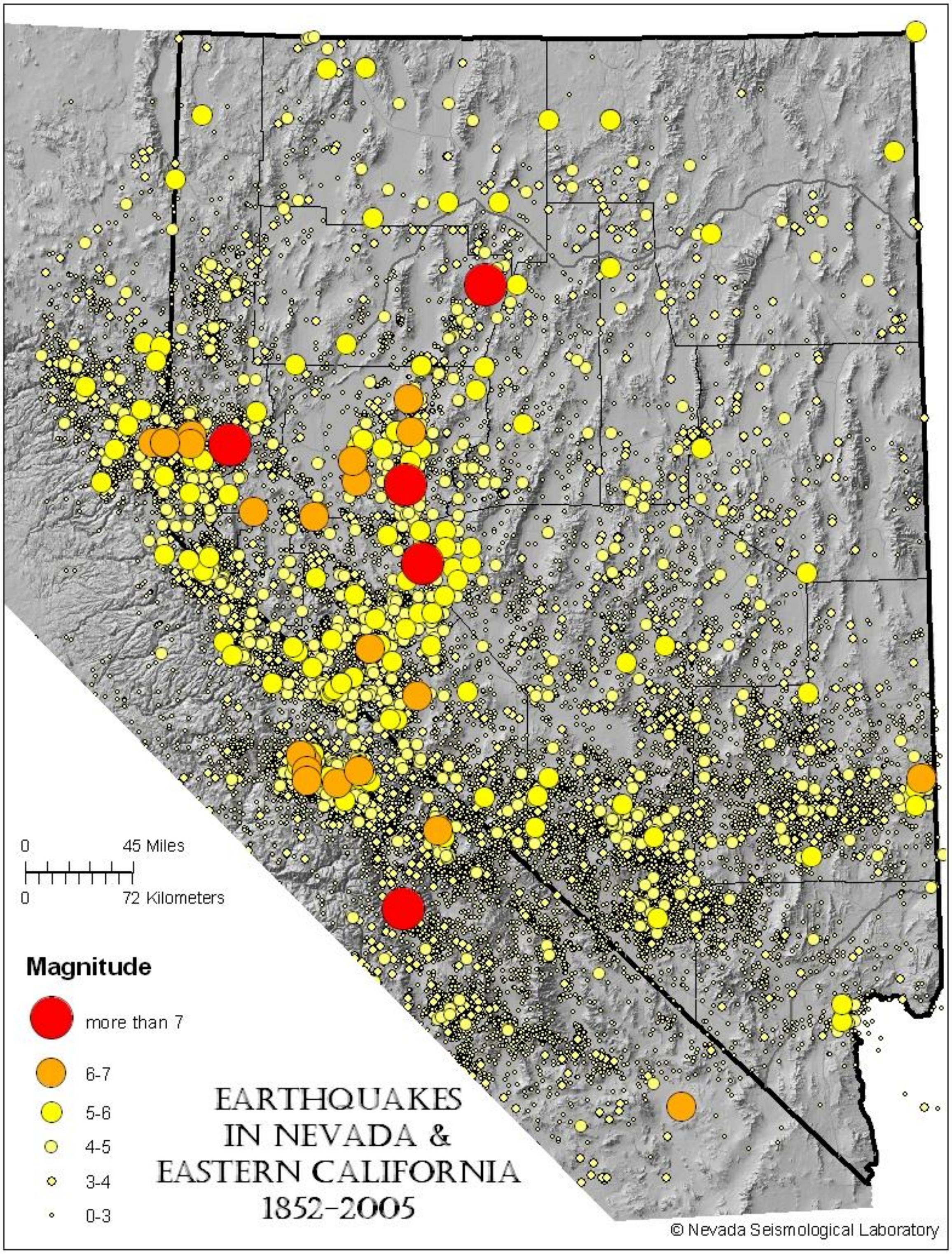


Figure 3-8 Earthquakes recorded in Nevada region. Courtesy of Nevada Seismological Laboratory.

There is no doubt that Nevada is in earthquake country. Historically, there has been a magnitude 7 or greater earthquake about every thirty years somewhere in Nevada; the last one was in 1954, over 50 years ago. The following list documents that small earthquakes that are felt by humans occur frequently in Nevada. This list contains earthquake activity from 2000 to 2005.

- 23 June 2000 11:00 AM PDT: The Nevada Seismological Laboratory recorded an earthquake of M = 3.6 at 7:02 AM (PDT) Friday, June 23, near Minden-Gardnerville, Nevada. Another event of M = 3.3 at 6:55 AM preceded it. Due to its relatively small size, no damage was expected.

- 26 September 2000 12:10 PM PDT: The Nevada Seismological Laboratory recorded an earthquake of M = 4.7 at 12:20 AM (PDT) Tuesday, September 26, near Topaz Lake, Nevada. The preliminary location of this event is 38.66N, 119.52W, 2 miles southeast of Topaz Lake and approximately 16 miles southwest of Wellington, Nevada. The depth was computed to be approximately 9 km (6 mi). Many foreshocks were recorded during the hours prior to this earthquake, and a foreshock of approximately M = 3.0 occurred a few seconds prior to the main event. Numerous aftershocks have been recorded. This event occurred in a moderately active seismic zone which has had at least 3 nearby (<10 km) earthquakes in the last decade of M > 4.

- 16 November 2000 2:00 PM PDT: The Nevada Seismological Laboratory recorded an earthquake of M = 3.8 at 5:07 AM (PST) Thursday, November 16, near Gerlach, Nevada. The preliminary location of this event is 40.50N, 119.48W, approximately 10 mi. south of Gerlach, Nevada. The depth was computed to be approximately 3 km (2 mi). This event occurred in a small area which has had 12 earthquakes > M 2 and 2 earthquakes > M 3 since October 5 of this year.

- 19 November 2000 6:30 PM PDT: The Nevada Seismological Laboratory recorded an earthquake of M = 4.3 at 4:54 AM (PST) Sunday, November 19, near Gerlach, Nevada. The preliminary location of this event is 40.49N, 119.51W, approximately 12 mi. south of Gerlach, Nevada. The depth was computed to be approximately 5 km (3 mi).
- 2 December 2000 11:00 AM PDT: The Nevada Seismological Laboratory recorded an earthquake of ML = 4.9 at 7:34 AM (PST) Saturday, December 2, 2000, west of Truckee, California. Aftershocks of M = 3.0 at 7:37 AM and 3.2 at 8:30 AM followed it. The preliminary location of the larger event is 39.38 degrees North and 120.46 degrees west. This location is about 4 miles north of the Kingvale exit on I80, or about 15 miles west-northwest of Truckee. The depth was computed to be approximately 12 km (5 mi). There is a sequence of small aftershocks.

- 10 August 2001 2:00 PM PDT: There was magnitude 5.4 earthquake August 10, 2001, at 1:19 p.m. It was located at 39.828 N, 120.532 W, with a preliminary depth of 14 kilometers. It was located approximately 5 miles north of the community of Graegle, California and 41 miles south of Susanville, California. This earthquake was widely felt throughout eastern California and western Nevada. No reports of damage or injury have been received as of this notification, but minor damage and/or injury would be possible for an event of this size. A number of aftershocks have been recorded. This region has experienced smaller events of a similar character in the past few years.

- October 2001 10:37 PM PDT: There was magnitude 4.6 earthquake at 10:37 PM (local time) about 50 km (30 mi) north of Elko, Nevada. It was located at 41.225 N, 115.858 W. The location is somewhat uncertain because this is beyond the fringe of the NSL network and because a station east of Elko was the closest at 74 km (46 mi) from the epicenter. This earthquake was felt in the Elko area.

- 14 June 2002 9:30 AM PDT: There was magnitude 4.4 earthquake June 14, 2002, at 5:40 a.m. today. It was located at 36.7150 N, 116.3003 W, with a preliminary depth of 12 kilometers (~ 7 mi). This location is approximately 20 km (~ 12 miles) southeast of the proposed nuclear waste repository at Yucca Mountain and just inside of Hwy 395 between Indian Springs and Beatty, Nevada. This earthquake occurred in the aftershock zone of the M 5.6 Little Skull Mountain earthquake of June 29, 1992. The area has been active since that earthquake, but this is the largest event in over 6 years.

- 19 July 2002 9:30 AM PDT: There was magnitude 2.4 earthquake Friday, July 19, 2002, at 6:38 A.M. It was located at 36.5442 N, 119.7599 W, with a preliminary depth of 13 kilometers (~ 8 mi). This location is approximately near the intersection of Pyramid Highway with Interstate 80 in Sparks, Nevada. This earthquake, although very small in magnitude, was apparently felt by several people in Sparks.

- 21 October 2002 4:00 PM PDT: There was magnitude 3.5 earthquake October 21, 2002, at 3:31 p.m. It was located at 39.533 N, 119.156 W, with a preliminary depth of 11 kilometers (~ 7 mi). It was located approximately 10 km (~ 7 mi) southeast of Fernley NV. This earthquake was felt in the Fallon and Fernley areas. No reports of damage or injury have been received.

- 21 November 2002 9:00 AM PST: The NSL recorded a magnitude 3.5 earthquake at 11:51 PM PST on November 20, 2002. It was located at 39.388 N, 119.193 W, with a preliminary depth of 13 kilometers (~ 8 mi). This location is approximately 7 km (~ 4 mi) southeast of Silver Springs NV.

- 29 May 2003 5:00 PM PDT: A magnitude 4.0 earthquake was recorded today at 3:52 PM, PDT, May 29, 2003. It was located at 38.262 N, 117.904 W, with a preliminary depth of 8 kilometers (5 miles). This location is approximately 23 km (14 miles) southeast of Mina, Nevada. This is a remote area in the southern part of the Monte Cristo Range. This event was preceded by an M 3.7 earthquake at 11:33 AM PDT at approximately the same location and also by some other smaller, intervening shocks.

- 17 September 2003 12:30 PM PDT: A magnitude 2.7 earthquake was felt at 11:02 PM, PDT (September 17, 2003). It was located at 35.94 N, 114.70 W, with a preliminary depth of 3.6 km (2 miles). This location is approximately 15 km (9 miles) southeast of Boulder City, Nevada.

- April 10, 2004 3:00 PM PDT: A magnitude 2.4 earthquake was recorded Saturday, at 6:57 AM PDT on April 10, 2004, in Reno, Nevada. It was located at 39.507 N, 119.767 W, with a preliminary depth of 8.6 kilometers (~ 5 miles). This location is approximately under the Reno International Airport. The earthquake was felt by many residents of Reno/Sparks. No aftershocks have been located.

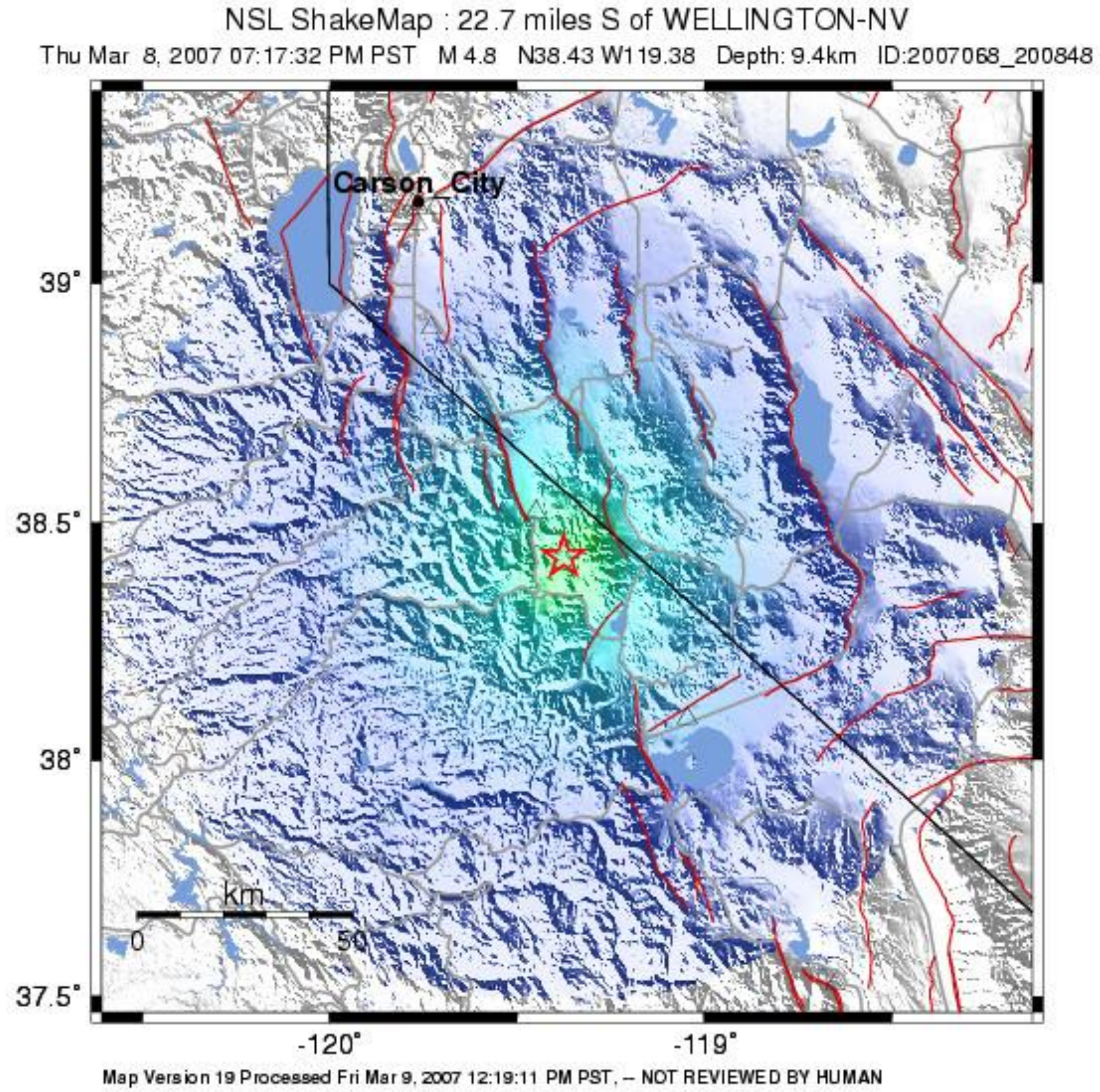
- June 3, 2004 9:00AM PDT: A magnitude 4.5 earthquake was recorded Thursday, at 1:54 AM PDT on June 3, 2004, in the Reno - Lake Tahoe region, Nevada and California. It was located at 39.334 N, 120.007 W, with a preliminary depth of 8.6 kilometers (~ 5 miles). This location is approximately 6 miles (10 km) north of Kings Beach (and the north shore of Lake Tahoe), and nearly on the Nevada - California state line. We located five minor foreshocks, with the largest being a (preliminary) magnitude 2.7 foreshock at 1:25 AM. We are recording a large number of aftershocks. The largest so far was at 4:16 AM (preliminary magnitude 1.5). The earthquake was felt as light to weak shaking throughout the Reno and Lake Tahoe region.

- 20 September 2004 11:00 AM PDT: A magnitude 5.0 earthquake was recorded (Monday, September 20) at 9:51 AM PDT near Mono Lake, California, nearly on the Nevada border. It was located at 38.024 N, 118.642 W, with a preliminary depth of 5.5 kilometers (~3 miles). This earthquake follows two larger events on Saturday, September 18, at 4:02 and 4:43 PM PDT; their magnitudes were 5.5 and 5.4, respectively. All three events are within roughly 3 km (~2 miles) of one another. The location of these events is roughly 30 miles south of Hawthorne, Nevada, and 30 miles northwest of Mammoth Lakes, California. Numerous aftershocks (nearly 1000 so far) of the Saturday events have been observed at the Nevada Seismological Laboratory.

- 27 December 2004 12:00 PM PST: A magnitude 2.5 earthquake was felt at 7:12 AM, PST (December 27, 2004). It was located at 39.594 N, 119.795 W, with a preliminary depth of 3.4 km (~2 miles). This location is approximately 5 miles north of downtown Reno, Nevada in the Sun Valley area. This is the largest of a swarm of over 100 micro-earthquakes seen in this area by the Nevada Seismological Laboratory. The M 2.5 earthquake was reported to be felt by at least three people. Earthquakes with magnitudes as small as M 2 have been reported in the Reno vicinity in the past.

- 26 June 2005 12:50 PM PDT: A magnitude 5.0 earthquake was recorded Sunday, at 11:45 AM PDT on June 26, 2005, in the Reno - Lake Tahoe region, Nevada and California. It was located at 39.315 N, 120.060 W, with a preliminary depth of 13.2 kilometers (~ 6.6 miles). This location is approximately 8 miles (12 km) east of Truckee, California, and close to the Nevada – California state line. This earthquake occurred in an active area, with a M 4.5 earthquake recorded on June 3, 2004. The earthquake was felt widely throughout the Reno and Lake Tahoe region.

- Mar 8 2007 19:17:32 PST: A magnitude 4.8 earthquake was recorded 22.7 miles south of WELLINGTON-NV. The quake map for this event is in Figure 3-9.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Figure 3-9 NSL Shake Map for 22.7 miles south of Wellington Nevada.
Courtesy of Nevada Seismological Laboratory.

3.3.4.3 *Location, Severity, and Probability of Future Events*

In Nevada, faults occur along many of the range fronts, within ranges, and within valleys. Normal-slip faults, those that down-drop the ground during earthquakes, commonly appear as steps in the landscape related to the vertical offset, whereas strike-slip faults, that offset the ground sideways, usually are expressed by linear features, such as elongate valleys, and alignments of features, such as springs. Historical earthquakes have ruptured both kinds of faults in Nevada.

In the *Hazard Mitigation Survey* and the *County Hazard Mitigation Plans*, Eureka and Clark Counties considered this risk as low. Eureka considered the county's water and sewer lines could be at risk in case of an earthquake. Clark County cited Yucca Mountain as a problem in case of an earthquake. Carson City considered this risk high citing problems with collapsing buildings after an earthquake. Also, Churchill, Douglas, Lincoln, Nye, Story and Washoe Counties considered this risk to be high. Douglas County has some of the most active faults in Nevada. Lincoln County has many known faults, although the hazard appears to be lower in this county than in most counties in Nevada. Nye County has had two major earthquakes and several minor earthquakes. Washoe County was concerned with residential and commercial structural damage, transportation loss due to major highways through the county, and utility damage.

In the *Tribal Hazard Mitigation Survey*, Ely Shoshone Tribe, Shoshone-Paiute Tribes of Duck Valley, and South Fork Band Council considered this hazard as low risk. Shoshone-Paiute Tribes of Duck Valley mentioned that there are eighteen identified fault lines on the Duck Valley Indian Reservation. The Confederated Tribes of Goshute Reservation identified this hazard as a probability of moderate. All of the tribes that answered this survey mentioned that structural damage to residential buildings would be a major problem with this hazard.

According to the Nevada Seismological Laboratory and Nevada Bureau of Mines and Geology, Nevada has earthquake sources throughout the State. An earthquake could occur in any part of the State.

Considerable information about earthquake hazards is available online through the Nevada Bureau of Mines and Geology (http://www.nbmg.unr.edu/), the Nevada Seismological Laboratory (http://www.seismo.unr.edu), the University of Nevada, Las Vegas (http://earhtquakes.unlv.edu/outreach/), and the U.S. Geological Survey (http://earthquake.usgs.gov/). The U.S. Geological Survey has collaborated with the Nevada Bureau of Mines and Geology and other state geological surveys to produce maps showing the approximate locations of faults that in the geological past moved during major earthquakes and that will move again sometime in the future (http://earthquake.usgs.gov/retional/qfaults/). There are hundreds of such faults in Nevada, including one associated with nearly every mountain range within the State.

Table 3-4 contains a list of some of the major faults in Nevada.

Table 3-4
Some Major Faults in Nevada

Fault	Potential Earthquake Magnitude	Length in Miles (km)	Slip Rate Millimeters Per Year*	Average Time Between Earthquakes (years)**
Genoa fault	7.4	47 (75)	1 - 3	1,500 - 4,000
Pyramid Lake fault zone	7.3	47 (75)	0.4 - 1.1	1,500 - 4,000
Toiyabe Range fault zone	7.3	69 (110)	0.1 - 0.8	2,000 - 15,000
Steptoe Valley fault zone	7.2	87 (139)	0.04 - 0.1	18,000 - 45,000
Ruby Mountains fault zone	7.2	62 (99)	0.05 - 0.3	10,000 - 100,000
Mt. Rose fault zone	7.1	25 (40)	0.2 - 0.4	2,000 - 10,000
Dixie Valley fault zone	7.1	60 (96)	0.3 - 0.6	6,000 - 12,000
Carson City fault	6.8	9 (14)	0.4 - 1	1,500 - 8,000
Frenchman Mountain fault zone	6.8	16 (26)	0.02 - 0.2	5,000 - 50,000
Black Hills fault	6.8	17 (27)	0.05 - 0.2	5,000 - 20,000

*Scientists usually use metric values, particularly millimeters per year, for slip rates of faults. To convert to inches per year, multiply by 0.039.
**Because we lack detailed studies, these values are approximations that cover wide ranges of potential values.

From Living with Earthquakes in Nevada.

Figure 3-10 Vertical Slip Rates of Normal-Slip Faults in Nevada

Probabilities of Earthquakes of Various Magnitudes Occurring within 50 Years within 50 Kilometers of Major Communities in Nevada

The table 3-5 shows the probability of experiencing an earthquake of a given size or greater over a 50-year period within 50 kilometers (31miles) of major communities in Nevada, and the maps linked with this table are intended to give people throughout Nevada an idea of their earthquake hazard. These maps were generated for four magnitude thresholds: M≥5.0, M≥6.0, M≥6.5, and M≥7.0 using the U.S. Geological Survey PSHA (Probabilistic Seismic Hazard Analysis) Model, which is presented at http://eqint.cr.usgs.gov/eq/html/eqprob.html.

What these Magnitudes Mean

Although it is nearly impossible to specifically predict what an earthquake of a given size might do to a community, the earthquake sizes presented relate to different general levels of damage. Generally, the greater the magnitude, the stronger the shaking will be and the longer the shaking will last.

Magnitude 5 earthquakes are distinctly felt by almost everybody and can cause rockslides and nonstructural damage, such as heavy, unsecured objects falling off shelves.

Magnitude 6 earthquakes can cause significant nonstructural damage, especially in basins and along ridge tops.

Magnitude 6.5 earthquakes can create surface offsets, may be of longer duration, and can cause significant damage.

Magnitude 7 earthquakes cause widespread structural and nonstructural damage, and require a significant "recovery period" for communities to get back to the way they were before the quake.

The Maps

Please see Appendix H to see the HAZUS maps.

Each map covers an area of about 120 kilometers (75 miles) around the indicated community. The numbers along the left side of the map are degrees and minutes north latitude, and the numbers along the bottom are degrees and minutes west longitude.

The numbers on the probability scales indicate the probability of an earthquake equaling or exceeding the given magnitude within 50 kilometers (31 miles) of the given location within the next 50 years. The numbers on the scale can be converted to percentage by multiplying by 100; for example. "0.10" is 10%. The colors indicate the ranges of probability and run from light blue for low probability to red for high probability to brown for maximum probability. Note: Each map has its own probability scale and color scheme.

There are many uncertainties in the input data for these calculations, but they are based on the best data available. It is important to keep this in mind in some of the lower probability areas of Nevada. Low probability doesn't mean that an earthquake won't occur. Earthquake sources are located throughout the state, and earthquakes have been known to occur in areas where the probabilities were low. All of Nevada is earthquake country, and mitigating for safety and to protect valuables is a good idea everywhere. The maps are meant to be general guides to earthquake potential for communities in Nevada, at the current state of knowledge.

Table 3-5

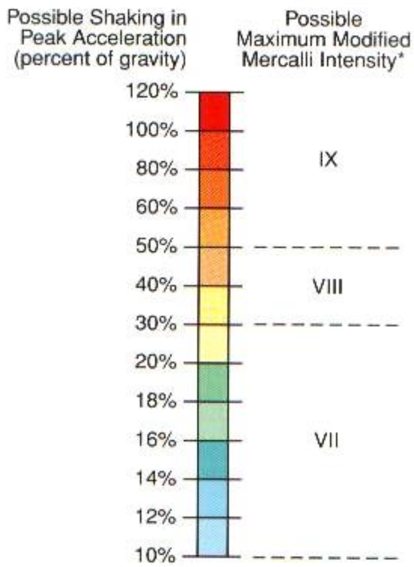
Earthquake Probabilities in the State of Nevada

County	County Seat/*Other Town*	% Probability of Magnitude Greater Than			
		5	6	6.5	7
Carson City	Carson City	>90	70	50-55	12-15
Churchill	Fallon	80-90	30-40	20-25	6-8
Clark	Las Vegas	40-50	10-20	<5	<1
Douglas	Minden	>90	60-70	50-60	10-12
Elko	Elko	30-40	10-15	6-8	0.5-1
Esmeralda	Goldfield	80-90	20-30	5-10	<1
Eureka	Eureka	40-50	10-15	4-6	<0.5
Humboldt	Winnemucca	50-60	15-20	5-10	1-1.5
Lander	Battle Mountain	60-70	15-20	10	1.5
	Austin	60-70	20	10-15	2-3
Lincoln	Pioche	30-40	6-10	2-3	<0.5
Lyon	Yerington	>90	60	40-45	12
Mineral	Hawthorne	>90	60	30-40	10-12
Nye	Tonopah	70-80	20-30	5-10	<1
	Beatty	70-80	30-40	20-30	12
	Gabbs	>90	40-50	20-25	6-8
Pershing	Lovelock	50-60	10-20	10	1-2
Storey	Virginia City	>90	65-70	50	12-15
Washoe	Reno	>90	65-70	50	12-15
	Gerlach	40	10-15	6-10	2-3
White Pine	Ely	20-30	4-6	1.5-2	<0.5

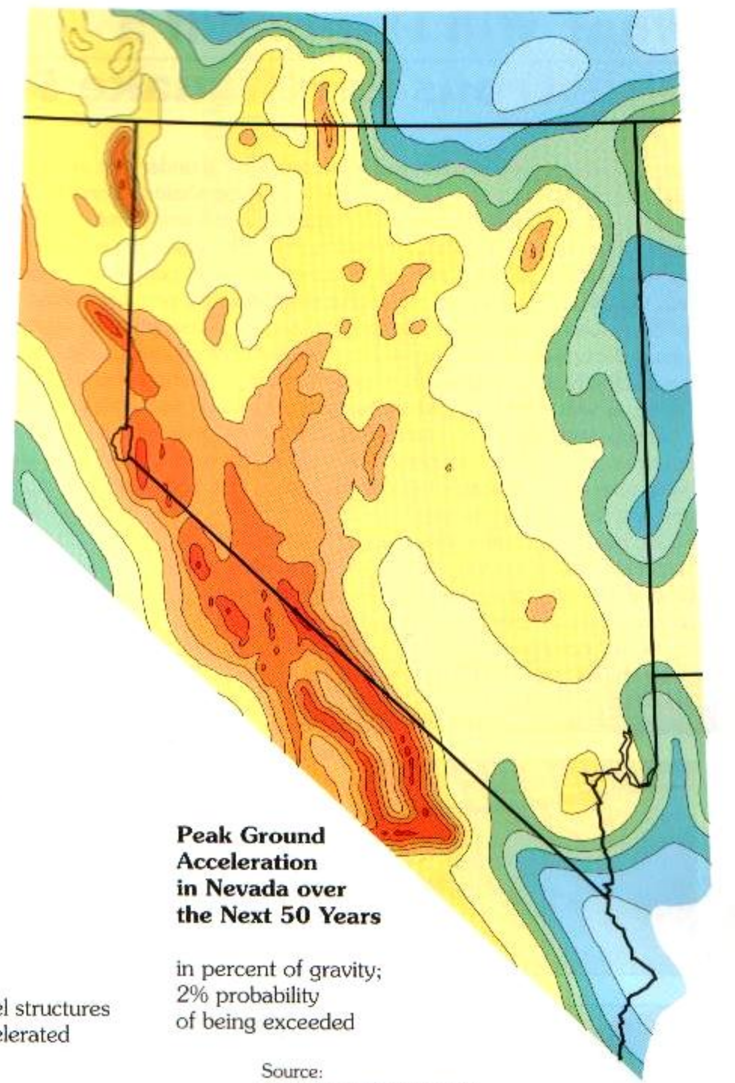
Courtesy of Nevada Bureau of Mines and Geology

A shaking potential map for the entire state of Nevada is in Figure 3-11.

Shaking Potential Map for Nevada



* See page 4 for descriptions of Intensity VII and VIII. In Intensity IX, general panic occurs and there may be damage to some well-built structures.



Peak Ground Acceleration in Nevada over the Next 50 Years

in percent of gravity; 2% probability of being exceeded

Source: Frankel and others (1997)

Engineers use computer models and model structures to see how buildings hold up to being accelerated sideways by a seismic wave.

The notion of a map like this is very much like rolling the dice and calculating odds. If a rarer, but damaging, earthquake occurs in a part of Nevada that has less frequent earthquakes (yellow to blue colors), the shaking will be every bit as strong as earthquakes we anticipate in western Nevada.

If we correlate this shaking potential map with possible damage, all of Nevada could experience damaging shaking. This is why Nevadans need to take messages of earthquake preparedness seriously.

When an earthquake occurs, another probability becomes important! The chance, given strong shaking, that something bad will happen to you. This is the probability you can do something about. **By securing shaking hazards around your home and workplace, you can put the odds in your favor that you, your loved ones, your customers, and your valuable and important possessions will be safe from earthquakes.**

Figure 3-11 Shaking Potential Map for Nevada
From Nevada Bureau of Mines and Geology Special Publication 27

3.3.4.4 Vulnerability Assessment and Analysis of Potential Losses

The earthquake hazards in Nevada are huge. To assess risks and vulnerability, the Nevada Bureau of Mines and Geology ran FEMA's loss-estimation model, HAZUS-MH, using earthquakes that have occurred in the geological past near each county seat. The results, using Version 1 of HAZUS-MH, were reported in Nevada Bureau of Mines and Geology Open-File Report 06-1 (http://www.nbmg.unr.edu/dox/of061/of061.htm). More recently, the Nevada Bureau of Mines and Geology updated this report, using Version 2 of HAZUS-MH (HAZUS MR2) and some updated information on critical facilities, and reported the results in Open-File Report 07-1 (http://www.nbmg.unr.edu/dox/of071/of071.htm). The results are summarized in Tables 3-6, 3-7, and 3-8.

Table 3-6 indicates that damage from major earthquakes could range from hundreds of thousands of dollars in sparsely populated rural counties to tens of billions of dollars in urban areas. Tens of thousands of buildings could suffer extensive or complete damage. Fatalities could reach into the hundreds. Thousands of people may need public shelter. Importantly, many earthquakes are likely to cause significant, simultaneous damage in multiple counties. In particular, a major earthquake anywhere in the Reno-Carson City urban corridor is likely to cause significant damage in not only Carson City but also Douglas, Storey, and southern Washoe Counties.

Table 3-7 demonstrates that essential facilities will be severely stressed following major earthquakes. The HAZUS program predicts that few hospitals in the epicenter areas will have sufficient beds to accommodate the injured people, which means that plans need to be in place for transporting injured people to other jurisdictions. Fire stations, police stations, and schools will most likely be operating at reduced capacity, and there will be significant damage to utilities and transportation systems.

Table 3-8 summarizes vulnerability (or risk) from earthquakes for the 17 counties in Nevada in several ways. One way of assessing vulnerability is in terms of total losses. Using a measure of economic loss in dollars, the top nine counties are ranked as follows:

Highest dollar loss from scenario earthquake chosen: Clark County ($9.0 billion)
2nd highest: Washoe County ($3.7 billion)
3rd highest: Carson City ($740 million)
4th highest: Douglas County ($550 million)
5th highest: Elko County ($210 million)
6th highest: Lyon County ($95 million)
7th highest: Mineral County ($85 million)
8th highest: Lander County ($79 million)
9th highest: White Pine County ($76 million)

Not surprisingly, the counties with the largest populations are generally the ones with the most at risk.

Another approach is to look at the expected loss in terms of some measure of the ability of the county to recover. Assuming that the value of buildings in the county (building exposure) is a good measure of economic wealth of the county, the top nine counties are ranked as follows:

Highest loss as a percentage of building exposure: Lander County (32%)
2nd highest: Pershing County (26%)
3rd highest: Mineral County (25%)
4th highest: Carson City (22%)
5th highest: Douglas County (15%)
6th highest: Washoe County (15%)
7th highest: White Pine County (14%)
8th highest: Clark County (11%)
9th highest: Elko County (9%).

This ranking of counties, in terms of loss relative to economic wealth, is considerably different, with Lander and Pershing Counties' topping the list and Lyon's dropping out of the top nine.

These first two approaches do not take into account the probabilities that events like the scenario earthquakes will occur. The scenario earthquakes are examples of earthquakes that are likely to occur (chosen based on knowledge of comparable events in the geological past on nearby faults), and sooner or later, almost assuredly will occur again. However, for any given community or county, there are several faults that could be the source of earthquakes. The U.S. Geological Survey's Probabilistic Seismic Hazard Analysis discussed above (Table 3-5) provides an estimate the probability of on event of a comparable magnitude occurring within 50 kilometers within the next 50 years. A standard approach to assessing vulnerability (or risk) is to multiply probability of an event occurring times the likely consequences. Table 3-8 compares vulnerability by county using two measures: (1) probability times economic loss and (2) probability times loss as a percentage of building exposure.

Ranking the counties by probability of an earthquake comparable to the scenario earthquake occurring times economic loss from such an event, the top nine are:

Highest ranking for probability times economic loss: Washoe County
2nd highest: Carson City
3rd highest: Clark County
4th highest: Douglas City
5th highest: Churchill County
6th highest: Elko County
7th highest: Lyon County
8th highest: Storey County
9th highest: Humboldt County.

Ranking the counties by probability times loss as a percentage of exposure, the top nine are:

Highest ranking for probability times loss as a percentage of exposure: Carson City
2nd highest: Washoe County
3rd highest: Storey County
4th highest: Douglas City
5th highest: Churchill County
6th highest: Lyon County
7th highest: Elko County
8th highest: Humboldt County
9th highest: Clark County.

From a geological perspective, it is obvious that all areas of Nevada will experience major earthquakes at some times in the future. Thus, a county may be well justified in evaluating a serious earthquake scenario regardless of that earthquake's probability of occurrence, particularly if deciding whether to design earthquake resistance into a particularly critical facility. From a probabilistic standpoint – looking at what is most likely to happen – the latter two rankings are most applicable. Although the mix is different, the top nine counties are on both lists, and Carson City, Washoe, Douglas, and Churchill counties are among the top five on both lists.

Work is underway to update HAZUS with more accurate information for Nevada on critical facilities and State-owned buildings. In addition, HAZUS uses population data from the 2000 census. As demonstrated in Table 3-8, several Nevada counties have experienced rapid growth since 2000, such that damage numbers from HAZUS runs may be underestimates. On the other hand, given all the uncertainties in actual ground shaking and damage potential during earthquakes, estimates from HAZUS are unlikely to be accurate to better than a factor of two and could be off by as much as a factor of ten. Nonetheless, HAZUS provides a reasonable, widely accepted methodology for assessing vulnerabilities and ranking areas by relative risk.

In preparing this report, the Nevada Bureau of Mines and Geology used the Federal Emergency Management Agency's loss-estimation model, HAZUS-MH, to estimate what the effects would be of potential earthquakes near each of the county seats in Nevada (similar to ones we know have occurred in the geologic past). The report also includes some of the latest information from the U.S. Geological Survey regarding their best estimates of the probability of various earthquakes occurring within the next fifty years near each of the county seats.

In the *Nevada Earthquake Risk Mitigation Plan,* the Nevada Earthquake Safety Council wrote the following words in their Executive Summary:

> Nevada is earthquake country, ranking third in the Nation in the number of major earthquakes. Since the 1850s, 62 earthquakes have occurred in Nevada that have had potentially destructive magnitudes of 5.5 or greater. Nevada leads the Nation in population growth, and the risk and harm from earthquakes increases proportionally with population and development. We can expect earthquakes to continue in Nevada and some of these will strike our growing urban centers and communities. Nevada needs to prepare for these earthquakes.

To assess risks, the Nevada Bureau of Mines and Geology ran FEMA's loss-estimation model, HAZUS-MH, using earthquakes that have occurred in the geological past near each county seat. The results are reported in Nevada Bureau of Mines and Geology Open-File Report 06-1 and summarized in Table 3-6. Appendix H has the HAZUS maps created from the scenarios used to develop Tables 3-6, 3-7 and 3-8.

Losses to State facilities are depicted in Table 3-16 found in Section 3.5.2. A revised table will be presented in the next reiteration of this Plan following the release of HAZUS MR3 after the building stock data is updated.

Table 3-6
Summary of HAZUS MR2 loss-estimation output for earthquake scenarios that may affect counties in Nevada (adapted from Nevada Bureau of Mines and Geology Open-File Report 06-1)

			Building-Related Economic Loss (1)		Buildings with Major Damage (1)		Fatalities		People Needing Public Shelter		Earthquake	
											Magnitude	Probability
County	County Seat	Earthquake Scenario Magnitude	(multi-county region) $ billion	(county alone)	(multi-county region)	(county alone)	(multi-county region)	(county alone)	(multi-county region)	(county alone)	(compare with probabilities)	within 50 years within 50 km (2)
Carson City	Carson City	6.5	0.6 to 2.5	$740 million	~3,800	~2,800	30 to 110	~45	170 to 700	~270	6.5 6.0	50-55% ~70%
Churchill	Fallon	6.5	0.0 to 0.2	$73 million	~400	~300	<20	~2	10 to 40	~17	6.5 6.0	20-25% 30-40%
Clark	Las Vegas	6.6	4.5 to 18	$9.0 billion	~30,000	~30,000	200 to 900	~460	3,000 to 11,000	~5,400	6.5 6.0	<5% 10-20%
Douglas	Minden	7.1	0.7 to 2.8	$550 million	~3,600	~1,300	30 to 110	~25	150 to 600	~92	7.0 6.5 6.0	10-12% 50-60% 60-70%
Elko	Elko	6.5	0.1 to 0.4	$210 million	~800	~800	10 to 40	~18	40 to 140	~72	6.5 6.0	6-8% 10-15%
Esmeralda	Goldfield	6.7	< 0.1	$290 thousand	~3	~2	<20	none	none	none	6.5	5-10%
Eureka	Eureka	7.2	< 0.1	$4.5 million	~100	~48	<20	none	none	none	7.0 6.5 6.0	<0.5% 4-6% 10-15%

County	County Seat	Earthquake Scenario Magnitude	Building-Related Economic Loss (1) (multi-county region) $ billion	Building-Related Economic Loss (1) (county alone)	Buildings with Major Damage (1) (multi-county region)	Buildings with Major Damage (1) (county alone)	Fatalities (multi-county region)	Fatalities (county alone)	People Needing Public Shelter (multi-county region)	People Needing Public Shelter (county alone)	Earthquake Magnitude (compare with probabilities)	Earthquake Probability within 50 years within 50 km (2)
Humboldt	Winnemucca	6.5	< 0.1	$50 million	~490	~490	<20	none	10 to 20	~2	6.5 6.0	5-10% 15-20%
Lander	Battle Mountain	7.5	0.1 to 0.2	$79 million	~1,400	~1,200	<20	~6	10 to 20	~10	7.5 7.0 6.5 6.0	0.1-0.2% ~1.5% ~10% 15-20%
Lincoln	Pioche	6.5	< 0.1	$5.2 million	~40	~40	<20	none	none	~1	6.5 6.0	2-3% 6-10%
Lyon	Yerington	6.9	0.1 to 0.4	$95 million	~900	~760	<20	~3	10 to 40	~13	7.0 6.5 6.0	12% 40-45% ~60%
Mineral	Hawthorne	7.5	0.1 to 0.4	$85 million	~1,300	~660	<20	~3	20 to 60	~21	7.5 7.0 6.5 6.0	<0.5% 10-12% 30-40% ~60%
Nye	Tonopah	7.0	< 0.1	$480 thousand	~140	~1	<20	none	none	none	7.0 6.5 6.0	<1% 5-10% 20-30%
Pershing	Lovelock	7.3	0.0 to 0.2	$64	~840	~780	<20	~4	10 to 30	~11	7.5	~0.1%

County	County Seat	Earthquake Scenario Magnitude	Building-Related Economic Loss (1) (multi-county region) $ billion	Building-Related Economic Loss (1) (county alone) million	Buildings with Major Damage (1) (multi-county region)	Buildings with Major Damage (1) (county alone)	Fatalities (multi-county region)	Fatalities (county alone)	People Needing Public Shelter (multi-county region)	People Needing Public Shelter (county alone)	Earthquake Magnitude (compare with probabilities)	Earthquake Probability within 50 years within 50 km (2)
											7.0	1-2%
											6.5	~10%
											6.0	10-20%
Storey	Virginia City	6.5	0.7 to 2.9	$8.2 million	~3,500	~56	20 to 80	none	190 to 800	none	6.5	50%
											6.0	65-70%
Washoe	Reno	6.9	2.0 to 8.2	$3.7 billion	~11,000	~9,600	100 to 400	~180	700 to 3,000	~1,400	7.0	12-15%
											6.5	~50%
											6.0	65-70%
White Pine	Ely	6.8	0.0 to 0.2	$76 million	~430	~430	<20	~4	10 to 20	~12	7.0	<0.5%
											6.5	1.5-2%
											6.0	4-6%

(1) Buildings with major damage are those listed in the HAZUS report as suffering extensive or complete damage; losses include business interruption.
(2) Refer to http://www.nbmg.unr.edu/eqprob/eqprob.htm for details on earthquake probabilities estimated by the U.S. Geological Survey.

updated 4-Sep-07

Table 3-7
Predicted hospitalization needs, functionality of essential facilities, and damage to utilities and transportation within the counties for earthquake scenarios, using FEMA's HAZUS MR2 model

County	Earthquake Scenario Magnitude	# People requiring hospitalization	Functionality of Essential Facilities						Utility Losses ($ million)	Transportation Losses ($ million)
			# Hospital beds (total)	# Beds available at Day 1	Day 7	Fire Stations	Police Stations	Schools		
Carson City	6.5	169	128	11	48	1 @ 17%	2 @ 17%	15 @ 19%	30	5.7
Churchill	6.5	9	40	11	26	2 @ 49%	2 @ 49%	1 @ 2% 10 @ 49%	33	6.1
Clark	6.6	1783	3,022	878	1,697	31 @ 48%	21 @ 50%	292 @ 53%	350	40
Douglas	7.1	189 (incl. Carson)	128 (in Carson)	25	72	3 @ 35%	4 @ 27%	12 @ 32%	16	9.4
Elko	6.5	64	65	34	39	6 @ 84%	9 @ 62%	24 @ 65%	6.8	6.6
Esmeralda	6.7	0	42 (in Nye)	34	39	none	2 @ 80%	1 @ 100%	1.2	4.4
Eureka	7.2	0	25 (in Lander)	25	25	none	1 @11%	3 @ 74%	7.6	2.8
Humboldt	6.5	9	52	7	24	1 @ 27%	2 @ 16%	13 @ 55%	3.7	9.3
Lander	7.5	22	25	4	13	2 @ 56%	2 @ 56%	4 @ 56%	42	6.2

County	Earthquake Scenario Magnitude	# People requiring hospitalization	Functionality of Essential Facilities: # Hospital beds (total)	# Beds available at Day 1	Day 7	Fire Stations	Police Stations	Schools	Utility Losses ($ million)	Transportation Losses ($ million)
Lincoln	6.5	0	20	8	15	3 @ 81%	2 @ 92%	9 @ 72%	8.0	2.4
Lyon	6.9	14	63	6	24	10 @ 79%	8 @ 53%	17 @ 74%	88	8.6
Mineral	7.5	14	35	1	6	1 @ 6%	2 @ 10%	5 @ 28%	55	3.4
Nye	7.0	0	42	12	21	3 @ 99%	3 @ 99%	18 @ 98%	2.1	1.8
Pershing	7.3	16	37	3	11	none	2 @ 29%	3 @ 41%	230	14
Storey	6.5	109 (incl. Washoe)	1279 (in Washoe)	763	1,121	none	1 @ 33%	4 @ 66%	16	0.3
Washoe	6.9	662	1,279	196	602	5 @ 60%	9 @ 36%	110 @ 30%	280	69
White Pine	6.8	15	40	1	5	1 @ 13%	1 @ 14%	7 @ 22%	50	3.3

Utility losses include potable water, waste water, oil systems, natural gas, electric power, and communications.
Transportation losses include highways, railways, and airports.
Some volunteer fire stations are not counted in the HAZUS analysis. updated 5-Sep-07

Table 3-8.
Vulnerability to earthquakes in Nevada counties

County	Population (2000 Census)	Population (2006 estimate)	Building Exposure ($ million)	Building-Related Economic Loss for Scenario Earthquake ($ million)	Loss as % of exposure for Scenario (%)	Approximate Probability in 50 years (%)	Rank by Economic Loss x Probability	Rank by Loss as % Exposure x Probability	Loss x Probability ($ million)	Loss x Probability (% of exposure)
Carson City	52,547	57,701	3,332	740	22	50 to 55	2	1	389	12
Churchill	23,982	27,371	1,233	73	6	20 to 25	5	5	16	1.3
Clark	1,375,765	1,874,837	84,829	9,000	11	1 to 4	3	9	225	0.27
Douglas	41,259	51,770	3,698	550	15	~10	4	4	55	1.5
Elko	45,291	48,339	2,237	210	9	6 to 8	6	7	15	0.66
Esmeralda	971	1,262	59	0.29	0	~5	15	15	0.015	0.025
Eureka	1,651	1,460	118	4.5	4	<0.5	16	16	0.011	0.010
Humboldt	16,106	17,751	823	50	6	5 to 10	9	8	3.8	0.46
Lander	5,794	5,655	248	79	32	0.1 to 0.2	14	14	0.12	0.04778
Lincoln	4,165	3,987	233	5.2	2	2 to 3	13	13	0.13	0.05579
Lyon	34,501	54,031	1,699	95	6	12 to 15	7	6	13	0.75
Mineral	5,071	4,399	337	85	25	<0.5	12	12	0.21	0.06

County	Population (2000 Census)	Population (2006 estimate)	Building Exposure ($ million)	Building-Related Economic Loss for Scenario Earthquake ($ million)	Loss as % of exposure for Scenario (%)	Approximate Probability in 50 years (%)	Rank by Economic Loss x Probability	Rank by Loss as % Exposure x Probability	Loss x Probability ($ million)	Loss x Probability (% of exposure)
Nye	32,485	44,795	1,369	0.48	0.04	<1	17	17	0.002	0.0002
Pershing	6,693	6,955	250	64	26	0.1 to 1	11	10	0.35	0.14
Storey	3,399	4,110	209	8.2	4	~50	8	3	4.1	2.0
Washoe	339,486	409,085	25,015	3,700	15	12 to 20	1	2	592	2.4
White Pine	9,181	9,542	552	76	14	0.1 to 1.5	10	11	0.61	0.11

The 2006 population was estimated by the State Demographer
(http://www.nsbdc.org/what/data_statistics/demographer/).
Refer to Nevada Bureau of Mines and Geology Open-File Report 06-1 for details on the earthquake scenarios and
approximate probabilities. Rank is calculated assuming a probability between the tabulated ranges.

updated 5-Sep-07

3.3.5 Epidemic *(Special Risk Category)*

3.3.5.1 *Nature*

A disease is a pathological (unhealthy or ill) condition of a living organism or part of the organism that is characterized by an identifiable group of symptoms or signs. Disease can affect any living organism, including people, animals, and plants. Disease can both directly (via infection) and indirectly (via secondary impacts) harm these living things. Some infections can cause disease in both people and animals. The major concern is an epidemic, a disease that affects an unexpected number of people or sentinel animals at one time. (Note: an epidemic can result from even one case of illness if that illness is unheard of in the affected population e.g., smallpox.)

Of great concern for human health are infectious disease caused by the entry and growth of microorganisms in man. Most infectious diseases are communicable. They can be spread by direct contact with someone infected with the disease, someone in a carrier state who is not sick at the time, or another living organism that carries the pathogen. Disease-producing organisms can also be spread by indirect contact with something a contagious person or other carrier has touched and contaminated, like a tissue or doorknob, or another medium (e.g., water, air, or food).

According to the Centers for Disease Control and Prevention (CDC), during the first half of the twentieth century, optimism grew as steady progress was made against infectious diseases in humans via improved water quality and sanitation, antibiotics, and inoculations (October 1998). The incidences and severity of infectious diseases such as tuberculosis, typhoid fever, smallpox, polio, whooping cough, and diphtheria were significantly reduced during this period. This optimism proved premature, for a variety of reasons, including the following: antibiotics began to lose their effectiveness against infectious disease (e.g., Staphylococcus aureus); new strains of influenza emerged in China and spread rapidly around the globe; sexually transmitted diseases resurged; new diseases were identified in the U.S. and elsewhere (e.g., Legionnaires' disease, Lyme disease, toxic shock syndrome, and Ebola hemorrhagic fever); acquired immunodeficiency syndrome (AIDS) appeared; and tuberculosis (including multi-drug resistant strains) reemerged (CDC, October 1998).

In a 1992 report titled *Emerging Infections: Microbial Threats to Health in the United States,* the Institute of Medicine (IOM) identified the growing links between U.S. and international health, and concluded that emerging infections as a major threat to U.S. health. An emerging infectious disease is one that has newly appeared in a population or that has been known for some time, but is rapidly increasing in incidence or geographical range. Emerging infectious diseases are a product of modern demographic and environmental conditions, such as global travel, globalization and centralized processing of the food supply, population growth and increased urbanization.

In response to the threat of emerging infectious diseases, the CDC launched a national effort to protect the U.S. public in a plan titled *Addressing Emerging Infectious Disease Threats.* Based on the CDC's plan, major improvements to the US health system have been implemented, including improvements in surveillance, applied research, public health infrastructure, and prevention of emerging infectious disease (CDC, October 1998).

Despite these improvements, infectious diseases are the leading cause of death in humans worldwide and third leading cause of death in humans in the U.S. (American Society for Microbiology, June 21, 1999). A follow-up report from the Institute of Medicine, titled *Microbial Threats to Health: Emergence, Detection, and Response*, notes that the impact of infectious disease in the U.S. has only grown in the last ten years and that public health and medical communities remain inadequately prepared. Further improvements are necessary to prevent, detect, and control emerging, as well as resurging microbial threats to health. The dangers posed by infectious diseases are compounded by other important trends: the continuing increase in antimicrobial resistance; the diminished capacity of the U.S. to recognize and respond to microbial threats; and the intentional use of biological agents to do harm (Institute of Medicine, 2003).

The CDC has established a national list of over 50 nationally reportable diseases. A reportable disease is one that, by law, must be reported by health providers to federal, state or local public health officials. Reportable diseases are those of public interest by reason of their communicability, severity, or frequency.

The nationally notifiable list includes the following diseases:

- Acquired Immunodeficiency Syndrome (AIDS)
- Anthrax
- Arboviral neuroinvasive and non-neuroinvasive diseases
- Botulism
- Brucellosis
- Chancroid
- Chlamydia trachomatis, genital infections
- Cholera
- Coccidioidomycosis
- Cryptosporidiosis
- Cyclosporiasis
- Diphtheria
- Ehrlichiosis
- Giardiasis
- Gonorrhea
- Haemophilus influenzae, invasive disease
- Hansen disease (leprosy)
- Hantavirus pulmonary syndrome
- Hemolytic uremic syndrome, post-diarrheal
- Hepatitis, viral, acute
- Hepatitis, viral, chronic
- HIV infection
- Influenza-associated pediatric mortality
- Legionellosis
- Listeriosis
- Lyme disease
- Malaria
- Measles
- Meningococcal disease

- Mumps
- Novel influenza A virus infections
- Pertussis
- Plague
- Poliomyelitis, paralytic
- Poliovirus infection, nonparalytic
- Psittacosis
- Q Fever
- Rocky Mountain spotted fever
- Rubella
- Rubella, congenital syndrome
- Salmonellosis
- Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV) disease
- Shiga toxin-producing Escherichia coli (STEC)
- Shigellosis
- Smallpox
- Streptococcal disease, invasive, Group A
- Streptococcal toxic-shock syndrome
- Streptococcus pneumoniae,
- Syphilis
- Syphilis, congenital
- Tetanus
- Toxic-shock syndrome (other than Streptococcal)
- Trichinellosis (Trichinosis)
- Tuberculosis
- Tularemia
- Typhoid fever
- Vancomycin
- Varicella (morbidity)
- Varicella (deaths only)
- Vibriosis
- Yellow fever

(Centers for Disease Control and Prevention, Nationally Notifiable Infectious Diseases, United States 2007 Revised).

Many other hazards, such as floods, earthquakes or droughts, may create conditions that significantly increase frequency and severity of diseases. These hazards can affect basic services (e.g., water supply and quality, wastewater disposal, electricity), the availability and quality of food, and the public and agricultural health system capacities. As a result, concentrated areas of disease may result in large losses of life and damage to the economic value of the area's goods and services.

3.3.5.2 *History*

The influenza pandemic of 1918 and 1919, known as the Spanish Flu or Swine Flu, had the highest mortality rate in recent history for an infectious disease. More than 20 million persons were killed worldwide, some 500,000 of which were in the U.S. alone (Centers for Disease Control and Prevention, October 1998). More recent incidences of major infectious disease affecting people in the U.S. include the following:

- West Nile Virus (WNV), a seasonal infection transmitted by mosquitoes, caused an epidemic which grew from an initial U.S. outbreak of 62 disease cases in 1999 to 4,156 reported cases, including 284 deaths, in 2002 (Centers for Disease Control and Prevention, July 8, 2003).

- Severe acute respiratory syndrome (SARS) was estimated to have killed 915 and infected 8,422 worldwide by mid-August 2003 (Word Health Organization, August 15, 2003). In the U.S., there were 175 suspect cases and 36 probably cases, although no reported deaths (Centers for Disease Control and Prevention, July 17, 2003).

- Although most cases go unrecognized, Norovirus is believed to affect over 20 million people in the U.S. each year. Norovirus accounts for 96 percent of all non-bacterial outbreaks of gastroenteritis (Arizona Department of Health Services, March/April 2003).

Table 3-9 provides an example of epidemics that have been recorded throughout the State of Nevada.

Table 3-9
Historical Occurrences of Outbreaks in Nevada

Date	Details
February 1992	Cholera outbreak confirmed. At least 26 passengers from Aerolineas Argentinas Flight 386 that brought a cholera outbreak to Los Angeles traveled on to Las Vegas, where 10 showed symptoms of the disease. Cholera or cholera-like symptoms developed in 67 passengers of Flight 386.
Spring 2000	Five cases of the measles confirmed. Outbreak identified and confirmed, Clark County Health District (CCHD) Office of Epidemiology (OOE) worked with the Immunization Clinic and the media to alert the community about preventing the spread of the disease.
October 2004	Norovirus confirmed at a major public accommodation facility on the Strip in Las Vegas.
2004	During October 13-19, a total of 200 cases of human West Nile Virus were reported in 20 states, which included Nevada. During 2004, 40 states including Nevada reported a total of 2,151 cases of human West Nile Virus.
Fall 2004	Chickenpox (varicella) outbreak in Clark County, Nevada elementary school. 32 students from all grades were infected.
April 2006	Norovirus outbreak at a Reno, Nevada daycare, Noah's Ark. 30 Norovirus cases were confirmed. 2 additional people were infected after the daycare had been cleaned and sanitized.
March 2007	A norovirus outbreak in Las Vegas, Nevada sickened at least 215 inmates and 41 staff members at the Clark County Detention Center. Most of those sickened complained of stomach-related distress such as diarrhea, vomiting and cramps. None were hospitalized.

3.3.5.3 *Location, Severity, and Probability of Future Events*

Clark County as a tourist destination for about 40 million visitors and with the ten largest hotels in the world has a potential risk of a large exposure to disease for visitors and residents alike. Additionally, Clark County's large transient population contributes to this hazard.

In the *Hazard Mitigation Survey* and the *County Hazard Mitigation Plans*, Washoe and Nye County are concerned about this hazard. Nye County contributes many workers to the casino industry in Clark County. Washoe County also has a large share of tourists and casino industry. Other counties in Nevada have not considered this hazard as a risk.

The non-profit organization, Trust for America's Health, issued in March 2007 a document, *Pandemic Flu and the Potential for U.S. Economic Recession: A State-by-State Analysis.* This document showed that Nevada had the highest economic risk from a severe flu pandemic. According to this document, Nevada could lose 9 billion dollars, a projected GPD percentage loss of 8.08%.

Additionally, the document projected that during a pandemic, Nevada could have 720,000 sick workers with 13,000 lives lost.

Epidemics are considered as hazards in a "special risk category" because their effects are mitigated through the health emergency plan handled by the Nevada Department of Health and Human Services (NDHHS). A representative from NDHHS is a standing member of the Subcommittee. This provides a method by which existing plans are integrated with this Plan.

3.3.6 Expansive Soils *(No Substantial Risk Category)*

3.3.6.1 *Nature*

Soils and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soils. Changes in soil volume present a hazard primarily to structures built on top of expansive soils. The most extensive damage occurs to highways and streets.

In the United States, two major groups of rocks serve as parent materials of expansive soils, and occur more commonly in the West than in the East. The first group consists of ash, glass, and rocks of volcanic origin. Glass and aluminosilicate minerals in these volcanic materials often decompose to form expansive clay minerals (most commonly, smectite, a group of clay minerals that incorporate water in their crystal structures). The second group consists of sedimentary rock containing clay minerals, examples of which are the shales of the semiarid West-Central States. Because clay materials are most susceptible to swelling and shrinking, expansive soils are often referred to as swelling clays.

Expansive soils can be recognized by visual inspection in the field. Shales, claystones, weathered volcanic rocks, and residual soils containing smectite often have a characteristic “popcorn” texture, especially in semi-arid areas.

Most engineering problems caused by swelling clays involve soils underneath areas covered by buildings and slabs or layers of concrete and asphalt, such as those used in construction of highways, walkways, and airport runways.

Houses and one-story commercial buildings are more apt to be damaged by expansive soils than are multi-story buildings, which usually are heavy enough to counter the swelling pressures. However, if constructed on wet clay, multi-story buildings may be damaged by shrinkage of the clay if moisture levels are substantially reduced, such as by evaporation from beneath heated buildings.

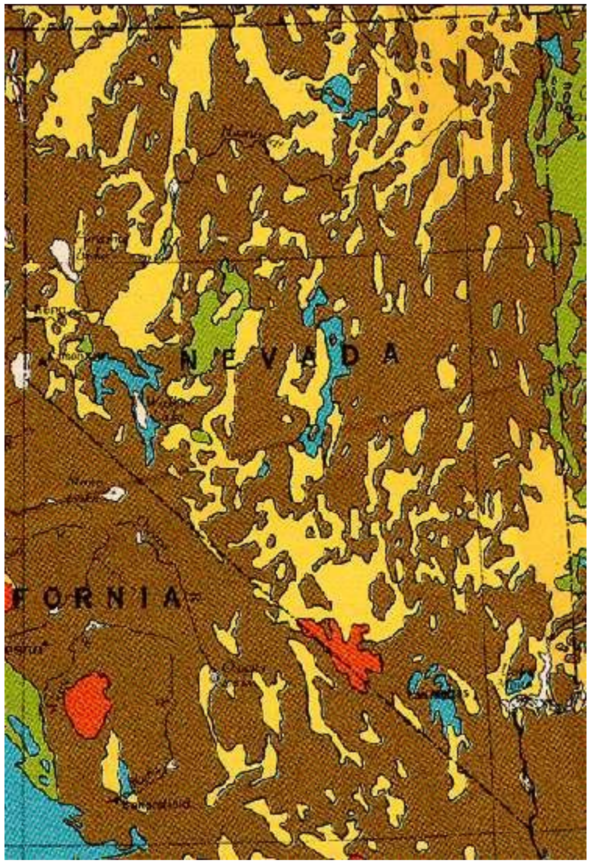
The best means to prevent or reduce damage from expansive soils is avoidance. When other choices are not possible, applied engineering practices such as removal of the soil, application of heavy loads, preventing access to water, presetting, or stabilization are necessary.

3.3.6.2 *History*

In 1957 the Las Vegas and Eldorado Valleys Area Survey of soil was completed. The area had problems with house roofs displacing up to 18 inches and concrete slab floors rising as much as 3 feet. In the report, the soil scientists found that these homes were destroyed by swelling soils. Salts in the soil became deliquescent at air temperatures of 41 to 45 degrees F. Upon becoming deliquescent, the salts (sodium sulfate) in the soils took on 10 molecules of water from the atmosphere, causing the damage to homes and other buildings.

Between 1994 and 1999, Beazer Homes constructed and sold 206 single-family residences on a 40-acre residential subdivision in North Las Vegas. In April 2000, three homeowners filed a complaint against Beazer Homes for constructional defects to their homes. The complaint alleged that their houses’ foundations and concrete slabs were damaged by expansive soils. *Shuette v. Beazer Homes Holding Corp., 121 Nev. Adv. Op. 82* (2005)

1989 U.S. Geological Survey
Swelling Clays Map Of The Conterminous U.S. (Soil Map of Nevada)



Unit contains abundant clay having high swelling potential

Part of unit (generally less than 50%) consists of clay having high swelling potential

Unit contains abundant clay having slight to moderate swelling potential

Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential

Unit contains little or no swelling clay

Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only)

Figure 3-12 1989 Soil Map of Nevada

This map is sourced from the U.S. Geological Survey publication "Swelling Clays map of the Conterminous United States" by W.W. Olive,

A.F. Chleboarad, C.W. Frahme. Julius Schlocker, R.R. Schnieder, and R.I. Shuster; 1989

In 1997 Southern Nevada added a required swell test (1803.3) to their building code amendments. This test would determine if certain buildings required special design considerations to counteract soil expansion.

In the 2003 Edition of the International Building Code, The City of Reno amended Chapter 18, Soils and Foundations. They added this sentence to 1802.1 General. "The Building Official may require certification of freedom from plastic or expansive materials in base for concrete slabs, fills, and foundations."

In Nye County on the northwest side of Pahrump Valley, expansive soils were blamed for causing foundation and septic damage to homes in the area. Because of the septic damage, some of the land in the area was contaminated. In response, the Nye County Commission passed a bill in October 13, 2006, requiring disclosure of soil conditions to the buyer.

Expansive clays occur in and near urban areas of Washoe and Storey Counties where hydrothermal alteration (associated with volcanism several million years ago) has converted volcanic rocks to smectite. The problem has been most acute to date in the hills on the north side of Reno and Sparks, but similar rocks occur in the foothills of Peavine Peak, the Virginia Range, and the Carson Range. As development encroaches higher up the slopes, this hazard will become more of a risk to homeowners.

In the *Tribal Hazard Mitigation Survey,* the South Fork Band reported this hazard as low.

3.3.6.3 Location, Severity and Probability of Future Events

At this time, this risk is centered in Clark, Nye, and Washoe counties near the higher population centers.

Each of these counties has been amending their building codes as described above to avoid damage caused by this risk. Even so, there are many homeowners in these areas filing lawsuits to pay for past damage to their homes from expansive soils.

Expansive soils are considered to be hazards in the "no substantial risk category" from a State perspective because this hazard will most likely be handled efficiently by local authorities through their building codes or by the Nevada Department to Transportation through their building practices in areas prone to this hazard. The Subcommittee will continue to monitor this hazard closely in future meetings.

3.3.7 Extreme Heat *(Moderate Risk Hazard)*

3.3.7.1 *Nature*

Heat may kill by pushing the human body beyond its limits. In extreme heat, evaporative cooling is diminished and the body must work extra hard to maintain a normal temperature.

Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat.

Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect."

Heat waves kill more people in the United States than any other disaster. It was estimated by the University of Delaware that an average of 1500 American city dwellers die each year due to heat. Annual deaths from tornados, earthquakes and floods put together average fewer than 200.

Excessive heat during the nighttime hours is a predictor of heat-related injury and deaths. Nighttime temperatures in the 85th percentile of the temperature distribution are likely to set the stage for an increase in heat-related deaths and injuries.

Livestock and pets are also at great risk for heat related injury during long periods of temperatures in the 85th percentile.

Extreme heat coupled with higher elevation produces a hazard to air-traffic. In July of 2006 Las Vegas McCarran International Airport canceled or delayed commercial flights because of heat and altitude density guidelines. Smaller, less powerful aircraft are more at risk of heat related performance problems.

Other effects of heat waves include buckled roadways and train derailments.

3.3.7.2 *History*

Las Vegas is located in a broad desert valley in extreme southern Nevada. Mountains surrounding the valley extend 2,000 to 10,000 feet above the valley floor. The Las Vegas Valley comprises about 600 square miles and runs from northwest to southeast. The valley is bounded on the north by the Sheep Range, while Boulder City and the Lake Mead National Recreation Area are considered its southern extent. To the west are the Spring Mountains, which include Mt. Charleston, the region's highest peak at 11,918 feet. Several smaller ranges line the eastern rim of the valley, including the Muddy Mountains, the Black Mountains and the Eldorado Range.

Official weather observations began in 1937 at what is now Nellis Air Force Base. In late 1948, the U.S. Weather Bureau moved to McCarran Field, now McCarran International Airport.

The Las Vegas Valley summers display classic desert southwest characteristics. Daily high temperatures typically exceed 100 degrees with lows in the 70s. The summer heat is tempered by the extremely low relative humidity. Because of the valley's typical summer temperatures residents who are not careful can be overcome by heat-related illness such as sunburn, heat exhaustion, heat cramps, and heat stroke.

Northern Nevada also experiences extreme heat conditions in the summer months. The month of July, 2002 set records for high temperatures. On July 10th and 11th, the Reno Airport reached 108 ° F, setting an all time record for that area.

The following offers a complete overview of the heat extremes throughout Nevada:

Heat Extremes

The State Climatologist prepared the following data about heat extremes in each county. The data is not relevant to state declarations but will assist each county in its preparedness and response planning.

Carson City:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Carson City County one station was available; Carson City. At Carson City 127 days were observed to have a temperature of 100° or higher within the time span from 1893 to 2006. This equates to a frequency of just more than 1 day per year (1.34). Leading to the conclusion that Carson City County historically is not at threat to suffering from heat above 100° F. A summary of station follows:

- Carson City - Days of 100° or higher = 127, frequency = 1.34 days/year

Churchill County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Churchill County two representative stations were selected; Fallon NAS and Hawthorne AP. On average Churchill County can expect about **10** days a year at or above 100°. A summary of the two stations follows:

- Fallon NAS - Days of 100° or higher = 540, frequency = 10.65 days/year
- Hawthorne AP - Days of 100° or higher = 571, frequency = 8.98 days/year

Clark County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Clark County five representative stations were selected; Mesquite, Searchlight, Las Vegas AP, Indian Springs, and Valley of Fire SP. Searchlight had an abnormally lower frequency of events than the rest of the stations in Clark County. The other stations had much higher numbers, averaging **80.69** days a year at 100° or higher, leading to the conclusion that Clark County historically is at threat to suffering from heat above 100° F. A summary of the five stations follows:

- Searchlight - Days of 100° or higher = 2193, frequency = 24.87 days/year
- Las Vegas AP - Days of 100° or higher = 4279, frequency = 74.48 days/year
- Indian Springs - Days of 100° or higher = 1899, frequency = 68.15 days/year
- Valley of Fire SP - Days of 100° or higher = 2787, frequency = 83.31 days/year
- Mesquite - Days of 100° or higher = 1784, frequency = 96.80 days/year

Douglas County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Douglas County three representative stations were selected; Minden, Glenbrook, and Topaz Lake. A summary of the three stations follows:

- Minden - Days of 100° or higher = 267, frequency = 2.79 days/year
- Glenbrook - Days of 100° or higher = 0, frequency = 0.00 days/year
- Topaz Lake - Days of 100° or higher = 55, frequency = 1.92 days/year

Elko County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Elko County five representative stations were selected; Elko AP, Jiggs, San Jacinto, Clover Valley, and Tuscarora. Only at the Elko AP station did 100° weather appear more than once a year. The other stations had much lower numbers, leading to the conclusion that Elko County historically is not at threat to suffering from heat above 100° F. A summary of the five stations follows:

- Elko AP - Days of 100° or higher = 326, frequency = 3.01 days/year
- Jiggs - Days of 100° or higher = 7, frequency = 0.46 days/year
- Tuscarora - Days of 100° or higher = 0, frequency = 0.00 days/year
- Clover Valley - Days of 100° or higher = 0, frequency = 0.00 days/year
- San Jacinto - Days of 100° or higher = 24, frequency = 0.60 days/year

Esmeralda County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Esmeralda County three representative stations were selected; Silverpeak, Coaldale Junction and Goldfield. The longest period of record was from the Goldfield station. At Goldfield the frequency was much lower than the other stations, averaging less than 1 day per year. The other stations had higher numbers, perhaps Goldfield being over 1000 feet higher in elevation than the other two may be the reasoning for this. A summary of the three stations follows:

- Coaldale Junction - Days of 100° or higher = 401, frequency = 32.10 days/year
- Goldfield- Days of 100° or higher = 68, frequency = 0.73 days/year
- Silverpeak - Days of 100° or higher = 912, frequency = 23.45 days/year

Eureka County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Eureka County two representative stations were selected; Eureka and Beowawe. The longest period of record was from the Eureka station. At Eureka 30 days were observed to have a temperature of 100° or higher within the time span from 1888 to 2006. This equates to a frequency of less than one day per year. The other station had higher numbers, but nothing out of the ordinary. A summary of the two stations follows:

- Eureka- Days of 100° or higher = 30, frequency = 0.35 days/year
- Beowawe - Days of 100° or higher = 468, frequency = 5.06 days/year

Humboldt County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated, averaging **4.80** days/year. Within Humboldt County two representative stations were selected; Winnemucca AP and Quinn River Crossing. A summary of the two stations follows:

- Winnemucca AP - Days of 100° or higher = 521, frequency = 5.86 days/year
- Quinn River Crossing - Days of 100° or higher = 99, frequency = 3.73 days/year

Lander County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Lander County two representative stations were selected; Austin and Battle Mountain. There was a wide range of observations at the two stations. Austin only had a 100° plus day once every five years where as Battle Mountain averages nearly 10 days a year. Austin is located over 2000ft higher in elevation than Battle Mountain so that could be the reason. A summary of the two stations follows:

- Battle Mountain - Days of 100° or higher = 578, frequency = 9.55 days/year
- Austin - Days of 100° or higher = 20, frequency = 0.18 days/year

Lincoln County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Lincoln County four representative stations were selected; Elgin, Caliente, Pioche, and Pahranaghat Wildlife

Refuge. The Pioche station had abnormally low numbers when compared to the other stations, but it is also at a much higher elevation than the others. With the Pioche frequency removed Lincoln County could expect about **24** days per year at or above 100°. A summary of the four stations follows:

- Elgin - Days of 100° or higher = 638, frequency = 29.81 days/year
- Caliente - Days of 100° or higher = 389, frequency = 13.84 days/year
- Pioche - Days of 100° or higher = 116, frequency = 1.49 days/year
- Pahranaghat - Days of 100° or higher = 1173, frequency = 28.36 days/year

Lyon County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Lyon County three representative stations were selected; Yerington, Wellington Ranger Station, and Fernley. A summary of the three stations follows:

- Wellington Ranger Station - Days of 100° or higher = 10, frequency = 0.33 days/year
- Yerington - Days of 100° or higher = 329, frequency = 3.62 days/year
- Fernley - Days of 100° or higher = 311, frequency = 10.28 days/year

Mineral County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Mineral County two representative stations were selected; Mina and Thorne. The longest period of record was from the Mina station. At Mina 1317 days were observed to have a temperature of 100° or higher within the time span from 1896 to 2006. This equates to a frequency of more than 12 days a year (12.65). The other station had lower numbers. County average: **10.67** days per year. A summary of the two stations follows:

- Mina - Days of 100° or higher = 1317, frequency = 12.65 days/year
- Thorne - Days of 100° or higher = 293, frequency = 8.69 days/year

Nye County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Nye County five representative stations were selected; Tonopah, Pahrump, Sarcobatus, Duckwater, and Smokey Valley. The longest period of record was from the Pahrump station. At Pahrump 2972 days were observed to have a temperature of 100° or higher within the time span from 1914 to 2006. This equates to a frequency of nearly 51 days per year (50.71). The other stations had lower numbers, but Nye County is a very large county that spans numerous climate types. A summary of the five stations follows:

- Tonopah - Days of 100° or higher = 108, frequency = 2.03 days/year
- Pahrump - Days of 100° or higher = 2972, frequency = 50.71 days per year
- Sarcobatus - Days of 100° or higher = 515, frequency = 28.10 days/year
- Duckwater - Days of 100° or higher = 35, frequency = 1.12 days/year
- Smokey Valley - Days of 100° or higher = 46, frequency = 0.84 days/year

Pershing County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Pershing county four representative stations were selected; Lovelock Derby filed, Imlay, Paris Ranch and Gerlach. The longest period of record was from the Imlay station. At Imlay 647 days were observed to have a temperature of 100° or higher within the time span from 1914 to 2006. This equates to a frequency of nearly 8 days a year (7.64). Two of the three stations had higher numbers, averaging out at 11.26 days per year, leading to the conclusion that Pershing County historically is prone to receiving heat above 100° F. A summary of the four stations follows:

- Imlay - Days of 100° or higher = 647, frequency = 7.64 days/year
- Lovelock Derby Field - Days of 100° or higher = 614, frequency = 11.11 days/year
- Paris Ranch - Days of 100° or higher = 503, frequency = 20.26 days/year
- Gerlach - Days of 100° or higher = 201, frequency = 6.02 days/year

Storey County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Storey county station was available; Virginia City. At Virginia City only 1 day was observed to have a temperature of 100° or higher within the time span from 1951 to 2006. The conclusion is that Storey County historically is not at threat to suffering from heat above 100° F. A summary of the station follows:

- Virginia City - Days of 100° or higher = 1, frequency = 0.02 days/year

Washoe County:

Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within Elko County four representative stations were selected; Reno AP, Vya, Nixon and Sand Pass. The average in Washoe County is **6.44** days per year. A summary of the three stations follows:

- Reno AP - Days of 100° or higher = 1061, frequency = 15.42 days/year
- Vya - Days of 100° or higher = 1, frequency = 0.06 days/year
- Sand Pass - Days of 100° or higher = 288, frequency = 5.57 days/year
- Nixon - Days of 100° or higher = 172, frequency = 4.72 days/year

White Pine County:
Daytime maximum temperatures were analyzed to determine the threat heat can pose. The number of days that reached or exceeded 100° were also calculated. Within White Pine County three representative stations were selected; Ely Yelland Filed, Lund, and McGill. The average in White Pine County was one day in five years (**0.20**) would be at or above 100°. A summary of the three stations follows:

- Ely Yelland Field - Days of 100° or higher = 3, frequency = 0.04 days/year
- Lund - Days of 100° or higher = 17, frequency = 0.35 days/year
- McGill - Days of 100° or higher = 19, frequency = 0.20 days/year

3.3.7.3. *Location, Severity, and Probability of Future Events*

Although this hazard occurs mainly in the southern portion of the state, all of the counties reach high temperatures in the summer months, mainly in July.

In the *Hazard Mitigation Survey,* Storey and Washoe Counties considered this hazard as a low threat. Washoe County did indicate that death of people and livestock, buckled railways, and train derailments could be caused by this hazard. Churchill County considered this hazard to be a moderate threat.

In the *Tribal Mitigation Survey,* Ely Shoshone Tribe and the South Fork Band considered this hazard as a high threat. Ely Shoshone Tribe indicated that this hazard affected people and livestock. The South Fork Band indicated that this hazard happened yearly. It caused dry vegetation and wildfires on the reservation.

The hazard rating for extreme heat is considered a "moderate risk hazard" in Nevada. Coupled with possible electrical-system failures that could occur from earthquakes or other causes, large numbers of residents, and tourists as well as the State's economy could be affected.

As shown by the data provided by the State Climatologist, extreme heat is an ongoing event in Nevada. The Subcommittee recommended further analysis of the data presented. They also recommended further research to determine locations most prone and subject to the greatest impact throughout the Sate. This should be presented in the following Plan.

Increased public awareness of the seriousness of dehydration and heat-related illnesses as well as energy conservation measures are warranted throughout the State.

Hazard Mitigation/Tribal Mitigation Surveys

Heat Threat Consideration

County/Tribal Hazard Mitigation Plans	***Low***	***Moderate***	***High***	***No Data***
Carson City				X
Churchill County		X		
Clark County				X
Douglas County				X
Elko County				X
Ely Shoshone Tribe			X	
Esmeralda County				X
Eureka County				X
Humboldt County				X
Lander County				X
Lincoln County				X
Lyon County				X
Mineral County				X
Nye County				X
Pershing County				X
White Pine				X
Shoshone-Paiute Tribes of Duck Valley				X
South Fork Band Tribe			X	
Storey County	X			
Washoe County	X			

3.3.8 Floods *(High Risk Hazard)*

3.3.8.1 *Nature*

Flooding is the accumulation of water where there is usually none or the overflow of excess water from a stream, river, lake, reservoir, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods.

Floods also occur along streams and arroyos (stream channels that are normally dry) that do not have classic floodplains. These include flash floods in mountains (sometimes with rapidly rising water several tens of feet deep) and on alluvial fans, which are typically fan-shaped, gently sloping areas between the steep parts of mountain ranges and the nearly flat valley floors. Because much of Nevada is part of the Great Basin (an area of internal drainage, in which streams are not connected to rivers that flow to the oceans), flood waters will commonly drain into interior lakes (e.g., Walker Lake at the terminus of the Walker River, Pyramid Lake at the terminus of the Truckee River), wetland areas (e.g., Carson Sink at the terminus of both the Carson and Humboldt Rivers), or playas (normally dry lake beds, such as Roach Lake, south of Las Vegas, where a new airport is planned).

Floods are natural events that are considered hazards only when people and property are affected. Nationwide, on an annual basis, floods have resulted in more property damage than any other natural hazard. Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.
- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.
- Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines severed.

Floods also cause economic losses through closure of businesses and government facilities; disrupt communication; disrupt utilities such as water and sewer service; result in excessive expenditures for emergency response; and generally disrupt the normal function of a community.

3.3.8.2 *History*

Nevada Bureau of Mines and Geology Special Publication 23 (published in 1998) describes the effects of the 1997 New Year's floods in western Nevada (affecting the Carson, Truckee, and Walker Rivers). The 1997 flooding along these rivers, which occurred primarily during the first week of 1997, was the most costly and damaging flood in the last 160 years. The floods inundated approximately 63,800 acres and caused direct damages estimated between $167 million and $169 million. Additional losses to the local economy due to lost business and disruptions in travel probably amounted to hundreds of millions of dollars. Two lives were lost: one in Washoe County and one in Douglas County. The floods were caused by unusually heavy snow and rainfall in the Sierra Nevada.

Special Publication 23 includes a section on previous floods, and Nevada Bureau of Mines and Geology Special Publication 34 (on "Weather and Climate of the Reno-Carson City-Lake Tahoe Region," published in 2007) documents and explains the causes for floods in the region. Other major historical floods along rivers in western Nevada occurred in 1852, December 1861 — January 1862, December 1867 – January 1868, March 1907, March 1928, December 1937, 1986, December 31, 2005 – January 1, 2006, and March 18, 2007. Many of these historical floods affected the Reno-Sparks metropolitan area.

In addition, flash floods have caused local disasters in many areas. Special Publication 34 documents significant flash floods, related landslides, and debris flows cited below.

Notable debris flows:

- July 1913, in which a stranded automobile was covered with 25 to 30 feet of debris
- July 1927, with over two inches of rainfall per hour, causing the Grass Lake irrigation reservoir on Browns Creek, southwest of Reno, Washoe County, to fail
- May 1983 when a landslide off Slide Mountain hit Upper Price Lake and sent a 40-mile-per-hour, 15- to 20-foot wall of water, mud, and boulders down Ophir Creek into Washoe Valley in Washoe County, killing one person and covering an 1,800-foot stretch of U.S. Highway 395 with mud and debris
- March 1995, causing over $2.5 million in damage in the Rainbow Bend subdivision along Long Valley Creek at Lockwood in Storey County
- January 1997, coincident with the major flooding on the rivers in northern Nevada affecting the counties of Carson, Douglas, Lyon, Storey and Washoe
- June 2002, causing at least $500,000 damage to the new Spanish Springs High School in Washoe County.
- September 14, 1974, a flash flood/debris flow occurred in Eldorado Canyon, Clark County, killing at least 9 and perhaps as many as 20 people. The U.S. Geological Survey estimated the flow to be 76,000 cubic feet per second. Water depth was up to 20 feet, and up to 40 feet of sediment was deposited near Nelson's Landing on the shore of Lake Mead.

The Clark County Regional Flood Control District (http://www.ccrfcd.org/) notes that

> "In a special report entitled History of flooding, Clark County, Nevada 1905-1975, the U.S. Soil Conservation Service documented 184 different flooding events that resulted

> in damage to private property and public facilities. Since 1960, the area has experienced at least 11 floods costing more than a million dollars each. In that same period, 31 lives were lost in 21 separate flash flood events."

The District also documents major flooding in August 1997, July 1999, December 2004, and January 2005 (the latter largely affecting Meadow Valley Wash and the Virgin River).

The U.S. Geological Survey (USGS) within the U.S. Department of the Interior, with the support of the Federal Emergency Management Agency (FEMA) and Nevada's Floodplain Management Program of the Nevada Division of Water Resources (NDWR), have developed a web site, *Flood Chronology of the Carson River Basin, California and Nevada, Nevada* http://nevada.usgs.gov/crfld/, that makes historic flood information for the Carson River Basin publicly available. At this time, the website does not have flood information for other parts of the State. Only a few of the floods from this site are mentioned in this report

The following information comes from *Flood Chronology of the Carson River Basin, California and Nevada* http://nevada.usgs.gov/crfld/.

- **New Year 2006:** Widespread heavy rain began the afternoon of December 30, 2005 and continued until mid-morning of December 31, 2005. Widespread flooding occurred throughout the Carson River Basin including tributaries in Carson Valley, Carson City and the Dayton Valley area. Provisional stream flow data from the USGS indicate the flow at East Fork Carson River near Gardnerville, Nev., (gauging station 10309000) peaked at 8,920 cubic feet per second (cfs); the flow at West Fork Carson River at Woodfords, Calif., (gauging station 10310000) at 3,010 cfs; the flow at Carson River near Carson City, Nev., (gauging station 10311000) at 13,200 cfs, and the flow at Carson River at Fort Churchill, Nev., (gaging station 10312000) at 10,300 cfs.

Storms throughout a 10-day period in February 1986 caused severe flooding along the Truckee and Carson Rivers and to a lesser extent along the Walker River. The storms causing the floods were similar meteorological to those in December 1955 and February 1963, but in 1986 the rains continued for a longer period, and the snow level was at a significantly lower altitude. Maximum precipitation for the period was 12 inches in valley areas, 20 inches in the foothills of the Sierra Nevada, and 30 inches in the higher mountains. The precipitation was unprecedented for durations of as many as 10 days. Flows in the Truckee River in the Reno-Sparks area and in the Carson River at Carson City were the greatest since 1963. Downstream on the Carson River near Fort Churchill, the flow was the greatest since record keeping began in 1911. http://geochange.er.usgs.gov/sw/impacts/hydrology/state_fd/nvwater1.html)

The following list reflects the flooding events in northern Nevada, specifically in the Carson River, the Truckee River Basins, the Walker River Basin and the Humboldt River Basin which is the largest Basin in the entire region.

Year	Flooding Location	Comments	Estimated Losses
December 1852	Carson Valley	Two days of heavy snowfall followed by four days of warm rain. Little damage occurred because settlements were located away from the low areas. It is likely flooding occurred along other western Nevada rivers at this time.	No Figures available
December 1861 January 1862	Carson and Truckee River Basins	Two days of heavy snow before Christmas, followed by extreme cold temperatures freezing the snow. From Christmas Day until December 27, a warm rain fell. It was reported that Carson Valley became a lake. At that time, most of the settlements were located out of the valley along the eastern slope of the Sierra Nevada, so little damage was reported.	No Figures available
December 1867 January 1868	Carson and Truckee River Basins	On December 20, an unseasonably warm rainstorm fell on snow accumulations in the Sierra Nevada. This storm became more intense on December 24 and ended on Christmas Day. After a period of clear weather, a second intense rainstorm began on December 30 and continued through January 2, 1868. The Carson Valley again became a lake. This flooding exceeded the 1861 flood crest. All bridges in the Carson Valley crossing the East Fork and West Fork Carson River as well as the main-stem, were swept away, including William Cradelbaugh's toll bridge, the first bridge over the Carson River in Carson Valley.	No Figures available
May 1906	Humboldt River Basin	Heavy rainfall caused the failure of reservoir dam. Six deaths. Various structures damaged. Horses and mules died. Southern Pacific railroad tracks undermined.	No Figures available
March 1907	Walker, Carson and Truckee River Basins	A series of snow storms began on March 16, turning to rain and continuing until March 20. The Truckee River severely damaged the Electric Light Bridge. In Carson Valley, all of the bridges of the East Fork and West Fork Carson River as well as the main-stem Carson River were Either destroyed or seriously damaged. Among the bridges destroyed on the Carson River were the Cradlebaugh bridge on the Gardnerville-Carson city Road (U.S 395, and the McTarnahan bridge on the toll-road on the south end of Prison Hill. .	No Figures available
February-April 1910	Humboldt River Basin (Mary's	Worst flooding in history struck the river basin. Greater than 100 year recurrence interval. Flooding	No Figures available

Year	Flooding Location	Comments	Estimated Losses
	River)	due to rapid thawing and light rain on snowpack. Extensive damages to all railroad bridges and tracks in the region. Severe damages to mining camps. Severe flooding to the towns of Carlin, Elko in Elko County, town Battle Mountain in Lander County, town of Winnemucca in Humboldt County and Lovelock Valley in Pershing County. All major diversions and canals were washed out throughout the region.	
July 1913	Little Humboldt River Sub-basin	Dry mantle flooding from severe thunder and rainstorms. Widespread damage to hay fields in Paradise Valley, Humboldt County.	No Figures available
January-April 1914	South fork Humboldt River	Wet mantle flooding (rain on melting snow). Damage to multiple bridges, roads, trestles, reservoirs, diversion channels, and farms.	No Figures available
February 1921	Humboldt River Basin	Wet mantle flooding. Moderate damage to railroad track and bridges. Extensive damage to meadow lands in the basin.	
March 1928	Walker, Carson and Truckee River Basins	A snowstorm began March 23 and soon turned to a rainstorm below the 8,000-foot elevation. On March 26 Temperatures dropped. In the Carson Valley, both forks of the Carson River and the main-stem Carson River overflowed their banks, but little damage was caused.	No Figures available
December 1937	Carson and Truckee River Basins	Rain began on the evening of December 9, and continued until the afternoon of December 11, melting most of the snowpack at the higher elevations. After a short break, the rain restarted and continued until December 13. On the East Fork Carson River, the Douglas Power (Rithenstrothf) Dam was severely damaged. Flooding began in the south end of Carson Valley on December 10. In the Gardnerville area, the flood crested at 10.300 cfs late in the afternoon of December 11 at the USGS stream gage on the East Fork Carson River near Gardnerville	No Figures available
April-May 1942	Humboldt River Basin	Severe wet mantle flooding Extensive flooding to City of Elko (water	No Figures available

Year	Flooding Location	Comments	Estimated Losses
		several feet deep in the streets), Elko County; Town of Battle Mountain in Lander County was isolated. Extensive damage bridges, roads, irrigation structures, unregulated dams, ranch buildings. Erosion damage to cropland range areas. Destruction of Roger's dam and damage to Young dam and the Young canal.	
January 1943	Upper Humboldt River Basin	Severe wet mantle flooding Hot Creek reservoir washed out. Levees in Elko County closed highways. Severe railroad damage. Roads, bridges, and structures suffered severe damage throughout the basin.	No Figures available
November December 1950	Walker, Carson and Truckee River Basins.	A sequence of rapid moving storms and unseasonably high temperatures melted most of the early snowpack in the Sierra. During a period from November 13 to December 8, total precipitation ranged from about 5 inches at the foot of the Sierra Nevada in Nevada to about 30 inches at the crest in California. The greatest discharge in the Truckee River occurred where the greatest development existed, in the urban areas of Reno and Sparks. In downtown Reno, water stood almost 4 feet deep in the main floor of the Riverside Hotel. East of Reno, 3,500 acres of agricultural land in the Truckee Meadows were flooded. Two deaths were reported, and the American Red Cross assisted about 200 persons who were evacuated from their homes.	The estimate of damages in the three river basins was $4.4 Million ($27.6 million in 1997 dollars) (U.S. Geological Survey, 1954); of this $2.0 million ($12.3 million in 1997 dollars) was in Reno.
February-May 1952	Humboldt River Basin	Wet mantle flood due to rapid melting of the snowpack. Considerable damage throughout the basin, roads, bridges, railroad tracks, crop losses, watershed erosion. Extensive damages to ranches. Damage to various dams and levees.	No Figures available
December 1955	Truckee, Carson and Walker River Basins	During December 21 to 24, an intense storm of unseasonably high temperatures melted part of the snowpack in the Northern Sierra Nevada. Precipitation at the headwaters of the principal river basins averaged from 10 to 13 inches. Damage to buildings and other structures was not as severe as that of the 1950 flood. The Riverside and the Mapes Hotels, on the banks of the Truckee River, set up sandbag dikes supplemented by pumping and had little damage. However, the downtown area flooding was about as extensive as in 1950. The	The estimate of damages in the three river basins was $3,992,000 ($22,327,000 in 1997 dollars) (U.S. Geological Survey 1963b). One life was lost.

Year	Flooding Location	Comments	Estimated Losses
		Reno airport was flooded to a depth of 4 feet. Derby Dam on the Truckee river east of Vista overtopped on December 24 causing the dam to fail. Flooding on tributary streams draining the area surrounding Reno and Sparks caused damage to property in areas away from the Truckee River. Hobart Dam, at the headwaters of Franktown Creek failed and released water that severely damaged U.S. 395.	
February 1962	Humboldt River Basin	Recurrence interval >50 wet mantle flooding Extensive damage to town Battle Mountain, Lander County where over 200 residents evacuated due to water depth of up to 5 feet in specific locations. 1,500 head of cattle died due to the flood. Extensive railroad damage. Throughout the basin damage occurred to various buildings, diversion structures, irrigation ditches, and cultivated fields. The estimated 1962 value of losses is approximately $1.5 M.	No Figures available
January February 1963	Truckee, Walker and Carson River Basins	As late as January 27, western Nevada was having one of its worst winter droughts. An intense storm of unseasonably high temperatures started late January 28 and continued through February 1. Precipitation varied from 5 to more than 13 inches. The freezing level was above 8,000 feet during most of the storm and as high as 11,000 feet at times. The City of Reno had extensive flooding and about 20 square blocks in the downtown area were inundated to depths of as much as 4 feet. The airport was flooded as in 1955.	Damage in the three river basins was estimated at $3,248,000 ($15,130,000 in 1997 in dollars) (U.S. Geological Survey 1966a).
December 1964	Truckee and Carson River Basins	This flood resulted from a storm of unseasonably high temperature and rain melting part of the snowpack. During December 21-23, warm air mass raised temperatures, increased wind velocities and caused torrential rains, as much as 16 inches in the mountain areas. This flood was similar to the December 1955 flood.	The estimate of damages in these two river basins was $2,236,000 ($10,111,000 in 1997 dollars) (U.S. Geological Survey, 1966b).
April-June 1984	Humboldt River Basin	Extensive snow melt with a recurrence interval >100	No data on damages.
February 1986	Truckee and Carson River Basins	A light rain began February 12 becoming heavy on February 15, diminishing on February 18. In the Truckee Meadows, all but two bridges in Reno over the Truckee Rivers were closed. The rains caused several small landslides. Residents became	Damage resulting from this flood was estimated at $12,700,000 ($17,760,000 in 1997 dollars) (Donna Garcia,

Year	Flooding Location	Comments	Estimated Losses
		stranded or were evacuated.	U.S. Army Corps of Engineers, verbal commun., 1997)
December 1996 January 1997	Walker, Carson and Truckee River Basins	This flood resulted from several moderate to heavy snowstorms during December 1996, followed by three subtropical, heavy rainstorms from the Pacific. The third storm melted most of the snowpack in the Sierra Nevada below 7,000 feet and produced heavy rainfall up to 10,000 feet. Numerous businesses in the Truckee Meadows were damaged. Most bridges across the river in Reno were closed to traffic. An extensive lake formed in sparks and the eastern sections of Reno. Truckee River waters joined floodwater from Steamboat Creek at Vista flooding warehoused up to 6 feet. Ponded floodwater closed the Reno/Tahoe international airport. The flooding Truckee River flowed through largely undeveloped areas, past the towns of Wadsworth and Nixon where little damage was caused, to its terminus in Pyramid Lake.	Estimated initial damage (Interagency Hazard mitigation Team for FEMA-1153-DR-NV) $21,310,567. Washoe County's portion was $16,244,430.

Source: UNR – Nevada Bureau of Mines & Geology, special pub #23. Humboldt River data from USGS Chronology of the Humboldt River.

Also, Southern Nevada has had several historic floods. The following table, Table 3-10, combines historic information from *Flood Hazard Analyses: Las Vegas Wash and Tributaries—Clark County, Nevada* from 1905 to 1975.

Table 3-10

Clark County Historic Floods 1905-1975

Place	Date	Description
Las Vegas Valley	March 31, 1906	Flooding: 70 miles of track, bridges, and fills were swept away
Las Vegas Valley	August 25, 1906	Heavy rains: The water washed through the streets in heavy torrents.

Place	Date	Description
Las Vegas Valley	August 15, 1908	Cloudburst: 10 miles west of Indian Springs washed one mile of road.
Las Vegas Valley	August 21, 1909	Heavy rains: Damaged 30 feet of track north of the city.
Las Vegas Valley	January 8, 1910	Melting snow and torrential storms: Major flooding, washed away farms, trains, roads, etc. A train was washed away in Caliente area. Muddy Valley had the largest flood in years.
Las Vegas Valley	January 15, 1910	Flood in Virgin Valley area: it washed away a home, dams, livestock and crops
Las Vegas Valley	January 18, 1911	Salt Lake railway was washed out by flooding.
Las Vegas Valley	March 18, 1911	Snowstorms and rain flooded out the Salt Lake Railway.
Las Vegas Valley	February 28, 1914	Several washouts took out the railway. It also took out two farms.
Las Vegas Valley	May 12, 1917	Large flood: road between Goodsprings and Jean was damaged
Las Vegas Valley	August 4, 1917	Large flood damaged alfalfa crops on Moapa Indian Reservation
Las Vegas Valley	March 16, 1918	Large flood damaged farms in Mesquite and Bunkerville
Las Vegas Valley	July 24, 1920	Heavy storm: crops and boarding house were destroyed
Las Vegas Valley	August 27, 1921	Heavy torrential rain: Las Vegas had no damage, Moapa Valley had damaged roads, Rio Virgin Valley had a lot of damage.
Las Vegas Valley	January 7, 1922	Flashflood through Meadow Valley Wash. Damaged railroad tracks to Caliente
Las Vegas Valley	July 14, 1923	Flashflood: damage to farms, damage to the road from Las Vegas to Searchlight
Las Vegas Valley	July 28, 1923	Thunderstorm in Las Vegas. Caused damage to commercial, residential, and public buildings. Severe fiscal damage to the railroad company.
Las Vegas Valley	August 28, 1925	Heavy storm: Las Vegas to Searchlight road damaged
Las Vegas Valley	September 19, 1925	Flashflood: caused considerable damage to farms
Las Vegas Valley	August 30, 1927	Highways around Las Vegas were flooded.
Las Vegas Valley	August 5, 1929	Heavy deluge: washed out highways around Las Vegas and several roads in the city
Las Vegas Valley	August 27, 1929	Heavy deluge wrecked a state highway near Charleston turnoff
Las Vegas Valley	August 23, 1930	Cloudburst damaged Arrowhead Trail, section of an underpass, and the highway
Las Vegas Valley	August 12, 1931	Heavy rainstorm, cloudburst, structural damage to commercial property
Las Vegas Valley	July 11, 1932	Heavy storm. Much structural damage
Las Vegas Valley	August 27, 1932	Lower Virgin River Bridge was washed out from three cloudbursts
Las Vegas Valley	August 29, 1932	Heavy deluge: farms around Mesquite covered in one to three feet

Place	Date	Description
		of mud
Las Vegas Valley	August 21, 1933	Heavy deluge: Midway residents reported mud in their homes
Las Vegas Valley	August 21, 1934	Heavy deluge: Fremont street became a raging river
Las Vegas Valley	September 24, 1935	Cloudburst washed away roads on the Los Angeles highway
Las Vegas Valley	July 31, 1936	Cloudburst: two feet of water on Arden Highway. Washed out Charleston Highway.
Las Vegas Valley	September 24, 1937	Cloudburst near Glendale washed a car over a culvert.
Las Vegas Valley	March 3, 1938	Continuous rain and flooding caused damage to Boulder City
Las Vegas Valley	June 28, 1938	Rain at Indian Springs sent flood water to Las Vegas. Telephone lines in Las Vegas were down.
Las Vegas Valley	September 5, 1939	Heavy rains in Southern Nevada and Southern Utah., also severe damage to the Moapa Indian Reservation
Las Vegas Valley	September 10, 1939	Heavy rains caused damage to Eldorado Canyon district between Boulder City and Kingman
Las Vegas Valley	February 2, 1940	Heavy rains caused washouts on the Charleston highway
Las Vegas Valley	August 13, 1941	Two railway bridges were swept away in the flood.
Las Vegas Valley	August 10, 1942	Rain and hail, trailer camps were devastated
Las Vegas Valley	July 9, 1945	Flooding in Overton. Union Pacific railway main line was washed out.
Las Vegas Valley	August 1, 1945	Moapa Valley flooded, damaging crops
Las Vegas Valley	July 25, 1946	Cloudburst in Mesquite, killing one person.
Las Vegas Valley	October 13, 1947	Flooding in Las Vegas; Freemont Street flooded; Worst storm since 1945
Las Vegas Valley	September 8, 1950	Torrents of water roared down Freemont Street
Las Vegas Valley	July 20, 1951	Two cloudbursts, standing water in the homes near Boulder highway
Las Vegas Valley	August 28, 1951	Windstorm and Cloudburst, property damage in North Las Vegas
Las Vegas Valley	September 21, 1952	Heavy rainfall, power outage in Henderson
Las Vegas Valley	June 27, 1954	Heavy rainfall and several cloudbursts, Las Vegas Wash boiled over, several homes were filled with mud.
Las Vegas Valley	July 26, 1954	Flood torrents throughout the Las Vegas Valley, affected power lines, roads, homes
Las Vegas Valley	August 25, 1955	Worst storm, Union Pacific railroad was disrupted for 8 hours
Las Vegas Valley	July 26, 1957	Cloudburst, phones out of service, damage to low-level homes near Charleston Blvd.
Las Vegas Valley	August 21, 1957	Flooding damaged city streets and shut down highways out of Las Vegas

Place	Date	Description
Las Vegas Valley	June 22, 1958	Flash flood washed-out a five mile section of Nelson Road
Las Vegas Valley	November 11, 1958	Flash flood caused $60,000 worth of damage to Las Vegas including debris cleanup
Las Vegas Valley	July 22, 1960	Flash thunderstorm in Las Vegas, phone lines were downed
Las Vegas Valley	August 29, 1961	Heavy rainfall, some mobile homes had to be evacuated
Las Vegas Valley	September 18, 1961	Lamb Blvd was washout by the deluge, power was knocked out throughout the valley
Las Vegas Valley	April 8, 1965	Rain washed out road beds in the County
Las Vegas Valley	August 7, 1967	Flooding, 14th and 25th Streets caved in
Las Vegas Valley	August 19, 1967	Flashflood: damaged Highway 95 between Las Vegas and Searchlight
Las Vegas Valley	September 6, 1967	Severe Flooding: Tonapah Highway damaged
Las Vegas Valley	January 24, 1969	Rainstorms washed out roads and buried cars in mud
Las Vegas Valley	August 4, 1970	Heavy rains, damaged county roads
Las Vegas Valley	August 14, 1970	Heavy rains, water washed over road to Indian Springs, power lines downed
Las Vegas Valley	August 20, 1973	Las Vegas Wash Marina was severely damaged by a thunderstorm
Las Vegas Valley	September 14, 1974	Flashflood swept away mobile homes, cars, restaurant, and people in the worst disaster in Southern Nevada. 12-20 people were killed in Eldorado Canyon. 100 people were vacationing in this canyon.
Las Vegas Valley	July 4, 1975	Flashflood in Las Vegas Losee and Craig Roads, two men were washed away and drowned.

The following table contains more recent floods in the Las Vegas Valley.

Table 3-10 Clark County Flooding 1993-2003

Place	Date	Description
Clark County	February 8, 1993	Break out flooding from Washington Avenue Channel, Van Buskirk Channel, and Muddy River
Las Vegas Valley/ County	August 9-10, 1997	Line of thunderstorms caused severe flooding in Las Vegas and Boulder City, severe damage to public and private property
Las Vegas/County	September 11, 1998	The storm produced high winds, hail, a tornado, and as much as 2 inches of rainfall in parts of Las Vegas Valley (Manning, 1998). More than 3 inches of rain fell in Moapa Valley, about 50 miles northeast of Las Vegas (Timothy E. Sutko, Clark County Regional Flood Control District, written commun., 1998). The Clark County Public Works Department estimated that Moapa Valley sustained damage to roadways amounting to approximately $400,000.
Las Vegas Valley	July 8, 1999	Extreme flooding in washes, channels, and roads caused damage to public and private properties.
Las Vegas Valley	August 19, 2003	An intense thunderstorm overwhelmed the capacity of some of the drainage facilities. It caused flooding in many of the west-east roads in the Northeastern area.
*Las Vegas Valley/Lincoln County	January 10-11, 2005	Total flood and storm damage for Lincoln County was estimated at $9.4 million and $4.5 million for Clark County.

***Source: USGS –**ftp://ftp-fc.sc.egov.usda.gov/NV/web/partnerships/meadowValleyReviewTeam/2005%20Floods%20Clark%20Lincoln%20USGS.pdf

Please see the end of Section 3.3.8.3 for additional history pertaining to precipitation extremes by county.

3.3.8.3. *Location, Severity, and Probability of Future Events*

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as stream flow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed as a percentage for the chance of a flood of a specific extent occurring in any given year.

Factors contributing to the frequency and severity of flooding include the following:

- Rainfall intensity and duration
- Antecedent moisture conditions
- Watershed conditions, including steepness of terrain, soil types, amount and type of vegetation, and density of development
- Changes in landscape resulting from wild fires (loss of moisture-trapping vegetation and increased sediment available for runoff)
- The existence of attenuating features in the watershed, including natural features such as swamps and lakes, and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Availability of sediment for transport, and the erodibility of the bed and banks of the watercourse

These factors area evaluated using (1) a hydrologic analysis to determine the probability that a discharge of a certain size will occur, and (2) a hydraulic analysis to determine the characteristics and depth of the flood that results from that discharge.

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a 1 percent probability of occurrence in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program (NFIP). The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements. The FIRMs also show floodplain boundaries for the 500-year flood, which is the flood having a 0.2 percent chance of occurrence in any given year.

In the *Hazard Mitigation Survey* and *County Hazard Mitigation Plans*, Churchill, Eureka, Nye, and Storey Counties considered this hazard as moderate. Churchill County mentioned flooding problems in river and dams. Eureka County mentioned flooding in low-lying areas could have an impact on private property. Nye County identified sources of flooding in the area: Amargosa River and Wheeler Wash. Also, Pahrump Valley is on a 100-year flood plain.

Clark, Douglas, Lincoln, and Washoe Counties considered this hazard as high. Clark County mentioned that Las Vegas Valley had a large amount of flash floods. Douglas County indicated that there was a high threat to life and property in the area. Lincoln County indicated that flooding sources were from the Meadow Valley Wash and the White River. Washoe County mentioned that flooding caused structural damage and economic loss.

Also, Carson City considered this hazard as high. Carson City mentioned that during flood season, several canyons fed through the city. The Waterfall Fire caused a tremendous amount of erosion. During flood season, silt from the Waterfall Fire area flows through the city.

In the *Tribal Hazard Mitigation Survey,* Shoshone-Paiute Tribes of Duck Valley and South Fork Band considered this hazard as moderate. The Shoshone-Paiute Tribes mentioned that on the Duck Valley Reservation 156 structures are endangered by this hazard. Also, this hazard affects the roads on the reservation. The South Fork Band mentioned that this hazard happens at least every two years. This hazard endangers homes, bridges, and culverts. Also, irrigation canals wash out.

The rating for flood acquired from approved hazard mitigation plans or the hazard mitigation survey sent to counties and tribes is summarized in the table below.

Table 3-10A

Hazard Rating by County

County/Tribe	Low	Moderate	High	No Data
Carson City			X	
Churchill County		X		
Clark County			X	
Douglas County			X	
Elko County				X
Esmeralda County				X
Eureka County		X		
Humboldt County				X

County/Tribe	Low	Moderate	High	No Data
Lander County				X
Lincoln County			X	
Lyon County				X
Mineral County				X
Nye County		X		
Pershing County				X
Storey County		X		
Washoe County			X	
White Pine County				X
Shoshone-Paiute Tribes of Duck Valley		X		
South Fork Band		X		

3.3.8.4. Vulnerability Assessment and Analysis of Potential Losses

Flood hazards are considered high risk in most of Nevada. Floods affect many areas developed for businesses and homes, and they occur with more frequency than most other natural disasters. Large rainstorms can affect multiple jurisdictions, as was the case in January of 1997, when Carson City, Douglas, Lyon, Storey, and Washoe Counties were impacted by floods on the Carson, Walker, and Truckee Rivers. Based on the frequency of flooding in the past, the probability of future, damaging floods is high. Dry detention dams used in floodplain management have reduced flood hazards in Las Vegas Valley. Nevada will need to use proven techniques to reduce hazards further, particularly as more development occurs in floodplains and on alluvial fans.

To assess risks and vulnerability, the Nevada Bureau of Mines and Geology has tried to run FEMA's loss-estimation model, HAZUS-MH (Version 2, HAZUS MR2), for reaches of the Carson, Humboldt, Muddy, Truckee, Virgin, and Walker Rivers. Multiple problems with HAZUS MR2, including the inability to make flood runs for long reaches of rivers, has led to incomplete results reported at this time. The next version of the program, HAZUS MR3, is about to be released by FEMA and is supposed to solve the problems. The Bureau expects to receive a copy shortly and run all the reaches of the rivers. The Bureau plans to report the results in Open-File Report 07-2 (http://www.nbmg.unr.edu/dox/of072/of072.htm) and update the tables in this section of the plan. The preliminary results using HAZUS-MR2 are summarized in Tables 3-11 and 3-12. In all cases, the HAZUS runs used floods with average 100-year return periods.

Failures of dams can cause flash floods. No specific HAZUS runs were made to simulate dam failures. Nonetheless, the 100-year return period can be used to approximate the damage that could occur from some dam failures, particularly along the Truckee River (with the Stampede, Boca, and Prosser Reservoirs along tributaries in California, upstream from Reno), Carson River (with Lahontan Reservoir upstream from Fallon), and Humboldt River (with Rye Patch Reservoir upstream from Lovelock).

Table 3-11 indicates that damage from floods could range from hundreds of thousands of dollars in sparsely populated rural areas to hundreds of millions of dollars in large urban areas. Hundreds of buildings could suffer complete destruction. Thousands of people may need public shelter. Hundreds of thousands of tons of debris may need to be cleared.

Table 3-12 summarizes vulnerability (or risk) from floods using two methods of ranking flood vulnerability: (1) by building-related economic loss and (2) by economic loss as a percentage of building exposure. The county's building exposure, one of the factors within the HAZUS program, is a measure of the economic wealth of the county and a proxy for the ability of the county to recover from a disaster.

Please see Appendix K for the HAZUS maps created for each of the rivers assessed in Tables 3-11 and 3-12.

The Nevada Hazard Mitigation Planning Committee has not made a decision on which ranking is the most appropriate, because that decision may depend on the mitigation under consideration. Areas within the designated 100-year and 500-year floodplains, areas along canyons in mountains, and some alluvial fans where floodplain designations have not been made will undoubtedly flood in the future. Mitigation may be appropriate in any of those areas, depending on how critical the structure, building, or facility is.

Note that the section on Vulnerability of State-Owned Critical Facilities covers floods, earthquakes, and fires. This information is presented in Section 3.5.2, Table 3-17 below.

Work is underway to update HAZUS with more accurate information for Nevada on critical facilities and State-owned buildings. In addition, HAZUS uses population data from the 2000 census. Because several Nevada counties have experienced rapid growth since 2000, and because building costs have risen sharply in this timeframe, the damage numbers from HAZUS runs may be underestimates. On the other hand, given the uncertainties in values of structures, damage estimates from HAZUS are unlikely to be accurate to better than a factor of two and could be off by as much as a factor of ten. Nonetheless, HAZUS provides a reasonable methodology for assessing vulnerabilities and ranking areas by relative risk.

The HAZUS runs have been done along major rivers within the State. However, considerable flooding in Nevada has historically occurred along what are normally dry washes or ephemeral streams, particularly in Las Vegas Valley. These are typically caused by intense rainfall over relatively short periods of time. The Clark County Regional Flood Control District has had an aggressive program to reduce these hazards within their jurisdiction. As population in Nevada grows and development continues to move higher up alluvial fans, additional buildings will likely become prone to flooding. Future HAZUS runs made to help update this plan may address flooding along dry washes, in canyons, and on alluvial fans.

The Muddy River flood-related losses in Lincoln County totaled 26 million dollars. The county's building stock is relative small. The loss, as a percentage of exposure was very high (11%). This was comprised of 4.7% in direct loss and 6.3% in business interruptions – the highest in the State. This established the Muddy River as the fifth most dangerous river in Nevada. .

Table 3-11

Summary of HAZUS MR2 loss-estimation output for 100-year floods on selected rivers in Nevada

River	County	Cities and Towns Affected	Building-Related Economic Loss (1) $ million	Number of People Needing Public Shelter	Debris Generated tons
Carson					
	Douglas	Gardnerville, Minden	56	460	4,800
	Carson City	Carson City	26	2,700	4,400
	Lyon	Dayton, Silver Springs	1.4	0	530
	Churchill	Fallon	N/A*	N/A*	N/A*
	Total		83	3,160	9,730
Humboldt					
	Elko	Elko, Carlin	110	2,000	18,000
	Eureka	Palisade, Beowawe	0.02	0	32
	Lander	Battle Mountain	0.55	1	37
	Humboldt	Winnemucca	13	51	1,900
	Pershing	Lovelock (protected by Rye Patch Res.)	1.4	18	980
	Churchill	no large towns	N/A*	N/A*	N/A*
	Total		125	2,070	20,949
Muddy					
	Lincoln	Ursine, Panaca, Caliente	26	170	3,400
	Clark	Moapa, Glendale, Logandale, Overton	11	360	5,000
	Total		37	530	8,400
Truckee					
	CA counties	Truckee			
	Washoe	Verdi, Reno, Sparks, Wadsworth, Nixon	980	12,000	88,000
	Storey	Lockwood	15	380	9,200
	Total		995	12,380	97,200
Virgin					
	Clark	Mesquite-Bunkerville	70	670	8,400
Walker					
	Lyon	Wellington-Smith, Yerington	18	250	3,000
	Mineral	Schurz, Hawthorne (protected by Walker L.)	3	60	1,500
	Total		21	310	4,500

(1) Includes cost of both building repair/replacement and business interruption
* Not analyzed; negligible damage expected

updated 12-Oct-07

Table 3-12
Vulnerability to HAZUS MR2 100-year floods on selected rivers in Nevada

River & County	Building Exposure ($ million)	Building-Related Economic Loss ($ million)	Loss as % of exposure (%)	Rank by Economic Loss	Rank by Loss as % Exposure
Carson River				**3**	**4**
Douglas County	3,700	56	1.5		
Carson City County	3,300	26	0.79		
Lyon County	1,700	1.4	0.08		
Churchill County	1,200	N/A*	N/A*		
Total	9,900	83	0.8		
Humboldt River				**2**	**2**
Elko County	2,200	110	5.0		
Eureka County	120	0.02	0.02		
Lander County	250	0.55	0.22		
Humboldt County	820	13	1.6		
Pershing County	250	1.4	0.56		
Churchill County	1,200	N/A*	N/A*		
Total	4,840	125	2.6		
Muddy River				**5**	**6**
Lincoln County	234	26	11		
Clark County	85,000	11	0.01		
Total	85,234	37	0.04		
Truckee River				**1**	**1**

River & County	Building Exposure ($ million)	Building-Related Economic Loss ($ million)	Loss as % of exposure (%)	Rank by Economic Loss	Rank by Loss as % Exposure
California counties	32,000†	N/A†	N/A†		
Washoe County	25,000	980	3.9		
Storey County	210	15	7.1		
Total	25,210	995	3.9		
Virgin River				**4**	**5**
Clark County only	85,000	70	0.08		
Walker River				**6**	**3**
Lyon County	1,700	18	1.1		
Mineral	340	3	0.88		
Total	2,040	21	1.0		

* Not analyzed; negligible damage expected
† Not analyzed; outside State jurisdiction

updated 12-Oct-07

Flood hazards are considered "high risk" in most of Nevada. They affect many areas developed for businesses and homes, and they occur with more frequency than other natural disasters. Large rainstorms can affect multiple jurisdictions, as was the case in January 1997, when Carson City, Douglas, Lyon, Storey, and Washoe Counties were impacted by floods on the Carson, Walker, and Truckee Rivers.

The probability of this hazard in the future is high. Dry detention dams used in floodplain management in Las Vegas Valley have reduced damage caused by this hazard. As more development occurs in floodplain areas other than the Las Vegas area, Nevada will need to better document floodplains and areas that are likely to experience flash floods, avoid building in flood-prone areas, and use proven techniques to contain flooding.

The State Climatologist prepared the following data about extreme precipitation in each county. The data is not relevant to state declarations but will assist each county in its preparedness and response planning. Data compiled by the State Climatologist will be further analyzed by the Subcommittee during its established meetings, and provided to local jurisdictions for their reference in planning.

Precipitation Extremes

Carson City:
The same steps were taken to determine precipitation extremes in Carson City County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Carson City County there was one station available for use; Carson City. The value at the 15th percentile was **3.19** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of this station follows:

- Carson City: Days above 15th percentile = 242; Frequency = 2.46 days/year

Churchill County:
The same steps were taken to determine precipitation extremes in Churchill County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Churchill County there was two stations chosen; Fallon NAS and Hawthorne AP. The average value at the 15th percentile was **1.73** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Fallon NAS: Days above 15th percentile = 110; Frequency = 2.05 days/year
- Hawthorne AP: Days above 15th percentile = 125; Frequency = 2.02 days/year

Clark County:
The same steps were taken to determine precipitation extremes in Clark County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Clark County there was four stations chosen; Indian Springs, Las Vegas AP, Searchlight, and Valley of Fire SP. The average

value at the 15th percentile was **2.34** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Indian Springs: Days above 15th percentile = 61; Frequency = 2.14 days/year
- Las Vegas AP: Days above 15th percentile = 126; Frequency = 2.12 days/year
- Searchlight: Days above 15th percentile = 200; Frequency = 2.21 days/year
- Valley of Fire SP: Days above 15th percentile = 78; Frequency = 2.26 days/year

Douglas County:
The same steps were taken to determine precipitation extremes in Douglas County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Douglas County there was three stations chosen; Glenbrook, Minden, and Topaz Lake. The average value at the 15th percentile was **3.40** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Glenbrook: Days above 15th percentile = 184; Frequency = 2.75 days/year
- Minden: Days above 15th percentile = 252; Frequency = 2.56 days/year
- Topaz Lake: Days above 15th percentile = 66; Frequency = 2.25 days/year

Elko County:
The same steps were taken to determine precipitation extremes in Elko County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Elko County there was five stations chosen; Clover Valley, Elko AP, Jiggs, San Jacinto, and Tuscarora . The average value at the 15th percentile was **2.63** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Clover Valley: Days above 15th percentile = 170; Frequency = 2.36 days/year
- Elko AP: Days above 15th percentile = 217; Frequency = 2.21 days/year
- Jiggs: Days above 15th percentile = 123; Frequency = 2.05 days/year
- San Jacinto: Days above 15th percentile = 76; Frequency = 1.83 days/year
- Tuscarora: Days above 15th percentile = 100; Frequency = 2.14 days/year

Esmeralda County:
The same steps were taken to determine precipitation extremes in Esmeralda County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Esmeralda County there was four stations chosen; Coaldale Junction, Dyer, Goldfield, and Silverpeak. The average value at the 15th percentile was **1.99** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Goldfield: Days above 15th percentile = 178; Frequency = 1.94 days/year
- Silverpeak: Days above 15th percentile = 39; Frequency = 1.02 days/year
- Dyer: Days above 15th percentile = 146; Frequency = 2.08 days/year

- Coaldale Junction: Days above 15th percentile = 71; Frequency = 4.57 days/year

Eureka County:
The same steps were taken to determine precipitation extremes in Eureka County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Eureka County there was three stations chosen; Eureka, Beowawe, and Emigrant Pass. The average value at the 15th percentile was **2.63** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Eureka: Days above 15th percentile = 177; Frequency = 2.09 days/year
- Beowawe: Days above 15th percentile = 208; Frequency = 2.12 days/year
- Emigrant Pass: Days above 15th percentile = 94; Frequency = 2.08 days/year

Humboldt County:
The same steps were taken to determine precipitation extremes in Humboldt County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Humboldt County there was two stations chosen; Quinn River Crossing and Winnemucca AP. The average value at the 15th percentile was **1.87** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Quinn River Crossing: Days above 15th percentile = 60; Frequency = 2.21 days/year
- Winnemucca AP: Days above 15th percentile = 201; Frequency = 2.20 days/year

Lander County:
The same steps were taken to determine precipitation extremes in Lander County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Lander County there was four stations chosen; Antelope Valley, Austin, Battle Mountain, and Central NV Field Lab. The average value at the 15th percentile was **2.38** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Central NV Field Lab - Days > 15th = 43; Freq = 2.25 days/year
- Battle Mountain - Days > 15th = 100; Freq = 2.10 days/year
- Antelope Valley - Days > 15th = 26; Freq = 1.95 day/year
- Austin - Days > 15th = 203; Freq = 2.07 days/year

Lincoln County:
The same steps were taken to determine precipitation extremes in Lincoln County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Lincoln County there was three stations chosen; Pioche, Elgin and Caliente. The average value at the 15th percentile was **3.40** inches. The values are reported as daily totals, so the frequency is how many days per year the

15th percentile or higher value occurs. The summary of the stations follows:

- Pioche: Days above 15th percentile = 167; Frequency = 2.15 days/year
- Elgin: Days above 15th percentile = 52; Frequency = 2.38 days/year
- Caliente: Days above 15th percentile = 60; Frequency = 2.13 days/year

Lyon County:
The same steps were taken to determine precipitation extremes in Lyon County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Lyon County there was three stations chosen; Wellington Ranger Station, Yerington, Smith, and Fernley. The average value at the 15th percentile was **2.33** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Wellington Ranger Station- Days > 15th = 73; Freq = 2.34 days/year
- Yerington - Days > 15th = 183; Freq = 1.95 days/year
- Smith - Days > 15th = 134; Freq = 2.31 days/year
- Fernley - Days > 15th = 67; Freq = 2.08 days/year

Mineral County:
The same steps were taken to determine precipitation extremes in Mineral County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Mineral County there was two stations chosen; Mina and Thorne. The average value at the 15th percentile was **1.79** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Mina - Days > 15th = 208; Freq = 2.12 days/year
- Thorne - Days > 15th = 70; Freq = 2.06 days/year

Nye County:
The same steps were taken to determine precipitation extremes in Nye County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Nye County there was four stations chosen; Tonopah, Pahrump, Smokey Valley, and Duckwater. The average value at the 15th percentile was **2.12** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Tonopah - Days > 15th = 111; Freq = 2.08 days/year
- Pahrump - Days > 15th = 124; Freq = 2.15 days/year
- Smokey Valley - Days > 15th = 118; Freq = 2.09 days/year
- Duckwater - Days > 15th = 61; Freq = 1.93 days/year

Pershing County:
The same steps were taken to determine precipitation extremes in Pershing County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Pershing County there

was three stations chosen; Rye Patch Dam, Buffalo Ranch, Gerlach, and Lovelock Derby Filed. The average value at the 15th percentile was **2.32** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Rye Patch Dam - Days > 15th = 152; Freq = 2.13 days/year
- Buffalo Ranch - Days > 15th = 27, Freq = 2.00 days/year
- Gerlach - Days > 15th = 78, Freq = 2.26 days/year
- Lovelock Derby Field - Days > 15th = 114, Freq = 2.06 days/year

Storey County:

The same steps were taken to determine precipitation extremes in Storey County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In Storey County one station was available; Virginia City. The average value at the 15th percentile was **3.86** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Virginia City: Days above 15th percentile = 119; Frequency = 2.10 days/year

Washoe County:

To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. Washoe County is a thin, long county stretching from Lake Tahoe to Oregon. The range of extreme snowfall events was wide, from a high of **5.91** inches at **Marlette Lake** to a low of **0.20** inches in **Empire**. The average value at the 15th percentile was **1.98** inches in one day The summary of the snowfall events above the 15th percentile follow:

- Stead - Days > 15th = 60; Freq = 2.85 days/year
- Reno AP- Days > 15th = 189; Freq = 2.82 days/year
- Marlette Lake - Days > 15th = 55; Freq = 2.35 days/year
- Empire - Days > 15th = 36; Freq = 4.24 days/year

White Pine County:

The same steps were taken to determine precipitation extremes in White Pine County as was taken when determining snow extremes. To qualify as an extreme event the 15th percentile value was obtained and anything equal to and above that value would be considered extreme. In White Pine County there was three stations chosen; Ely, Lund, and McGill. The average value at the 15th percentile was **2.54** inches. The values are reported as daily totals, so the frequency is how many days per year the 15th percentile or higher value occurs. The summary of the stations follows:

- Ely: Days above 15th percentile = 170; Frequency = 2.23 days/year
- McGill: Days above 15th percentile = 202; Frequency = 2.06 days/year
- Lund: Days above 15th percentile = 100; Frequency = 2.00 days/year

3.3.9 Hail- and Thunderstorms *(Moderate Risk Hazard)*

3.3.9.1 *Nature*

Thunderstorms are formed from a combination of moisture, rapidly rising warm air, and a force capable of lifting air, such as warm and cold fronts or a mountain. A thunderstorm can produce lightning, thunder, and rainfall that may also lead to the formation of tornados, hail, downbursts, and microbursts of wind. Thunderstorms may occur singly, in clusters, or in lines. As a result, it is possible for several thunderstorms to affect one location in the course of a few hours.

Figure 3-13 Thunderstorms across the Sierra Nevada. Picture from NASA.

Most commonly associated with thunderstorms are thunder and lightning. Lightning occurs when the rising and descending motion of air within clouds produces a separation of positively and negatively charged particles. This separation produces an enormous electrical potential both within the cloud and between the cloud and the ground. Lightning results as the energy between the positive and negative charge areas is discharged. As the lightning channel moves through the atmosphere, heat is generated by the electrical discharge to the order of 20,000 degrees (three times the temperature of the sun). This heat compresses the surrounding clear air, producing a shock wave that decays to an acoustic wave as it moves away from the lightning channel, resulting in thunder.

In addition, hail can occur as part of a severe thunderstorm. Hail develops within a low-pressure front as warm air rises rapidly in the upper atmosphere and is subsequently cooled, leading to the formation of ice crystals. This cycle continues until the hailstone is too heavy to be lifted by the updraft winds and falls to the earth. The higher the temperature at the earth's surface, the stronger the updraft, thereby increasing the amount of time the hailstones are developed. As hailstones are suspended longer within the atmosphere, they become larger. Other factors impacting the size of hailstones include storm scale wind profile, elevation of freezing level, and the mean temperature and relative humidity of the downdraft air.

Also, downbursts and microbursts are also associated with thunderstorms. Downbursts are strong, straight-line winds created by falling rain and sinking rain that my reach speeds of 125 miles per hour (mph). Microbursts are more concentrated than downbursts, with speeds reaching up to 150 mph. Both downbursts and microbursts can typically last 5 to 7 minutes.

Finally, Nevada has a unique problem with dry thunderstorms. These thunderstorms with high lightning potential and low humidity have caused several wildfires in the Great Basin region. This hazard is discussed in depth in Section 3.3.19 on Wildfire.

3.3.9.2. *History*

In Nevada, thunderstorms usually occur from the spring to the fall. The most dangerous thunderstorms are during the summer due to the low humidity and high lightning potential. Additionally, Nevada's airports have problems with downbursts and microbursts during a thunderstorm.

Additionally, Tables 3-8 (3-47) and 3-9 (3-52) in the flood section show that much of the historic flooding in Las Vegas Valley was caused by thunderstorms and cloudbursts. This is not unique to the Las Vegas Valley, but true for the entire state.

The following anecdotal news articles demonstrate the various effects that thunderstorms have had in recent years on the State of Nevada:

- **August 9, 2001:** The Federal Emergency Management Agency (FEMA) authorized the use of federal funds today to help Nevada fight the uncontrolled Antelope fire burning in Washoe County. The state's request for federal fire suppression assistance was approved immediately after it was reported that the blaze was threatening farm areas and 150 homes in the Antelope Valley subdivision located about eight miles northwest of the city of Reno. The fire, which was started by lightning yesterday, had burned 800 acres of land and forced the evacuation of 100 people at the time of the request.

- **July 12-13, 2002:** Numerous high wind and downburst reports in western NV with areas of blowing dust.

- **August 2, 2002:** Thunderstorm-induced flash floods over parts of Reno, and near Virginia City and Dayton.

- **June 26, 2006: Elko —** A lightning storm touched off at least nine fires in northeastern Nevada, forcing interstate closures and threatening a small ranching community. A wildfire about 20 miles west of Elko burned about 5,000 acres, while another blaze had scorched about 3,000 acres northeast of Elko and forced residents in nearby Elburz to evacuate. Two sections of Interstate 80 were closed Sunday night.

- **Similar reports are common in news stories throughout the state, especially during the summer months.**

These four anecdotal reports are not isolated unusual events but common occurrences representative of daily or weekly summer weather in Nevada. The data provided below by the State Climatologist demonstrates the severity of thunderstorms in Nevada.

The State Climatologist prepared the following data about thunderstorms reported in each county. The data is not relevant to state declarations but will assist each county in its preparedness and response planning.

Thunderstorm Events (hourly observations)

Carson City:

No stations in Carson City County reported thunderstorm activity. It should be noted that while no formal reporting of thunderstorms occurred in Carson City, all surrounding counties did record such hazard activity. It can be surmised from those records that thunderstorms have occurred but were not recorded in Carson City County.

Churchill County:
Within Churchill County there are two weather stations available that reported thunderstorm events during the time frame of 1945 - 2006. The reporting stations were Fallon NAS and Hawthorne; with Fallon NAS being the only one to have a complete record for the entire time span. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the four stations events by type break down as follows:

- Dry Thunderstorms - 599
- Thunderstorms - 9
- Thunderstorms w/o Hail - 566
- Heavy Thunderstorms w/o Hail - 1
- Total Hourly recordings - 1175

The majority of these observations were made at the Fallon NAS station. These numbers equate to over **19 thunderstorms per year**, with roughly **51% being reported as dry thunderstorms**; which are a great concern for fire ignition.

Clark County:
Within Clark County there are three weather stations available that reported thunderstorm events during the time frame of 1942 - 2006. The reporting stations were Indian Springs, Las Vegas, and Nellis. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the three stations events by type break down as follows:

- Dry Thunderstorms - 1377
- Thunderstorms w/o Hail - 310
- Heavy Thunderstorms w/o Hail - 3
- Total Hourly recordings - 1690

The majority of these observations were made at the Las Vegas station. These numbers equate to over **26 thunderstorms per year**, with **81% being reported as dry thunderstorms**; which are a great concern for fire ignition.

Douglas County:
None of the stations in Douglas County reported thunderstorm events.

Elko County:
Within Elko County there are four weather stations available that reported thunderstorm events during the time frame of 1977 - 2006. The reporting stations were Elko AP, Wells, Wildhorse Reservoir, and Owyhee; with Elko AP being the only one to have a complete record for the entire time span. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A

summary of the four stations events by type break down as follows:

- Dry Thunderstorms - 932
- Thunderstorms w/o Hail - 204
- Thunderstorms w/ Hail - 2
- Heavy Thunderstorms w/o Hail - 1
- Total Hourly recordings – 1139

The majority of these observations were made at the Elko AP station. These numbers equate to nearly **38 thunderstorms per year**, with roughly **82% being reported as dry thunderstorms**; which are a great concern for fire ignition.

Esmeralda County:
Within Esmeralda County there were not any stations reporting thunderstorm activity.

Eureka County:
Within Eureka County there was one weather station available that reported thunderstorm events during the time frame of 1992 - 2005. The reporting station was at Eureka. No thunderstorms were reported at this station during this time span.

Humboldt County:
Within Humboldt County there is one weather station available that reported thunderstorm events during the time frame of 1959 - 1972. The reporting station was Winnemucca AP. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the station events by type break down as follows:

- Dry Thunderstorms - 0
- Thunderstorms w/o Hail - 161
- Thunderstorms w/ Hail - 0
- Heavy Thunderstorms w/o Hail - 0
- Total Hourly recordings - 161

These numbers equate to over **12 thunderstorms per year**, which are a great concern for fire ignition.

Lander County:
Within Lander County there are two weather stations available that reported thunderstorm events during the time frame of 1973 - 2006. The reporting stations were Austin and Battle Mountain. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the two stations events by type break down as follows:

- Dry Thunderstorms - 472
- Thunderstorms w/o Hail - 293
- Total Hourly recordings - 765

The majority of these observations were made at the Battle Mountain station. These numbers equate to over **23 thunderstorms per year**, with roughly **62% being reported as dry thunderstorms**; which are a great concern for fire ignition.

Lincoln County:

Within Lincoln County there was one weather station available that reported thunderstorm events during the time frame of 1977 - 2002; Caliente. At the Caliente station weren't any thunderstorms reported.

Lyon County:
Within Lyon County there were not any stations available that were reporting thunderstorm activity.

Mineral County:
Within Mineral County there were not any stations available that reported thunderstorm activity.

Nye County:
Within Nye County there are three weather stations available that reported thunderstorm events during the time frame of 1942 - 2006. The reporting stations are Yucca Flats, Tonopah and Mercury Desert Rock AP, with Tonopah spanning the entire time frame. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the two stations events by type break down as follows:

- Dry Thunderstorms - 1753
- Thunderstorms w/o Hail - 872
- Thunderstorms w/ Hail - 3
- Heavy Thunderstorms w/o Hail - 28
- Total Hourly recordings - 2656

The majority of these observations were made at the Elko AP station. These numbers equate to nearly **42 thunderstorms per year**, with roughly **66% being reported as dry thunderstorms**; which are a great concern for fire ignition.

Pershing County:
Within Pershing County there is one weather station available that reports thunderstorm events during the time frame of 1948 - 2006. The reporting station is Lovelock Derby Field. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the four stations events by type break down as follows:

- Dry Thunderstorms - 334
- Thunderstorms w/o Hail - 261
- Thunderstorms w/ Hail - 1
- Heavy Thunderstorms w/o Hail - 2
- Total Hourly recordings - 598

These numbers equate to over **10 thunderstorms per year**, with roughly **56% being reported as dry thunderstorms**; which are a great concern for fire ignition.

Storey County:
Within Storey County there were not any stations reporting thunderstorm activity.

Washoe County:
Within Washoe County there are two weather stations available that reported thunderstorm events during the time frame of 1943 - 2006. The reporting stations were Reno AP and Stead AFB, with Reno being the only one to have a complete record for the entire time span. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of

the two stations events by type break down as follows:

- Dry Thunderstorms - 679
- Thunderstorms w/o Hail - 514
- Normal Thunderstorms - 27
- Heavy Thunderstorms w/o Hail - 3
- Total Hourly recordings - 1223

The majority of these observations were made at the Elko AP station. These numbers equate to nearly **20 thunderstorms per year**, with roughly **56% being reported as dry thunderstorms** which are a great concern for fire ignition.

White Pine County

Within White Pine County there is one weather station available that reported thunderstorm events during the time frame of 1953 - 2006; Ely Yelland Field. These events were recorded hourly, so some days could have several readings for thunderstorm activity. A summary of the four stations events by type break down as follows:

- Dry Thunderstorms - 2035
- Normal Thunderstorms - 98
- Thunderstorms w/o Hail - 885
- Thunderstorms w/ Hail - 2
- Heavy Thunderstorms w/o Hail - 5
- Heavy Thunderstorms w/ Hail - 1
- Total Hourly recordings - 3026

The majority of these observations were made at the Elko AP station. These numbers equate to a little over **57 thunderstorms per year**, with roughly **67% being reported as dry thunderstorms**; which is a great concern for fire ignition.

3.3.9.3 *Location, Severity, and Probability of Future Events*

The location and severity are shown in the information compiled by the State Climatologist shown in Section 3.3.9.2. Based on this data, the probability of future events in all locations is high.

In the *Hazard Mitigation Surveys* and the *County Hazard Mitigation Plans,* Churchill and Storey Counties considered this hazard as low. Churchill County mentioned that this hazard could affect the river and dam.

In the *Tribal Hazard Mitigation Survey,* South Fork Band considered this hazard as low. According to the survey, this hazard is a yearly event with minor storms.

The rating for hail and thunder storms acquired from approved hazard mitigation plans or the hazard mitigation survey sent to counties and tribes is summarized in the list below.

County/Tribal	Low	Moderate	High	No Data
Carson City				X
Churchill County	X			
Clark County				X
Douglas County				X
Elko County				X
Esmeralda County				X
Eureka County				X
Humboldt County				X
Lander County				X
Lincoln County				X
Lyon County				X
Mineral County				X
Nye County				X
Pershing County				X
Storey County	X			
Washoe County				X
White Pine County				X
Shoshone-Paiute				X

County/Tribal	Low	Moderate	High	No Data
Tribes of Duck Valley				
South Fork Band	X			

Hazards directly associated with hailstorms and thunderstorms are considered "moderate risk hazard." Although these events are common, unless they start fires or cause floods, their consequences are usually concentrated in small areas and don't affect enough people to normally warrant a request for federal assistance.

The probability of future events for this hazard overall is high. Many if not most of Nevada's flash floods and wildfires are caused by thunderstorms throughout the State. Hailstorms are not as high a threat in the State and are generally localized.

The record of these hazard events throughout the State is sufficient to merit consideration of a Public Awareness campaign. The objective would be to inform citizens of the potential risks and how to best to avoid them.

The Subcommittee agreed that additional analysis of the information and research is necessary to determine the most prone and affected locations throughout the State. The new date will determine practical mitigation and priorities for action. Such will be presented in the next iteration of the Plan.

3.3.10 Hazardous Material Events *(Special Risk Category)*

3.3.10.1 *Nature*

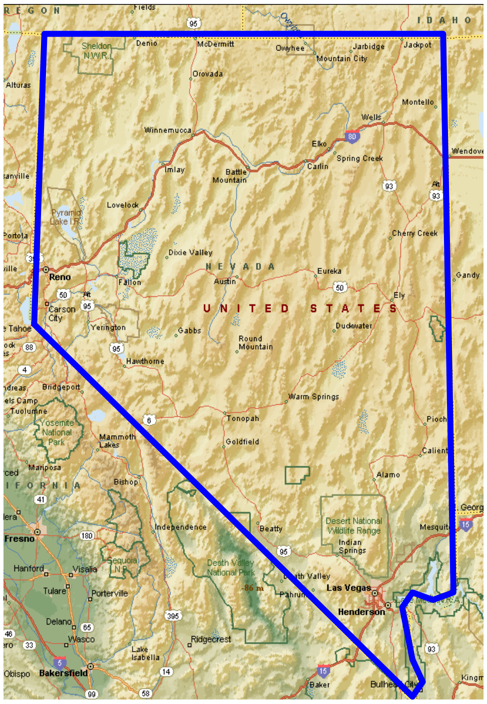


Figure 3-14 Highway Map of Nevada created by Microsoft Map Point. It shows major transportation routes in Nevada.

Hazardous materials may include hundreds of substances that pose a significant risk to humans. These substances may be highly toxic, reactive, corrosive, flammable, radioactive, or infectious. Hazardous materials are regulated by numerous Federal, State, and local agencies including the U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation (DOT), National Fire Protection Association, FEMA, U.S. Army, and International Maritime Organization.

Hazardous material releases may occur from any of the following:

- Fixed site facilities such as refineries, chemical plants, storage facilities, manufacturing, warehouses, wastewater treatment plants, swimming pools, dry cleaners, automotive sales/repair, and gas stations
- Highway (Figure 3-14) and rail transportation vehicles (Figure 3-15) such as tanker trucks, chemical trucks, and railroad tankers
- Proposed nuclear transportation to Yucca Mountain
- Air transportation such as cargo packages
- Pipeline transportation such as liquid petroleum, natural gas, and other chemicals

Figure 3-15 Major railway routes in Nevada from Union Pacific Railroad website at www.uprr.com/aboutup/usguide/nv.shtml.

Unless exempted, facilities that use, manufacture, or store hazardous materials in the United States fall under the regulatory requirements of the Emergency Planning and Community Right to Know Act (EPCRA) of 1986, enacted as Title III of the Federal Superfund Amendments and Reauthorization Act (42 USC 11001-11040; 1988). Under EPCRA regulations, hazardous materials that pose the greatest risk for causing catastrophic emergencies are identified as Extremely Hazardous Substances (EHSs). These chemicals are identified by the EPA in the *List of Lists – Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112 of* *the Clean Air Act.* Releases of EHSs can occur during transport to and from fixed site facilities. Transportation-related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or sensitive environmental areas. Transportation-related EHS releases are also more difficult to mitigate due to the variability of locations and distance from response resources.

In addition to accidental human-caused hazardous material events, natural hazards may cause the release of hazardous materials and complicate response activities. The impact of earthquakes on fixed facilities may be particularly serious due to the impairment or failure of the physical integrity of containment facilities. The threat of any hazardous material event may be magnified due to restricted access, reduced fire suppression and spill containment, and even complete cut-off of response personnel and equipment. In addition, the risk of terrorism involving hazardous materials is considered a major threat due to the location of hazardous material facilities and transport routes throughout communities.

On behalf of several Federal agencies including the EPA and DOT, the National Response Center (NRC) serves as the point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment within the United States.

The following are additional national statistics of interest compiled for the Federal Motor Carrier Safety Administration (2001):

- Hazmat shipments make up between 4 percent and 6 percent of all shipments.
- The average cost of a hazmat accident, both release and non-release, was estimated at $414,000.
- The average cost of a non-hazmat accident was estimated at $334,000.
- Class 3 shipments (flammable and combustible liquids) account for 64 percent of the en route accidents involving releases and about 52 percent of the non-release accidents.
- Class 3 and Class 8 shipments (corrosive materials) are involved in about 77 percent of all en route leaks per year.
- Class 3 and Class 8 shipments were also involved in about 84 percent of all loading and unloading incidents.

Source of statistics from "Costs of Hazmat Accidents" http://enviro.blr.com/display.cfm/id/73049.

In Nevada, the Department of Conservation and Natural Resources, Division of Environmental Protection (NDEP), the State Fire Marshal's Office and the State Emergency Response Commission (SERC) share responsibility for regulating hazardous materials. The State Fire Marshal and the SERC have a combined data base storing data about fixed facilities with hazardous materials meeting a) the most current International Fire Code and/or b) the EPCRA requirements. The total number of fixed facilities is 4,500. The EHS facilities total 1,200. Fees are imposed on fixed facilities for planning, training and equipment of first responders. The funding is managed by the SERC who provides grants to the local emergency planning committees. Each local emergency planning committee developed a hazardous materials response plan. The plans are reviewed by the SERC's standing Planning Subcommittee every two years. This plan must be approved in order to receive operating funds and grants from SERC. NDEP is the responsible state agency for the maintenance of the State Hazardous Materials Response Plan as well as for the response to any hazardous materials spill. NDEP was the lead in developing the Carson River Geographic Response Plan (CRGRP) through a collaborative effort between the local, state, and federal government agencies. In California the plan covers Alpine County; In Nevada it covers Douglas, Carson City, Lyon, and Churchill Counties.

3.3.10.2 *History*

Hazardous material events are no longer a rare event in Nevada. This type of event should be planned for due to the amount of hazardous materials located in and shipped through the State. Additionally, the nuclear waste facility in Yucca Mountain is another reason for the State of Nevada to prepare for hazardous material events as that material is delivered via rail and motor carrier into the State.

The following hazardous material events occurred in the State of Nevada in the last few years.

- In 1988, the PEPCON plant exploded in Henderson. The facility produced a component for rocket fuel. The explosion resulted in two deaths and extensive damage beyond its immediate surroundings.

- May 1988: Union Pacific Railroad Company Las Vegas, Nevada found a leak from a tank car filled with sulfuric acid from the Kennecott Corporation in Garfield, Utah. Due to this incident, Union Pacific incorporated a hazmat reporting structure for their officers and employees.

- September 1988: Six 5-gallon containers of hazardous materials spilled after a derailment at Sloan, Clark County, Nevada. The spilled material was absorbed into the soil.

- May 6, 1991 - A massive leak of liquefied chlorine at Pioneer Chlor-Alkali Company created a cloud of poison gas over the city of Henderson, Nevada, in the early morning hours of. Over 200 persons were examined at a local hospital for respiratory distress caused by inhalation of the chlorine and approximately 30 were admitted for treatment. Approximately 700 individuals were taken to shelters. It is estimated that from 2,000 to 7,000 individuals were taken elsewhere.
- January 7, 1998, two massive explosions just seconds apart destroyed the Sierra Chemical Company's Kean Canyon explosives manufacturing plant ten miles east of Reno, Washoe County, Nevada, killing four workers and injuring six others See U.S. Chemical & Safety Hazard Investigation Board report on Sierra Chemical Company explosion at http://www.csb.gov/completed_investigations/docs/CSB_Sierra.pdf …

- July 2000: An explosion of hydrogen trifluoride gas seriously damaged an industrial plant in

Dayton, Lyon County, Nevada.

- April 2002: A twenty-one car pileup on I-80 at Union Mills Grade just east of the California Highway Patrol scales. Six big rigs were involved spreading metal debris, gas, and furniture across both lanes of eastbound I-80 traffic.

- January 2004: An evacuation of Fernley's Nevada Pacific Industrial Park, Lyon County, due to a strange vapor emanating from a disposal bin. The smoke-like vapor was found nontoxic; however, PSC chemicals recycles sold and liquid acid, alkaline, cyanide, and battery waste. This could have been a dangerous situation.

- June 2004: Tractor trailer veers off road five miles east of Truckee, California. The cab of the tractor-trailer engulfed in flames killing the driver and passenger. The trailer portion ruptured, spilling insulating material along the interstate. While this event occurred outside of Nevada's border, it posed a threat to Nevada due to the location of the highway adjacent to the Truckee River. This river is a major supplier of Washoe County's water supply.

- February 2006: A tanker transporting 4,500 of wastewater from the San Onofre Power Plant leaked while en route to the disposal site in Utah. This particular tanker's route was through Las Vegas, Nevada. According to the driver, he was unaware of the leak until he stopped at Parowan, Utah.

- February 2007: A mobile methamphetamine lab in a suitcase was found off the side of the road in Fernley. There was no danger to the homes 100 to 150 yards away. The DEA hazmat team disposed of the suitcase and its contents.

- March 2007: Hydrochloric acid spill near Bruce Way in the industrial area of northeastern Mound House, Lyon County. No injuries were reported.

3.3.10.3 *Location, Severity, and Probability of Future Events*

U.S. Environmental Protection placed the Carson River as a Superfund National Priority List (the list of the nation's worst toxic waste sites.) As of June 24, 2004, the Carson River Mercury Site is the only site in Nevada under this list. The site includes mercury-contaminated soils at former mill sites, mercury contamination in sediments, fish and wildlife over more than a 50 mile length of the Carson River, beginning near Carson City, and extending downstream to the Lahontan Valley. Contamination at the site is a legacy of the Comstock mining era of the late 1800's when mercury was imported to the area for processing of gold and silver ore. This affects Lyon, Storey, and Churchill Counties.

The specific hazard posed to water supplies for the two major population centers, Reno-Sparks (Truckee River) and Las Vegas (Colorado River-Lake Mead) by possible hazardous materials contamination which might actually originate out of state in California for the Truckee River and Arizona for the Colorado River. The Walker River also flows from California into Nevada through Lyon, Douglas, and Mineral Counties.

More recently, the Waste Isolation Pilot Program (WIPP) transports transuranic waste to the Nevada Test site located in Nye County. Their website www.wipp.energy.gov/shipments.htm reports a total of 48 shipments received at the Nevada Test Site. This program provides funding for first responders training to respond to this type of incidents.

The minerals industry is important in hazardous materials transportation, production and use in Nevada. As of 2005, the University of Nevada Reno, Bureau of Mines and Geology reported 50 active mines statewide. Please see http://www.nbmg.unr.edu/dox/mi/05.pdf for additional details.

In the *Nevada Natural Hazard Mitigation Survey* and the *County Hazard Mitigation Plans,* Carson City, Douglas, Nye, and Washoe Counties identified this hazard as a moderate risk.

Carson City was concerned with highway accidents on the transportation corridor through the city. Additionally, they were concerned with natural gas pipeline leaks.

Douglas County was concerned with hazmat accidents on the transportation corridor.

Nye County mentioned that they had 56 facilities in the county that handled discharge water and waste. The transportation corridor was considered a risk as well.

Washoe County was concerned with a pipeline leak threatening the water supply.

Hazardous materials events are considered as hazards in a "special risk category."

The rating for hazardous materials acquired from approved hazard mitigation plans or the hazard mitigation survey sent to counties and tribes is summarized in the list below.

The probability of future events for this category is high for a variety of reasons. Without the counties and cities having the ability to enforce land use regulations, future hazmat events will occur. Additionally, the use of state routes to transport hazardous materials cannot be avoided. A further difficulty arises out of the fact that federal land stewardship presents an impediment to the enforcement of state laws. And in the final analysis, the State needs stronger commitment to the enforcement of its own existing laws.

County/Tribal	Low	Moderate	High	No Data
Carson City		X		
Churchill County				X
Clark County		X		
Douglas County		X		
Elko County				X
Esmeralda County				X
Eureka County				X
Humboldt County				X
Lander County				X
Lincoln County				X
Lyon County				X
Mineral County				X
Nye County		X		
Pershing County				X
Storey County				X
Washoe County		X		
White Pine County				X
Shoshone-Paiute Tribes of Duck Valley				X
South Fork Band				X

3.3.11 **Infestations** *(Special Risk Category)*

Nature

An "invasive species" is defined as a species that is

1) non-native (or alien) to the ecosystem under consideration and

2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Invasive species can be plants, animals, aquatic species and other organisms (e.g., microbes).

Source: United States Dept. of Agriculture, National Agriculture Library (10/5/2007)

Infestations impact Nevada's economy through the destruction of crops and natural resources. Some of these infestations, such as those of the plant variety are highly flammable and assist in the spread of wildfires.

Mormon crickets are flightless, ground dwelling insects native to the western United States. They eat native, herbaceous perennials (forbs), grasses, shrubs, and cultivated forage crops, reducing feed for grazing wildlife and livestock. In large numbers, their feeding can contribute to soil erosion, poor water quality, nutrient depleted soils, and potentially cause damage to range and cropland ecosystems. Drought encourages Mormon cricket outbreaks, which may last several years (historically 5 to 21 years) and cause substantial economic losses to rangeland, cropland, and home gardens.

Source: University of Nevada, Cooperative Extension – Identification and Management of Mormon Crickets fact sheet 06-16

3.3.11.2 *History*

Invasive species can be plants, animals, (e.g. rodents, insect, aquatic animals and other organisms), and other organisms (e.g., microbes). Human actions are the primary means of invasive species introductions.

Many insect (including beetle) infestations spread from California to Nevada. In the 1960s the major infestations of beetles came from Liverpool, England. The following is a typical list of invasive species infestations affecting Nevada currently or on the verge of invading the State:

- *Africanized honey bees:* Imported and bred with European honey bees to increase honey production in South America. The Africanized honey bees are more aggressive than European honeybees with a negative impact on the honey production industry.

Figure 3-17 Fire ant attacking larva. Photo courtesy of USDA/ARS

- *Scolytus schevyrewi or Bark Beetle* came from Asia. It was first collected in insect traps in Aurora Colorado. The beetle infests and breeds in elm trees stressed by drought.
- *Solenopsis Invicta or Fire Ants:* About 1930, the light fire ant was introduced from South America into the Mobile area, and has since spread to its current range. The ants nest in the soil of open areas, pastures and agronomic fields, but are found occasionally in wooded areas. Mounds are generally dome-shaped in contrast to those of other fire ant species, and the sting, characterized by an intense burning sensation, is more severe. A pustule (not seen in the sting of other species) is formed at the sting site in a day or so, which may become infected. Sensitive individuals can swell up as a result of stings and occasionally die. The ants have a serious impact on agriculture since the hardened mounds interfere with the mechanical cultivation of fields and the ants' painful stings interfere with livestock grazing and the harvesting of crops by farm workers.

Weeds spread at a rate of about 14% per year, which equates to a doubling of the affected acreage in five years. These include the following species:

- *Yellow starthistle* spread from one to 10 million acres within the 10-12 inch precipitation zone in northern California from 1980 to 1995.
- *Rush skeletonweed* spread from 40 acres to 4 million acres in a 10-12 inch precipitation zone in Idaho from 1964 to 1995.
- *Squarrose knapweed* spread from a few plants in 1954 to 140,000 acres in 1996 within a 8-10 inch precipitation zone in Utah. Portions of this large infestation are now at the Utah-Nevada border and are suspected to be present in Nevada.
- *Spotted knapweed* was first identified in Montana in the 1920s. It now covers 5 million acres in that state.
- *Medusahead* has experienced an explosive spread on public lands within the last ten years. Approximately one million acres of infestation in Idaho and 2 million acres in Eastern Oregon are now affected.

Other invasive plants are included in the following list:

- *Bromus tectorum* L. or *Cheatgrass* is an annual grass that forms tufts up to 2 feet tall. The leaves and sheathes are covered in short soft hairs. The flowers occur as drooping, open, terminal clusters that can have a greenish, red, or purple hue. These annual plants will germinate in fall or spring (fall is more common) and senescence usually occurs in summer. Cheatgrass invades rangelands, pastures, prairies, and other open areas. Cheatgrass has the potential to completely alter the ecosystems it invades. It can completely replace native vegetation and change fire regimes. It occurs throughout the United States and Canada, but is most problematic in areas of the western United States with lower precipitation levels such as Nevada. Cheatgrass is native to Europe and parts of Africa and Asia. It was first introduced into the United States accidentally in the mid 1800s.

- *Bromus rubens L.* or *Red brome:* In the North American region red brome is reported to be invasive because it faces low herbaceous competition. Once established, it has the potential to compete with other grasses. The accumulation of litter and necromass has the potential to increase fire frequency in the desert. Red brome-fueled fires result in the loss of native perennial species in invaded areas, resulting in disturbed areas that are ideal for increased growth of red brome.

- *Tamarisk*, also known as salt cedar (Tamarix sp.) is a prevalent invasive species that has infested many riparian areas in the southwestern United States. Mature salt cedar plants are resistant to high stress environments and fare well in drought conditions, mainly due to their extensive root systems that derive much of their sustenance from the water table rather than surface water and precipitation. The salt cedar root systems have altered hydrological patterns by tapping into underlying aquifers. This has decreased water available for recreational use, regional ecology and plant diversity.

3.3.11.3 *Location, Severity, and Probability of Future Events*

Invasive species are noxious weeds, insects and plant diseases - non-native to Nevada - that raise havoc with the environment, economy and public health. In the Wildfire section, the NDF Fire Management Officer noted that red brome and cheatgrass had caused the fire patterns in Nevada to become more aggressive. These two species have promulgated throughout Nevada.

During the first Nevada NHMPC Subcommittee meeting, the subcommittee members agreed that this hazard should be profiled even though it had not been mentioned in any of the *County Hazard Mitigation Plans.* This hazard affects wildfire and water conditions in Nevada.

Infestations are considered as hazards in a “special risk category.” Although it is unlikely that their effects can be mitigated through projects authorized within FEMA's hazard-mitigation programs, if an appropriate technology is developed to reduce cheatgrass and red brome, considerable mitigation can be accomplished to reduce the risks from wildland fires.

In conclusion, the Nevada Hazard Mitigation Planning Subcommittee agreed that infestations will continue to occur throughout the State as greater globalization takes place. Additional research is necessary among State and federal agencies (i.e., University of Nevada, Cooperative Extension, Nevada Department of Agriculture, U.S. Bureau of Land Management) to determine locations, causes and effects of infestations on the State's ecosystem. The findings of any such studies and resulting recommendations will be made part of the next iteration of this Plan.

3.3.12 Land Subsidence *(Low Risk Hazard)*

3.3.12.1 *Nature*

In the southwestern United States, agricultural and urban areas that depend on aquifer groundwater pumping are prone to land subsidence. Non-recoverable land subsidence occurs when declining water table levels lead to inelastic compaction of the solid particles in the aquifer (particularly clay minerals). A lesser amount of subsidence occurs with the recoverable compression of coarse-grained sand and gravel deposits. A common feature that accompanies subsidence is earth fissures, which are tension cracks in the sediment above the water table.

Aquifers in Nevada are comprised primarily of three major hydrogeologic units. One is the alluvial aquifer, which is the material that makes up the valleys between mountain ranges. Alluvial aquifers mostly consist of gravels, sands, silts, and clays.

Another aquifer in Nevada would be the carbonate aquifer, which is mainly made up of limestone and dolomite. These rocks comprise many mountain ranges and underlie the alluvial aquifer in places. The third major aquifer type in Nevada consists of volcanic rocks and, like the carbonate aquifer, makes up many mountain ridges and underlie the alluvial aquifer.

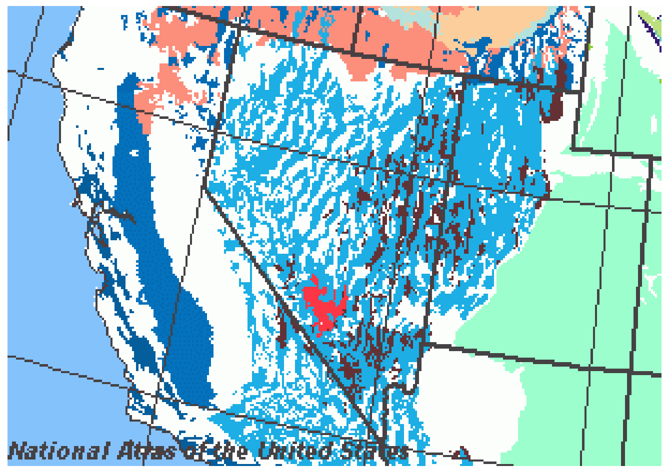


Figure 3-18 Nevada Aquifer Map from USGS and the National Atlas of the United States

Map Key: Turquoise: Alluvial aquifers, Dark Brown: Carbonate aquifers; Red: Igneous and metamorphic-rock aquifer; White: Other rock that is permeable (bedrock).

The major aquifer under Las Vegas Valley is an alluvial aquifer. Below the alluvial aquifer, at least in the western side of the valley, is the carbonate aquifer. Over-pumping (taking more water out than is naturally recharged from snow melt and rainwater) of the alluvial aquifer has caused subsidence problems in Las Vegas and Pahrump Valleys. To help mitigate this hazard, the Clark County building department has, as part of its building code, a requirement to conduct special geotechnical investigations near any earth fissures and faults to avoid building directly over these features.

The following link from the Nevada Division of Water Resources http://water.nv.gov/Water%20planning/wat-plan/PDFs/fig-4-14.pdf contains a map of "Designated Groundwater Basins of Nevada."

3.3.12.2 History

Most subsidence problems in Nevada have developed in Las Vegas Valley; however, this hazard is now recognized in other parts of Nevada. In the *Nevada Hazard Mitigation Survey*, Douglas, Nye, Storey, and Washoe Counties recognized that land subsidence is a risk. The primary problem in Storey County is one of collapse into excavations related to old mines on the Comstock Lode in

Virginia City. This phenomenon is unrelated to groundwater withdrawal and is a human-caused hazard similar to sinkholes that develop in areas with natural caverns near the surface. Evidence of groundwater-withdrawal-related land subsidence and local fissures has been recognized near some of the large open-pit mining areas in Humboldt, Lander, Eureka, and Elko Counties. Sections of Interstate 80 west of Battle Mountain have been repaired because of earth fissures developed near one of the mines.

Figure 3-18 shows that land subsidence can be caused by other actions than overdrafting water. Mining, hydrocompaction, and underground fluid withdrawal (water, oil, or other fluid) can cause this hazard and result in land surface displacements and fissures. Hydrocompaction means that water absorbed on and within clay minerals is removed by withdrawal or drying, and the clays shrink. Shrinkage of clays results in less volume, so the surface will subside as the clays become more tightly compacted.

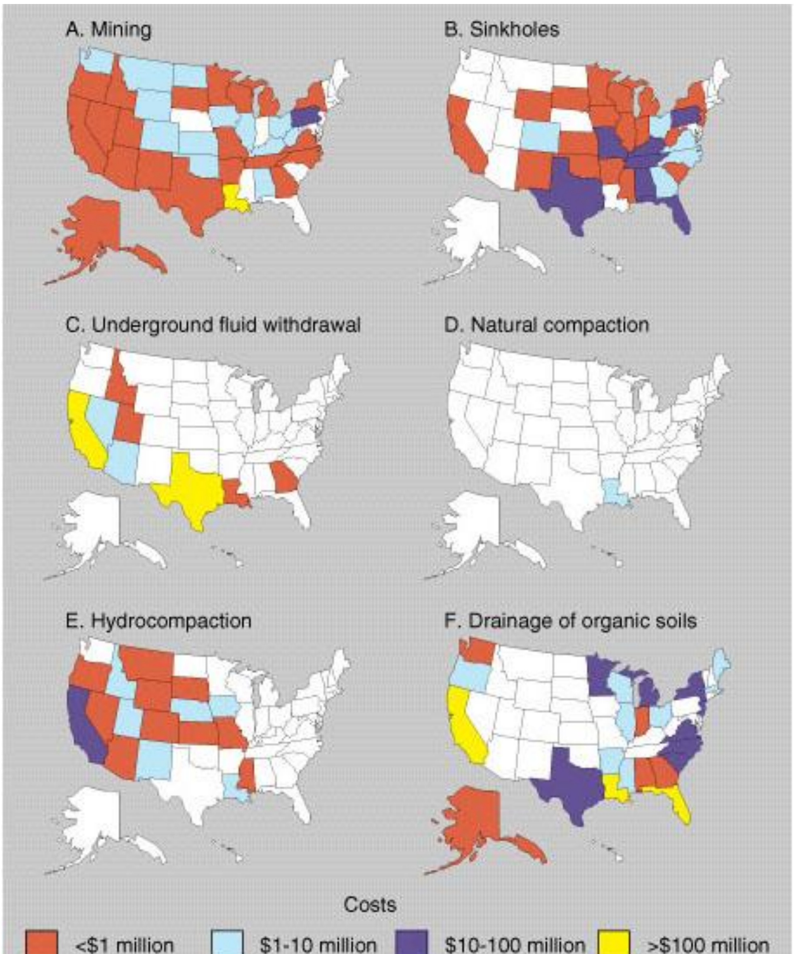


Figure 1. Distribution of subsidence problems in the United States estimated by the National Academy of Sciences (1991). Damage costs are conservative estimates for an unspecified period and are intended to show only relative magnitudes for state-by-state comparisons. The estimates do not reflect annual costs to control or mitigate damage from subsidence.

Figure 3-19 Distribution of subsidence problems in the U.S.

3.3.12.3 *Location, Severity, and Probability of Future Events*

As mentioned in the history section, Douglas, Nye, Storey, and Washoe Counties have problems with this hazard.

Las Vegas Valley in Clark County has more dramatic problems which include vertical aquifer-system deformation, land subsidence, and earth fissuring that have caused millions of dollars of damage and might have altered boundaries of flood-prone areas.

Land subsidence is considered a low-risk hazard. It generally occurs slowly (developing over periods of weeks, months, and years, rather than rapid occurrences of fires, earthquakes, and floods) and affects localized areas.

Due to Nevada's history of new development and pressures on water systems, the state will most likely see more subsidence problems. However, mitigation may be achievable through education programs; revision of building codes; artificial recharging of ground water and geo-technical investigation of the land prior to building.

3.3.13 Landslide *(Low Risk Hazard)*

3.3.13.1. *Nature*

A landslide is the movement of rock and soil that may take place gradually over a small area or it may be very rapid and involve a huge area, such as the landslides that have been documented on Slide Mountain between Reno and Carson City. Landslides may also be initiated by removal, or absence, of soil-retaining vegetation, from causes such as range fires or changes in agricultural practices. Removal of material at the base of slopes may result in an unstable condition. Heavy building structures, road fill and mine dumps may add enough stress to initiate landslide movement in otherwise stable conditions.

Earthquakes and extreme rainfall events commonly initiate landslides. Debris flows, which are moving masses of rock fragments, soil, and mud, more than half of the particles being larger than sand size, are considered a type of landslide in this risk assessment. Flash floods can initiate debris flows. In addition, wildfires often burn off vegetation that helps to trap moisture and soil; therefore, wildfires often leave ground vulnerable to debris flows that are initiated by extreme rainfall events (including flash floods).

3.3.13.2. *History*

Landslides in Nevada include rock falls. Some rock falls occur where sedimentary rocks are capped by volcanic rocks (lava flows and other layered volcanic rocks). When the sedimentary rock weathers and erodes, it undermines the lava cap and a rock fall results.

Another type of landslide in Nevada occurs in areas cut by perennial streams. An example of this type of slide is Mogul, on the Truckee River, west of Reno. The river as its floodwaters erode its channel banks has undercut clay-rich sedimentary rocks along its south bank, thereby destabilizing the ground and causing the ground above it to slide. Landslides in Nevada tend to be localized; therefore they tend to have less damaging economic impact than those of a widespread nature Landslides can occur with earthquakes, major storms, floods, and melting ice and snow.

Figure 3-20 Picture of the aftermath of Slide Mountain landslide from NOAA

The largest recorded event of this type in Nevada's recent history happened May 30, 1983 on the eastern slopes of Slide Mountain. A massive rockslide off Slide Mountain hit Upper Price Lake, initiating a debris flow/flash flood along Ophir Creek that killed one man, destroyed one house, and caused $2 million damage to the area. The fact that similar events have occurred many times in the past is documented on the geologic map of the area published by the Nevada Bureau of Mines and Geology in 1975 (Map 5Ag of the Washoe City Quadrangle). Patrick Glancy, a hydrologist with the U.S. Geological Survey has conducted extensive research on the rockslide and flood.

U.S.G.S. reports that there are other dangers of similar slides south of Kingsbury Grade (Douglas County) and along Second Creek where the neighborhoods of Incline Village exist today.

3.3.13.3 *Location, Severity, and Probability of Future Events*

In the *Nevada Hazard Mitigation Survey*, Douglas, Storey, and Washoe Counties reported that landslides were a danger in these areas. Slide Mountain, Kingsbury Grade, and Incline Village are in Washoe County.

In the Carson City *Hazard Mitigation Plan*, it was mentioned that the burned-over Waterfall area in the foothills west of Carson City would be prone to landslides unless the area were revegetated.

Landslides are considered a "low risk hazard" in Nevada primarily because Nevada is drier (in terms of average annual precipitation) than other states, and few people live in steep terrains or on rocks and soils that typically move in landslides. However, as development encroaches on areas that are higher in elevation than the valley floors such as alluvial fans, where most new development and building are occuring, it is likely that landslides and debris flows will become more significant hazards. Furthermore, most landslides are initiated by either major rainfall events (associated with floods) or by earthquakes, such that land-mitigation efforts, including avoiding building on hazardous areas, can undermine those efforts.

Due to the limited geographic extent of this hazard, management and mitigation is best handled at the local level. Support and technical assistance to local entities is available from state agencies in response to this type of hazard.

3.3.14 Severe Winter Storm *(Moderate Risk Hazard)*

3.3.14.1 *Nature*

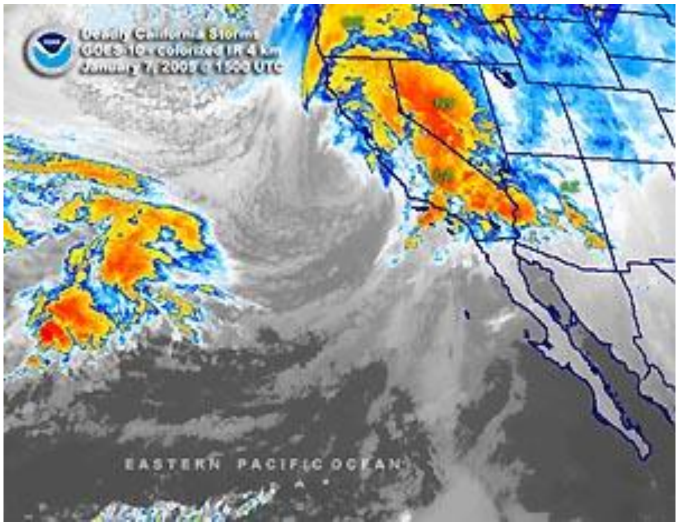


Figure 3-21 January 2005 Storm System. Courtesy of NOAA

Winter storms can bring heavy rain or snow, high winds, extreme cold, and ice storms. In Nevada, winter storms begin with cyclonic weather systems in the North Pacific Ocean or the Aleutian Islands that can cause massive low-pressure storm systems to sweep across the western states. Winter storms plunge southward from artic regions and drop heavy amounts of snow and ice. The severity of winter storms is generally minor. However, a heavy accumulation of ice can create hazardous conditions. Additionally, a large winter storm event can also cause exceptionally high rainfall that persists for days, resulting in heavy flooding.

3.3.14.2 History

During winter months, Nevada's higher elevations regularly experience rain, snow and freezing rain. Although less common, these conditions may also be experienced in lower elevations of the State.

The Basin and Range topography provides the necessary conditions for down-slope winds on the leeward (east) side of the ranges and into the valleys. North-South transportation routes can become obscured by blowing dust or snow during extreme wind conditions.

The following is a list of a few recent severe winter storms in Nevada:

- **1889-90** - Winter - Known as the "White Winter" nearly 100 inches of snow fell in northern Nevada - the heaviest snowfall in northern Nevada history. An estimated 90-95% of the state's livestock died during that winter

- 1909 – December Although severe winter storms are generally thought to affect mainly **Northern Nevada, In** a snow storm left twelve inches of snow on Las Vegas and in 1937, the Caliente Herald reported they were having the "coldest weather spell in memory for the past five days", with temperatures down to 10° above to 31° below zero, with 18 inches of snow

- 2004 - February**:** Severe winter storm. Gusts on the ridges were up to 110 mph. There were white-out conditions in Tahoe area. Several minor accidents were caused by the storm.

- December 29, 2004 through January 2, 2005 and January 6-10 2005**:** FEMA designated 15 counties (Carson City, Churchill, Clark, Douglas, Elko, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Storey, Washoe, and White Pine) eligible for federal funding to pay part of the cost for emergency protective measures undertaken as a result of the snowstorm on December 29 through January 2. Shortly thereafter, FEMA designated these counties plus Pershing County eligible for federal funding as a result of another snowstorm on January 6-10.

Additionally, National Oceanic and Atmospheric Administration (NOAA) compiled the following data for excessive snowstorms (15.0 inches or greater of total snowfall)

Inclusive Dates	**Snowfall / Daily Amt. (Date)**
Jan. 10 – 14, 1911	37.9 / 19.7 (Jan. 12)
Dec. 1 – 5, 1919	33.6 / 11.5 (Dec. 3)
Jan. 31 – Feb. 6, 1901	28.4 / 10.1 (Feb. 5)
Feb. 9 – 11, 1922	27.4 / 12.6 (Feb. 10)
Jan. 17 – 18, 1916	25.5 / 22.5 (Jan. 17)
Dec. 29, 2004 – Jan. 1, 2005	22.2 / 16.4 (Dec. 30)
Feb. 16 – 21, 1897	22.1 / 10.0 (Feb. 16)
Feb. 10 – 12, 1959	21.9 / 13.2 (Feb. 10)
Feb. 16 – 18, 1990	21.1 / 18.0 (Feb. 16)
Dec. 23 – 29, 1941	20.0 / 6.5 (Dec. 27)
Jan. 15 – 20, 1933	19.1 / 10.5 (Jan. 19)
Jan. 15 – 16, 1913	19.0 / 10.0 (Jan. 16)
Jan. 24 – 27, 1956	17.8 / 11.0 (Jan. 25)
Feb. 23 – 26, 1969	17.3 / 8.0 (Feb. 24)
March 14 – 15, 1952	17.1 / 13.6 (March 14)
Jan. 28 – 30, 1937	17.0 / 10.1 (Jan. 30)
Feb. 23 – 26, 1969	17.3 / 8.0 (Feb. 24)
March 14 – 15, 1952	17.1 / 13.6 (March 14)
Jan. 28 – 30, 1937	17.0 / 10.1 (Jan. 30)
Jan. 22 – 25, 1923	16.5 / 9.2 (Jan. 24)
Jan. 7 – 8, 2005	16.4 / 10.5 (Jan. 8)
Nov. 8 – 12, 1985	16.3 / 15.2 (Nov. 10)
Jan. 31 – Feb. 4, 1938	15.6 / 8.6 (Feb. 3)
Feb. 4 – 9, 1976	15.1 / 5.1 (Feb. 4)
March 1 – 3, 1902	15.5 / 14.4 (March 1)

Please see Section 3.3.14.3 for more detailed information regarding snow extremes by county.

3.3.14.3 *Location, Severity, and Probability of Future Events*

In the *Hazard Mitigation Surveys* and *County Hazard Mitigation Plans,* Churchill and Nye Counties reported this hazard as low. Nye County mentioned that the hazard area in this county is above 5,000 feet in elevation.

Storey and Washoe Counties reported this hazard as moderate. Washoe County mentioned that this hazard could cause structural damage from the winds and transportation loss in the U.S. 395 corridor.

Carson City reported this hazard as high. Also, Douglas and Eureka Counties reported this hazard as high. Carson City reported that the city had several storms during the winter. Additionally, it was hard keeping the snow off the more traveled roads. Douglas County mentioned that this hazard caused damage to structures, impact on utilities, downed power-lines, and flashfloods. Eureka County mentioned that two times in the past five years that the residents and livestock were snowed-in.

In the *Tribal Mitigation Surveys,* Goshute Business Council, Shoshone-Paiute Tribes, and South Fork Band reported this hazard as moderate. Goshute Business Council mentioned that this hazard affected residential areas. Shoshone-Paiute Tribes mentioned that the Duck Valley reservation is 5400 feet elevation. The South Fork Band mentioned that roads could become closed during this hazard. They have no equipment (snowplows) for the reservation.

Severe winter storms are considered to be “moderate risk hazards.” They occur frequently and can cause significant damage to structures that have not been built to meet current building codes. The most damaging effects, however, are related to the floods that can be caused when the storms bring large amounts of rain or warm rain on top of already heavy snow packs.

Because snowstorms occur yearly in Nevada, most local and state jurisdictions are able to manage this type of event. Only when the storms are severe and repeated that there is a probability of this hazard causing damage. Accordingly, more research is necessary to determine and prioritize actions that will mitigate this hazard. The Subcommittee will assist in the development of strategies to mitigate this hazard as new data becomes available. These strategies should be available in the next presentation of this Plan.

The State Climatologist prepared the following data about extreme snow fall in each county. The data is not relevant to state declarations but will assist each county in its preparedness and response planning.

Snow Extremes

Carson City:

Snow occurs more frequently in Carson City County than high temperatures. The same station was used in this county; Carson City. To qualify as an ‘extreme’ event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was 1.26 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Carson City: Days above 15th percentile = 232; Frequency = 2.61 days/year

Churchill County:

Snow occurs in smaller amounts in Churchill County than some other northern counties in Nevada. Four stations were used as representatives within the county; Lahontan Dam, Hawthorne, and Fallon NAS. All the stations had low levels of snow. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was any amount over **0.26** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Lahontan Dam - Days > 15th = 209; Freq = 2.96 days/year
- Hawthorne - Days > 15th = 99; Freq = 1.90 days/year
- Fallon NAS - Days > 15th = 128; Freq = 2.47 days/year

Clark County:

Snow occurs much less frequently in Clark County than high temperatures. The same five stations were used as representatives within the county; Mesquite, Searchlight, Las Vegas AP, Indian Springs, and Valley of Fire SP. Not surprisingly at all the stations any snowfall above 0.00 qualified as extreme. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was any over **0.00** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Searchlight - Days > 15th = 70; Freq = 0.96 days/year
- Las Vegas AP - Days > 15th = 26; Freq = 0.54 days/year
- Indian Springs - Days > 15th = 22; Freq = 0.86 days/year
- Valley of Fire SP - Days > 15th = 7; Freq = 0.21 days/year
- Mesquite - Days > 15th = 0; Freq = 0.00 days/year

Douglas County:

Four stations within Douglas county were used to access snowfall; Glenbrook, Minden, Spooners Station, and Topaz Lake. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The 15th percentile varied from 0.59 inches at Topaz Lake 3N to 3.35 inches at Spooners Station. The average value at the 15th percentile was 2.17 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Glenbrook - Days > 15th = 169; Freq = 2.69 days/year
- Minden - Days > 15th = 251; Freq = 2.81
- Spooners Station - Days > 15th = 30; Freq = 3.64
- Topaz Lake 3N - Days > 15th = 79; Freq = 2.92 days/year

ElkoCounty:

Snow occurs more frequently in Elko County than high temperatures. The same five stations were used as representatives within the county; Elko AP, Jiggs, San Jacinto, Clover Valley, and Tuscarora. Elko AP had the longest record but most of the stations had a similar frequency of snow events. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was **1.67** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Elko AP - Days > 15th = 245; Freq = 2.59 days/year
- Jiggs - Days > 15th = 65; Freq = 1.24 days/year
- Tuscarora - Days > 15th = 128; Freq = 3.12 days/year
- Clover Valley - Days > 15th = 127; Freq = 2.41 days/year
- San Jacinto - Days > 15th = 49; Freq = 1.69 days/year

Esmeralda County:

Snowfall was accessed in Esmeralda County. Four stations were used as representatives within the county; Coaldale Junction, Dyer, Silverpeak and Goldfield. The 15th percentile varied from 1.10 inches at Goldfield to anything above 0.00 inches at Silverpeak. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was 0.57 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Coaldale Junction - Days > 15th = 42; Freq = 2.76 days/year
- Dyer - Days > 15th = 182; Freq = 2.72 days/year
- Goldfield - Days > 15th = 195; Freq = 2.64 days/year
- Silverpeak- Days > 15th = 60; Freq = 1.65 days/year

Eureka County:

Three stations were used as representatives within the county; Eureka, Beowawe, and Emigrant Pass. Eureka had the longest and highest records but most of the other stations had similar frequencies of snow events. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was 1.63 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Eureka - Days > 15th = 133; Freq = 1.77 days/year
- Beowawe - Days > 15th = 42; Freq = 2.76 days/year
- Emigrant Pass - Days > 15th = 98; Freq = 2.27 days/year

Humboldt County:

Two stations were used in Humboldt County to access snowfall extremes; Quinn River Crossing and Winnemucca AP. To qualify as an extreme value the snowfall had to fall into the 15th percentile or above. The average value in Humboldt County at the 15th percentile was **0.89** inches. The values are reported as daily totals so the frequency is reported as days per year that can be expected to reach or exceed the 15th percentile. A summary of the stations follows:

- Quinn River Crossing: Days above 15th percentile = 63; Frequency = 3.56 days/year
- Winnemucca AP : Days above 15th percentile = 149; Frequency = 2.45 days/year

Lander County:

Four stations were used as representatives within the county; Central NV Field Lab, Battle Mountain, Austin, and Antelope Valley. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was **1.43** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Central NV Field Lab - Days > 15th = 38; Freq = 2.03 days/year
- Battle Mountain - Days > 15th = 77; Freq = 1.94 days/year
- Antelope Valley - Days > 15th = 41; Freq = 3.13 day/year
- Austin - Days > 15th = 174; Freq = 2.00 days/year

Lincoln County:

Snow occurs less frequently in Lincoln County than high temperatures. The same four stations were used as representatives within the county; Elgin, Caliente, Pioche, and Pahranaghat Wildlife Refuge. Pioche had the longest record of the stations, but also had higher readings than the rest. Two of the stations snow fall extreme fell into any measurement above 0.00 (Elgin and Pahranaghat). To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was 0.49 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Pioche - Days > 15th = 160; Freq = 2.40 days/year
- Caliente - Days > 15th = 70; Freq = 2.65 days/year
- Elgin - Days > 15th = 5; Freq = 0.23 days/year
- Pahranaghat - Days > 15th = 30; Freq = 0.73 days/year

Lyon County:

The four stations used as representatives within the county; Wellington Ranger Station, Yerington, Smith, and Fernley. Yerington had the longest record but most of the stations had a similar frequency of snow events. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was 0.57 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Wellington Ranger Station- Days > 15th = 90; Freq = 3.26 days/year
- Yerington - Days > 15th = 202; Freq = 2.35 days/year
- Smith - Days > 15th = 98; Freq = 2.20 days/year
- Fernley - Days > 15th = 71; Freq = 2.49 days/year

Mineral County:

The same two stations were used as representatives for snow within the county; Mina and Thorne. Mina had the longest record but the other station had a low frequency of extreme snow events as well. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was 0.34 inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Mina - Days > 15th = 237; Freq = 2.41 days/year
- Thorne - Days > 15th = 41; Freq = 2.29 days/year

Nye County:

The same five stations were used as representatives within Nye County to access snow extremes; Tonopah, Pahrump, Sarcobatus, Duckwater, and Smokey Valley. At three of the stations any snow over 0.00 fell in the extreme snow event category; Pahrump, Sarcobatus, and Smokey Valley. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was **0.37** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Tonopah - Days > 15th = 121; Freq = 2.31 days/year
- Pahrump - Days > 15th = 22; Freq = 0.42 days/year
- Sarcobatus - Days > 15th = 31; Freq = 1.72 days/year
- Smokey Valley - Days > 15th = 107; Freq = 2.09 days/year
- Duckwater - Days > 15th = 86; Freq = 2.80 days/year

Pershing County:

Four stations were used as representatives within Pershing County to access snowfall extremes. Snowfall levels that measured as extreme varied from a low value of 0.20 inches at Lovelock to a high of 1.18 inches at Buffalo Ranch. The average value at the 15th percentile was **0.54** inches in one day. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The summary of the snowfall events above the 15th percentile follow:

- Rye Patch Dam - Days > 15th = 171; Freq = 2.71 days/year
- Buffalo Ranch - Days > 15th = 36, Freq = 2.96 days/year
- Gerlach - Days > 15th = 74, Freq = 2.37 days/year
- Lovelock Derby Field - Days > 15th = 150, Freq = 3.12 days/year

Storey County:

Snow occurs more frequently in Storey County than high temperatures. The same station was used; Virginia City. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was over **2.09** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Virginia City - Days > 15th = 146; Freq = 2.81 days/year

Washoe County:

To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. Washoe County is a thin, long county stretching from Lake Tahoe to Oregon. The range of extreme snowfall events was wide, from a high of **5.91** inches at **Marlette Lake** to a low of **0.20** inches in **Empire**. The average value at the 15th percentile was **1.98** inches in one day The summary of the snowfall events above the 15th percentile follow:

- Stead - Days > 15th = 60; Freq = 2.85 days/year
- Reno AP- Days > 15th = 189; Freq = 2.82 days/year

- Marlette Lake - Days > 15th = 55; Freq = 2.35 days/year
- Empire - Days > 15th = 36; Freq = 4.24 days/year

White Pine County:

Snow occurs more frequently in White Pine County than high temperatures. The six stations used as representatives within the county were; Ruth, Shoshone 5N, McGill, Lund, Great Basin NP, and Ely Yelland. To qualify as an 'extreme' event the snowfall had to be above the 15th percentile of overall snowfall at that particular station. The average value at the 15th percentile was **1.58** inches in one day. The summary of the snowfall events above the 15th percentile follow:

- Ruth - Days > 15th = 90; Freq = 2.38 days/year
- Shoshone 5N - Days > 15th = 55; Freq = 3.01 days/year
- McGill - Days > 15th = 208; Freq = 2.36 days/year
- Lund - Days > 15th = 120; Freq = 2.56 days/year
- Great Basin NP - Days > 15th = 45; Freq = 2.45 days/year
- Ely Yelland - Days > 15th = 154; Freq = 2.13 days/year

3.3.15 Terrorism/WMD (Special Risk Category)

3.3.15.1 *Nature*

Throughout human history, there have been many threats to the security of nations. These threats have brought about large-scale losses of life, the destruction of property, widespread illness and injury, the displacement of large numbers of people, and devastating economic loss.

Recent technological advances and ongoing international political unrest are components of the increased risk to national security.

Terrorism is the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom.

Terrorists often use threats to:

- Create fear among the public.
- Try to convince citizens that their government is powerless to prevent terrorism.
- Get immediate publicity for their causes.

Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons.

High-risk targets for acts of terrorism include military and civilian government facilities, international airports, large cities, and high-profile landmarks. Terrorists might also target large public gatherings, water and food supplies, utilities, and corporate centers. Further, terrorists are capable of spreading fear by sending explosives or chemical and biological agents through the mail.

3.3.15.2 *History*

In the aftermath of September 11th 2001, we have been left with the reality that disaster preparedness must now refer not only to natural disasters and accidental events but also to intentionally man-made ones as well. Part of being prepared for a crisis is learning to identify the various types of possible terrorist attacks and the appropriate actions to take to ensure Nevadans' safety.

The economic impact on the State of Nevada from 9/11 was sufficient to cause a hiring freeze and budget cuts at the State level. In the service industry, thousands of jobs were cut.

On August 26, 1980 three men planted a bomb containing almost 1,000 pounds of dynamite at Harvey's Resort Hotel in Stateline, Douglas County, Nevada. The mastermind behind the bomb, John Birges, was attempting to extort $3 million from the casino. The attempt to disarm it failed. The bomb was detonated destroying much of the casino. However, no one was injured.

Figure 3-22 Spectators view damage caused when a bomb was blown up in Harvey's on Aug 27, 1980. Photo by Marylin Newton of the Reno Gazette Journal.

3.3.15.3. *Location, Severity, and Probability of Future Events*

The potential terrorism threat to Las Vegas/Reno/Lake Tahoe and consequently to the top economic sector of the state the gaming/entertainment industry is of great concern to the state. The work of hardening the targets for terrorism is under way through the funding received from the Department of Homeland Security. The casino industry is very much involved with state agencies in the discreet WMD planning and prevention efforts.

In the *Hazard Mitigation Survey* and *County Mitigation Plans* Clark and Storey Counties considered this hazard low. Clark County mentioned that this hazard could be a problem during special events such as New Year's Eve.

Carson City and Washoe County considered this hazard as high. Carson City mentioned large special events like the 4th of July as a possible problem. Washoe County mentioned large special events, sewage plant in Truckee and a Fuel tank farm as possible problems with this hazard.

In the *Tribal Mitigation Survey,* the tribal entities did not consider this hazard a problem.

Terrorism is considered as a hazard in a "special risk category."

The Nevada Homeland Security Commission was appointed to make recommendations and propose programs to the Governor concerning Terrorism/weapons of mass destruction. On the website http://homelandsecurity.nv.gov/, Nevada Homeland Security provides preparedness tips for any type of emergency or security threat, including terrorist acts.

Planning, and funding for this category of hazard are managed by the Division of Emergency Management. However common activities which provide solutions to multiple hazards need to be incorporated, i.e., the resolution to a terrorist risk may well be used to mitigate a flood or fire risk. The Subcommittee will direct research into this concept and provide further data in the following iteration of this Plan.

3.3.16 Tornado *(No Substantial Risk Category)*

3.3.16.1 *Nature*

Figure 3-23 Oldest Tornado photograph, Howard, South Dakota. Courtesy of NOAA/ Dept. of Commerce

Tornadoes are one of nature's most violent storms. A tornado can be defined as a rapidly rotating column of air extending from the base of a thunderstorm to the ground. In an average year, approximately 1,000 tornadoes are reported across the United States, resulting in an average of 80 deaths and over 1,500 injuries. The most violent tornadoes, with wind speeds of 250 mph or more, are capable of tremendous destruction. Damage paths can be more than 1 mile wide and 50 miles long. Tornadoes can occur anywhere in the United States, but they are most common in the Great Plains region that includes parts of Texas, Oklahoma, Kansas, and Nebraska. Tornadoes are responsible for the greatest number of wind-related deaths each year in the United States.

Tornadoes come in all shapes and sizes. In the southern states, peak tornado season is March through May; peak months in the northern states are during the summer. Tornadoes can also occur in thunderstorms that develop in warm, moist air masses in advance of eastward-moving cold fronts. These thunderstorms often produce large hail and strong winds, in addition to tornadoes. During the spring in the central plains, thunderstorms frequently develop along a "dryline," which separates warm, moist air to the east from hot, dry air to the west. Tornado-producing thunderstorms may form as the dryline moves east during the afternoon hours. Along the front range of the Rocky Mountains, in the Texas panhandle, and in the southern high plains, thunderstorms frequently form as air near the ground flows "upslope" toward higher terrain. If other favorable conditions exist, these thunderstorms can produce tornadoes. Tornadoes occasionally accompany tropical storms and hurricanes that move over land. They are most common to the right and ahead of the path of the storm center as it comes onshore.

3.3.16.2 *History*

Although tornadoes are rare in Nevada, they do occur. Nevada ranks 44th out of 50 states with only one touchdown incident recorded in an average year. Texas ranks first with an average of 123 confirmed tornadoes every year. Between 1947 and 1973 in Nevada and the Sierra, thirteen confirmed touchdowns were recorded with thirty three confirmed funnel clouds.

The tornado project online http://www.tornadoproject.com/alltorns/worstts.htm has a list of the worst tornadoes in every state. The following is a list of tornadoes in Nevada that have caused injury or property damage.

- **May 26, 1964 2:45 p.m. 0 dead 1 injured**
  A small tornado damaged outbuildings on a ranch near Yerington. One man was struck by flying debris.

- **July 16, 1973 12:23 p.m. 0 dead 1 injured**
  A small tornado touched down six miles north of Reno.
- **March 30, 1992 11:45 a.m. 0 dead 0 injured**
  One home was shifted and other partially unroofed at the extreme south edge of Las Vegas.

According to the National Oceanic & Atmospheric Administration, Nevada has had seven tornadoes from 2004 to 2006. Tornado severity is measured with the Fujita Scale (ranging from F0 to F5). The Nevada tornadoes listed below are all F0. In the original scale, F0 stood for winds estimated at less than 73 miles per hour with typically light damage (some damage to chimneys, branches broken off trees, shallowly rooted trees pushed over, and sign boards damaged); in the Enhanced F Scale, which was implemented in the U.S. in 2007, three-second wind gusts estimated based on damage are in the 65 to 85 mile-per-hour range. The following is a list of those tornadoes:

- **Lamoille, Elko County**: June 24, 2004 4 p.m. F0. Two off duty NWS employees saw a small rope-like tornado approximately 5 miles north of the town of Lamoille. It appeared to be moving slowly towards the south.
- **Paradise Valley, Humboldt County**: June 25, 2004 4:15 p.m. F0. Trained weather spotter reported a rope-like tornado.
- **Winnemucca, Humboldt County**: June 25, 2004 4:25 p.m. F0. Trained weather spotter observed tornado on the west side of the Sonoma range.
- **Winnemucca, Humboldt County**: June 27, 2004 1:15 p.m. F0. Trained weather spotter observed a tornado.
- **Reno**: July 24, 2004 2:30 p.m. F0. An F0 tornado was spotted in Cold Springs, north of Reno. No damage was reported. The weak tornado lasted less than 2 minutes.
- **Carson City Airport**: April 27, 2005 5:30 p.m. F0. A tornado was reported near the Carson-Tahoe Hospital.
- **Eureka Airport, Eureka County**: June 9, 2006 11:05 a.m. F0. A rope like tornado was observed and photographed over open country about 1 mile west of the Eureka Airport. No reports of damage were received.

Figure 3-24 June 9th Tornado in Diamond Valley near Eureka, NV.
Photo Courtesy of Cheryl Morrison from Sheriff's Office in Eureka.

3.3.16.3 *Location, Severity, and Probability of Future Events*

According to the data from the NOAA site, twelve of the seventeen counties of Nevada have had one or more tornadoes since 1880. As new developments continue to be built, this hazard may become more evident.

Tornadoes are considered a hazard in the "no substantial risk category" because the ones that do occur in Nevada tend to be low in intensity. Few are reported each year anywhere in the State. They usually occur in unpopulated areas. Emergency response is likely to be handled without federal or State assistance. Structures built to modern building codes should be able to withstand the gusts of an F0 tornado.

3.3.17 Tsunami/Seiche *(Low Risk Hazard)*

3.3.17.1 *Nature*

Tsunamis (pronounced soo-ná-mees), also known as seismic sea waves (mistakenly called "tidal waves"), are a series of enormous waves created by an underwater disturbance such as an earthquake, landslide, volcanic eruption, or by meteorite impact. A tsunami can move hundreds of miles per hour in the open ocean and smash into land with waves as high as 100 feet or more. A seiche is an oscillating wave on the surface of a lake or semi-enclosed basin, generally initiated by winds, earthquakes, or changes in atmospheric pressure. Seiches rarely exceed heights of a few meters.

From the area where the tsunami originates, waves travel outward in all directions. Once the wave approaches the shore, it builds in height. The topography of the coastline and the ocean floor will influence the size of the wave. There may be more than one wave and the succeeding one may be larger than the one before. A small tsunami at one beach can be a giant wave a few miles away.

All tsunamis are potentially dangerous, even though they may not damage every coastline they strike. A tsunami can strike anywhere along most of the U.S. coastline. The most destructive tsunamis have occurred along the coasts of California, Oregon, Washington, Alaska, and Hawaii.

Earthquake-induced movement of the ocean floor most often generates tsunamis. If a major earthquake or landslide occurs close to shore, the first wave in a series could reach the beach in a few minutes, even before a warning is issued. Areas are at greater risk if they are less than 25 feet above sea level and within a mile of the shoreline. Drowning is the most common cause of death associated with a tsunami. Tsunami waves and the receding water are very destructive to structures in the run-up zone. Other hazards include flooding, contamination of drinking water, and fires from gas lines or ruptured tanks.

Although Nevada is landlocked, a study by Santa Clara University, U.S. Geological Survey, and the University of Nevada, Reno shows that a tsunami or seiche induced by an earthquake and landslide occurred at Lake Tahoe about 20,000 years ago. Although this incident is rare, this research shows that if a body of water is large enough with the right factors, then a tsunami/seiche can happen.

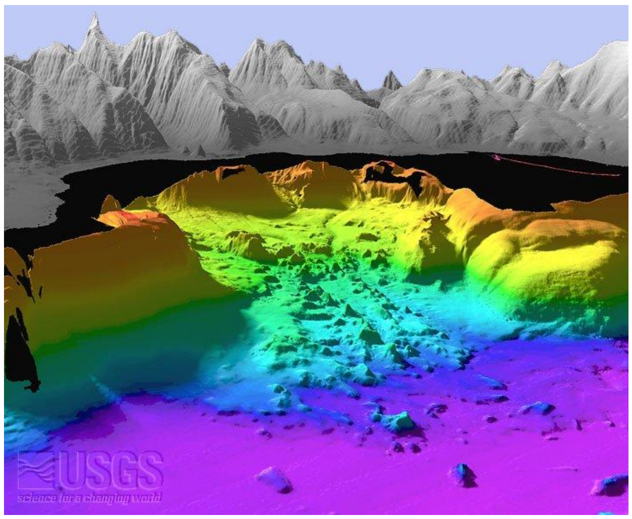


Figure 3-25 USGS bathymetry view of western Lake Tahoe, McKinney Bay.

3.3.17.2 *History*

In 1999, Gene A. Ichinose, Kenji Satake, John G. Anderson, Rich A. Schweickert, and Mary M. Lahren from The Nevada Seismological Laboratory, Earthquake Research Department, and Department of Geological Sciences conducted a study to determine if an earthquake magnitude of 7 could generate a tsunami or seiche wave, which could pose a hazard to shoreline communities of the Lake Tahoe Basin, California-Nevada. They concluded from their scenarios that a wave as small as 3m and as large as 10m in amplitude could threaten shoreline communities.

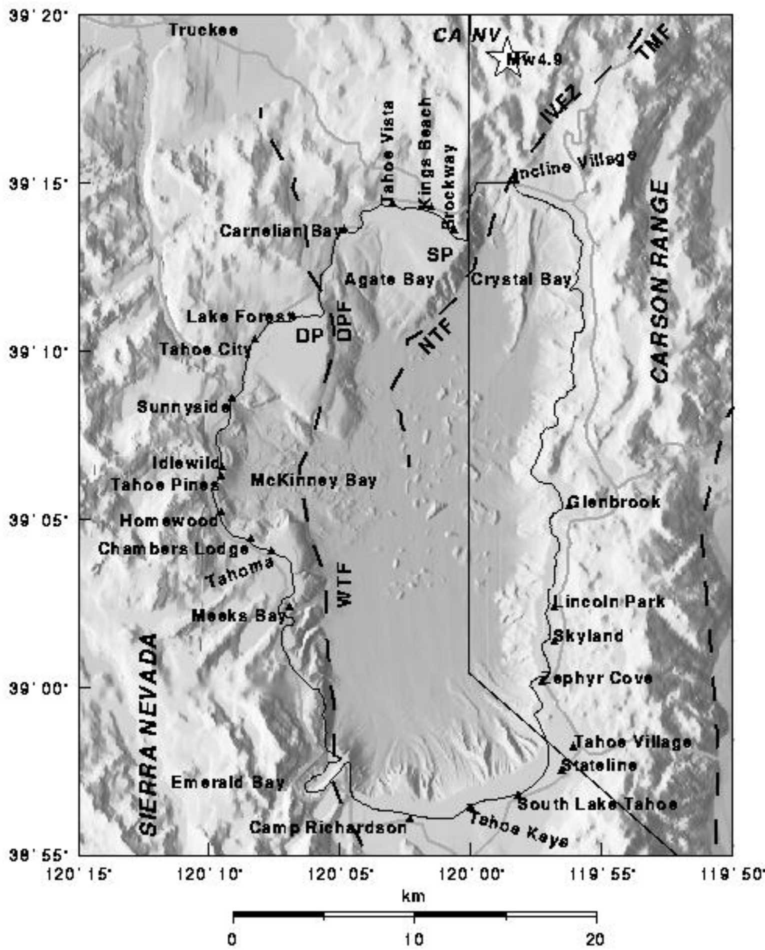


Figure 3-26 Lake Tahoe Fault Map. SP (Stateline Point), NTF (North Tahoe fault line), IVFZ (Incline Village Fault Zone), TMF (Truckee Meadows Fault), WTF (West Tahoe Fault), DPF (Dollar Point Fault)

A more recent study published in November 2006 showed evidence of a tsunami triggered by an earthquake and massive underwater landslide that deposited ridges of glacial boulders and smaller volcanic rocks on the "Tahoe City Shelf," a triangular region fifty feet below the eastern shore of the lake and twelve miles from the "McKinney Bay slide" which undermined the western shore (Figure 3-25).

In 2007, this team of scientists is returning to Lake Tahoe to analyze the strength and stability of steep rock walls along the lake, which could collapse and cause another seiche wave.

3.3.17.3 *Location, Severity, and Probability of Future Events*

There is a tsunami hazard at Lake Tahoe primarily because faults occur below the lake. These are dip-slip faults (ones in which one side goes down relative to the other), which could cause displacement in the water column above the fault rupture. If the displacement is large enough, a damaging tsunami could be generated. A large, rapid landslide, either underwater within the lake or into the lake from the side, could also generate a tsunami; such a landslide could also be induced by an earthquake.

Nevada also has strike-slip faults (ones in which one side moves horizontally relative to the other side), but this motion is not likely to create significant vertical displacements in the water column. Although strike-slip faults do occur near or underneath Pyramid Lake and Lake Mead, geological evidence at this time does not indicate the presence of active normal faults capable of producing tsunamis in these or other large lakes in Nevada (other than Lake Tahoe). There is good bathymetric evidence of a major landslide that spread large blocks from McKinney Bay across the floor of Lake Tahoe (Fig. 3-25 and 3-26). It appears that similarly large landslides have not occurred at the other large lakes in Nevada

Tsunamis are considered a low-risk hazard in Nevada primarily because the earthquakes that would likely cause sizeable tsunamis on Lake Tahoe, either directly by fault displacement or indirectly by a large landslide, appear to occur only once every few thousand to few tens of thousands of years. If a tsunami does happen, most of the near-shore parts of communities surrounding Lake Tahoe would be at risk. There would be little or no warning, other than perhaps feeling the ground shake from the earthquake before the first wave of water hits. As is the case along the Pacific Northwest coast, the most effective tsunami-hazard mitigation may be training people to run to high ground as soon as possible, if they feel strong shaking from an earthquake. It must be noted that this is a very limited exposure event, specifically to shore line residents of Lake Tahoe – very limited population, though the property damage value could be extensive.

3.3.18 Volcano *(Low Risk Hazard)*

3.3.18.1 *Nature*

Volcanoes are created when internal forces in the earth cause heated, melted rock (magma) to rise to the surface. First collecting in magma chambers, some of the magma pushes upward through cracks and eventually vents to the Earth's surface. As the magma reaches the surface, it can erupt violently due to escaping gases (e.g., Mount St. Helens in 1980), it can erupt less spectacularly as a lava flow (e.g., Hawaii), or it can expand slowly as a lava dome (similar to the filling of the crater of Mount St. Helens in recent years).

Volcanoes have varied shapes and sizes, but are divided into three main kinds depending on the type of material that reaches the surface and the type of eruption that ensues.

1. *Composite or Stratovolcanoes*

Composite volcanoes (stratovolcanoes) develop from repeated explosive and non-explosive eruptions of tephra (airborne lava fragments that can range in size from tiny particles of ash to house-size boulders) and lava that build up layer by layer. These volcanoes are the largest and form symmetrical cones with steep sides. Mount Shasta, Mount Rainier, and Mount St. Helens are examples of stratovolcanoes.

2. *Shield Volcanoes*

Shield volcanoes form from "gentle" or non-explosive eruptions of flowing lava. The lava spreads out and builds up volcanoes with broad, gently sloping sides. The low-profile shape resembles a warrior's shield. Currently active volcanoes of this type are found in the Hawaiian Islands.

3. *Cinder Cones*

Cinder cones build from lava that is blown violently into the air and breaks into fragments. As the lava pieces fall back to the ground, they cool and harden into cinders (lava fragments about ½ inch in diameter) that pile up around the volcano's vent. Cinder cones are the smallest volcanoes and are cone-shaped. Cinder cones are found in many areas, including Nevada.

Figure 3-27 Mount St. Helens 1980 Eruption - USGS Photograph by Austin Post

4. **Phreatic eruptions** occur when rising magma contacts ground or surface water. The extreme temperature of the magma (anywhere from 600 °C to 1,170 °C (1110–2140 °F)) causes near-instantaneous evaporation to steam resulting in an explosion of steam, water, ash, rock, and volcanic bombs. A less intense geothermal event may result in a mud volcano. This kind of activity is also described as **steam-blast eruptions**. Phreatic eruptions typically include steam and rock fragments and seldom erupt lava. The temperature of the fragments can range from cold to hundreds of degrees centigrade. If molten material is included, the term **phreato-magmatic** may be used. These eruptions occasionally create

broad, low-relief craters called *maars*. Phreatic explosions can be accompanied by carbon dioxide or hydrogen sulfide gas emissions. The former can asphyxiate at sufficient concentration; the latter is a broad spectrum poison. A 1979 phreatic eruption on the island of Java killed 149 people, most of whom were overcome by poisonous gases.

3.3.18.2 *History*

Nevada Volcanic Hazards

The most likely volcanic hazard for Nevada is an eruption from the Mono Craters area near Lee Vining and Mono Lake in Eastern California. Small eruptions from these volcanoes have sent ash into Nevada as recently as about 260 years ago. Other volcanoes that could deposit ash in Nevada include Mount Lassen, Mount Shasta and the Long Valley Caldera in California and volcanoes in the Cascade Mountains in Oregon. The biggest threat for Nevada from eruptions in California and Oregon is damage to flying aircraft.

A massive eruption from the Long Valley Caldera near Mammoth Lakes, California about 760,000 years ago devastated a considerable area in Owens Valley when thick, hot flows of ash were deposited as far south as Bishop. Air-fall ash from these eruptions did collect as thick piles of ash in parts of Nevada, and some of the ash may have been hot enough or thick enough to devastate the landscape locally. Scientist would expect to see strong indications from seismographs before another eruption of this magnitude. The U.S. Geological Survey continues to monitor the area around Mammoth Lakes, and will issue warnings prior to any subsurface changes that could precede a major eruption.

Seismic and geodetic data at the north end of Lake Tahoe have been interpreted by researchers at the University of Nevada, Reno (K.D. Smith and others, 2004, Evidence for deep magma injection beneath Lake Tahoe, Nevada-California: *Science*, v. 305, p. 1277-1280) to indicate active magma at a depth of approximately 30 kilometers. There does not appear to be a near-term threat of volcanic eruption from this area, in part because the last documented eruption in the area was approximately one million years ago. It is likely that seismic instruments will detect any imminent eruption in time to warn people to avoid the hazard. Our ability to monitor small tremors associated with magma at depth is limited by the currently limited number of seismographs that are operated in Nevada. The Nevada Seismological Laboratory and the U.S. Geological Survey have joint responsibilities for earthquake monitoring and warnings. The Advanced National Seismic System, which is authorized by Congress but currently has been funded at only a fraction of its intended size, will help to monitor for earthquakes and pending volcanic eruptions.

The Soda Lake and Little Soda Lake (near Fallon in Churchill County) maars (volcanoes that form by explosions when magma rises near the surface of the earth and boils the groundwater) are probably the youngest volcanoes within the borders of the State. They have not erupted in recorded history, although they definitely are younger then the last high stand of Lake Lahontan, about 13,000 years ago because deposits from these volcanoes overlie sediments deposited in the lake. On the basis of preliminary helium isotopic studies (Thure Cerling, University of Utah, personal communication, 1997), the eruption at Soda Lake may be younger then 1,500 years before present. Phreatic eruptions such as the one that caused Soda Lakes to form pose a risk of asphyxiation from volcanic gases released. Similar phreatic events have occurred at Steamboat geothermal area just south of Reno.

Other relatively young volcanoes occur in the Crater Flat – Lunar Crater Zone, Nye County, which includes basaltic volcanoes ranging in age from about 38,000 to 1 million years old (Smith, E.I. Keenan, D.L., Plank, T. 2002, Episodic Volcanism and Hot Mantle: Implications for Volcanic Hazard Studies at the Proposed Nuclear Waste Repository at Yucca Mountain, Nevada: GSA Today, v.12, no.4, p. 4-10; in Clayton Valley, near Silver Peak in Esmeralda County; near Winnemucca in Humboldt County; and near Reno in Storey County. Most of these are basaltic volcanoes, which typically form small cinder cones and small lava flows. There are also some one million-year-old rhyolitic lava flows in the Reno area near Steamboat Hot Springs, but volcanoes in this area are thought to be extinct.

Although geothermal power plants in many parts of the world are associated with active volcanoes, the 15 geothermal power plants in northern Nevada do not appear to be associated with magma. With the possible exception of the Steamboat geothermal system at the south end of Reno, the geothermal areas in Nevada appear to be derive their heat from deep circulation of groundwater rather than direct connections with magma or cooling igneous rock. A hazard that is recognized in the Steamboat area is violent eruption of steam, mud, and rock from geysers. As indicated on the geologic map of the Mt. Rose NE Quadrangle ((Nevada Bureau of Mines and Geology Map 4Bg), such eruptions have occurred during the Quaternary Period near the Mount Rose Highway (Nevada Route 431), west of the intersection with U.S. Highway 395, and could occur again there or in other parts of the Steamboat area. The hazard from such eruptions is a local feature that would not be likely to require federal assistance.

3.3.18.3 *Location, Severity, and Probability of Future Events*

There is clearly some potential for ash from the Mono Craters and Inyo Craters to affect airplanes, air quality, and highway driving in Nevada, particularly in near-downwind areas of Esmeralda, Mineral, and Nye Counties. Similarly, there is some potential for ash from Cascade volcanoes in northern California (Lassen Peak and Mt. Shasta areas) and Oregon to affect airplanes, air quality, and highway driving in northern Nevada, particularly Washoe, Humboldt, Pershing, and Elko Counties. Geologic evidence of past eruptions from these volcanoes, recognized as ash deposits of particular ages and distinct chemical compositions, is abundant in Nevada. Volcanic gases associated with phreatic eruptions could pose a localized threat of asphyxiation to humans in poorly ventilated spaces in the immediate vicinity of these vents. Another CO2 death occurred at Mammoth Mountain, California when a skier became trapped in a snow pocket that was filled with gas. However, it is noted that the ski resorts in that region are located in close proximity to volcanoes and earthquake faults whereas Nevada is not.

In the *Hazard Mitigation Survey* and the *County Hazard Mitigation Plans,* Carson City considered this hazard low. Also, Storey and Washoe Counties considered this hazard low. Carson City indicated that if the any of the volcanoes across in California became active that ash would cause air quality problems and damage to aircraft. Washoe County mentioned that a volcano would be a secondary hazard from an earthquake.

The tribal entities did not consider this hazard a threat.

Volcanoes are considered a low-risk hazard in Nevada in part because the consequences are likely to be minimal for the types of eruptions that would affect Nevada.

The probability for this hazard is low. Mitigation actions are limited to public awareness and evacuation procedures at the local level.

3.3.19 Wildfire *(High Risk Hazard)*

3.3.19.1 *Nature*

A wildfire is a type of fire that spreads by consumption of vegetation. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildfires can be caused by human activities such as arson or campfires or by natural events such as lightning. Wildfires are not confined to forests but can easily ignite in other areas with ample vegetation such as sagebrush or cheatgrass. Additionally, wildfires can be classified as urban fires, interface or intermix fires, and prescribed fires.

Nevada is susceptible to weather that may range from prolonged periods of drought to periods that are marked by above average precipitation. The result of these weather ranges produces millions of acres of dead or dying vegetation, which rapidly dries out under normal summer weather conditions. The dry, hot conditions and windy weather patterns characteristic of Nevada's summers combine with vegetation conditions that fuel fast-moving, high intensity wild land fires.

The following three factors contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas.

- **Topography:** Topography is the configuration of the earth's surface, including its relief and the position of its natural and man-made features. Topography has a direct bearing on fire behavior. As slope increases, the rate of wildfire spread increases. A slope's aspect correlates with the amount of moisture, quantity and type of vegetation. As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier, thereby intensifying wildfire behavior. However, ridge-tops may mark the end of wildfire spread, since fire spreads more slowly or may even be unable to spread downhill.

- **Fuel:** Fuel characteristics determine the potential fire intensity, and influence the rate of spread. The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought, as the moisture content of both living and dead plant matter decreases. The fuel's continuity, both horizontally and vertically, is also an important factor.

- **Weather:** The most variable factor affecting wildfire behavior is weather. Temperature, humidity, wind, and lightning can affect both the chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. By contrast, cooling and higher humidity often signal reduced wildfire occurrence and easier containment. Wind has the greatest impact on fire behavior of any of the weather factors. The passage of a warm front will usually bring a wind direction shift of 45 to 90 degrees. The passage of a cold front will shift wind direction from less than 45 degrees to as much as 180 degrees. Great Basin heating causes downslope winds in Nevada. As the winds flow downslope in the atmosphere it is compressed, becoming warmer and dryer. This causes the fuels to dry out. As the temperature increases, wind speed may reach 50 to 70 miles per hour. Another extreme weather condition that Nevada faces is thunderstorms. A thunderstorms effect may extend 25 to 30 miles from the actual storm. Downbursts are caused by thunderstorms collapsing. When this happens, cool air is released in a downward direction. When this occurs, it will adversely affect fire behavior and fire suppression efforts.

The frequency and severity of wildfires also depends on other hazards, such as lightning, drought, and infestations. If not promptly controlled, wildfires may grow into an emergency or disaster. Fires that break out immediately following earthquakes can be particularly devastating, because the earthquake may have impaired the ability to reach or combat an urban or urban interface fire. Even small fires can threaten or destroy lives, resources, improved properties. In addition to affecting people, wildfires may severely affect wildlife, livestock, and pets. Such events may require emergency watering/feeding, evacuation, and shelter. After the wildfire season of 2006, Elko issued a second hunting season to reduce the population of wildlife that was dying from the lack of vegetation.

The indirect effects of wildfires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, increasing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards.

3.3.19.2 *History*

In Nevada, particularly in Northern Nevada, wildfires are a common yearly event. Nevada's fire season starts in May and ends in October, but wildfires can occur at any time of the year depending on fire and weather conditions.

Nevada's fire regime is outside the range of historical variation which means that wildland fires have become larger, more destructive, and more frequent. In the past fifty years there have been eight large fire seasons in Nevada. Five of these fire seasons have occurred in the past eight years. Since the record fire season of 1999, over five million acres of Nevada's forest, watersheds and rangelands have burned. These fires have devastated ranches, watersheds and wildlife habitat. With each fire more native plant communities are lost, causing cheatgrass and red brome to spread. The spread of these invasive annual plants perpetuates the cycle of destructive fires and the loss of native plant communities.

Out of the ten worst fire seasons since 1960 in terms of acres burned, five of those have occurred from 1999 to 2006. The 2006 fire season had 1,274 wildfires that burned 1,348,871 acres in the State of Nevada. These fires threatened not only homes, but plant and animal species.

Figure 3-28 Wildland Urban Interface fire outside of Pioche, NV

The following is a brief description of some of the recent fires in Nevada.

- 2006 Pine Haven Fire: This fire was caused by power lines and windy conditions. Firefighters held the blaze to approximately 300 acres with wildland fire engines, structure fire engines, water tenders, several hand crews and other equipment. Although the fire briefly threatened homes near Caughlin Ranch near Reno, no structures were damaged or lost during the fire.

- 2006 Mud Fire: A Fire Management Assistance Grant (FMAG) was approved August 23, 2006. At the time of the grant, the Mud Fire was threatening 300 homes and had forced mandatory evacuations of about 1,000 persons. Burning more than 3,000 acres on the outskirts of Elko, the human–caused fire threatened businesses and a number of state and Federal facilities.

- 2006 Verdi Fire: This fire burned 6000 acres near Reno, Nevada threatening the Somersett area. It significantly depleted the winter food for the deer in this area.

- 2006 Linehan Fire Complex: This fire burned about 8,000 acres, threatening homes in Carson City. One federal Type I incident response team moved in to battle the 8,000-acre Sierra-Tahoe complex of fires in western Nevada near Reno and Carson City.

- 2006 Oregon Fire: This fire burned more than 160 square miles of Nevada rangeland near the Oregon border. Also, this fire on the Oregon side threatened the major transmission lines that carry power between California and the Pacific Northwest.

- 2006 Suzie Fire: This fire burned more than 78,300 acres about five miles from Elko. This fire threatened rangelands, homes, and highways. A five-member strike team from California, composed of personnel and engines from fire departments in Sacramento, Placer and Nevada counties was involved in fighting this fire.

- 2005 Chance Fire: The fire, which started August 28, had consumed more than 6,000 acres. It resulted in the voluntary evacuation of approximate 200 residents. The fire burned near the communities of Ryndon, Osino and Elburz in Elko County.

- 2005 Vor-McCarty Fire: This fire burning near Elko, in the northeastern part of the state threatened the Upper Ten Mile subdivision. It consumed more than 500 acres and threatened several historical structures.

- 2005 Good Springs Fire: This fire burned 31,600 acres of land near Las Vegas. It threatened Red Rock Conservation area, Mountain Springs, and Mt. Potosi area. It was started by a thunderbolt.

- 2004 Andrew Fire: The fire was located between Carson City and Reno. At the time the FEMA money was approved, the fire had burned more than 1,000 acres and a few residences. The fire was threatening hundreds of homes in the town of Pleasant Valley. An estimated 300 people had been evacuated.

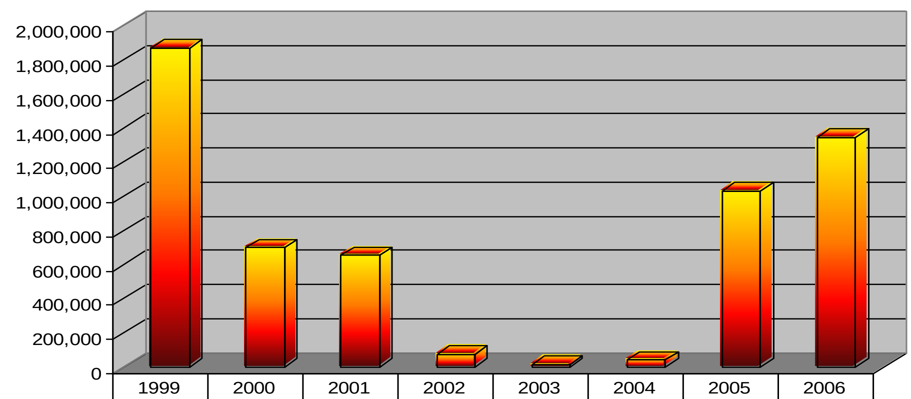
- 2004 Robbers Fire: This fire burned near Mount Charleston in Clark County. The 1,000-acre Robber fire resulted in the evacuation of about eight residential structures and Camp Stimpson, a Girl Scout camp, and the Spring Mountain Youth Camp, a juvenile detention center. In addition, 400 homes were under voluntary evacuation near an area known as Kyle Canyon.

- 2004 Waterfall Fire: This fire was located in Kings Canyon near Carson City. This fire burned more than 300 acres, threatening 350 homes and exhibiting extreme behavior. About 200 personnel responded to the fire that caused an evacuation of 50 homes closest to the flames.

- 2004 Verdi Fire Complex: This fire was located west and northwest of Reno. The blaze burned 1,094 acres west of Peavine Peak and cost $980,000 to fight.

Additionally, large fires generate an increase in the spread of invasive species like cheatgrass and red brome. In many cases these invasive species are more fire prone than native species and fuel larger, more intense fires. In recent years this fire-invasive-fire cycle is accelerating and posing serious threats to the health of some Nevada ecosystems.

Wildfires and Acreage Burned in Nevada



	1999	2000	2001	2002	2003	2004	2005	2006
Acres Burned by Wildland Fires in Nevada by Year	1,871,956	699,210	654,253	77,551	17,546	40,950	1,032,104	1,348,871

Figure 3-29 Wildfire Acreage Burned in Nevada - Contributed by Mike Dondero, Fire Management Officer Source information from Eastern Great Basin Geographic Area Coordination Center

3.3.19.3 *Location, Severity, and Probability of Future Events*

The entire State of Nevada is at risk to wildfires due to fuel loading, ignition risk, weather, and topography. No specific area of the State is immune to this risk. The State of Nevada Division of Forestry is the lead agency for wild-land urban interface fire planning, mitigation, and response. The agency's mission is to provide professional natural resource and fire services to Nevada's citizens to enhance and protect forest, rangeland, and watershed values; conserve endangered plants and other native flora; and provide effective statewide fire protection and emergency management.

In a collaborative effort, government agencies at all levels, tribes, communities, volunteers, and a variety of other participants have reduced the threats posed by wildland fire since adoption of the Western Governor Association's A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment - *10-Year Strategy*, *Implementation Plan*.

The revision of the *10-Year Strategy* in December of 2006 gives direction for a collaborative framework that crosses agency jurisdictions and program boundaries. It strongly emphasizes the following:

- Information sharing and monitoring of accomplishments and forest conditions to improve transparency
- Long term commitment to maintaining the essential resources for project implementation
- Landscape-level approach to the restoration of fire adapted ecosystems
- Use of fire as a management tool (wildland fire use, prescribed fire)
- Improve collaboration on all levels consistent with the *10-Year Strategy*, the *Implementation Plan*, and individual agency goals and objectives.

The severity of wildfires in the State of Nevada has been determined by the Nevada Hazard Mitigation Planning Committee (NHMPC) using a hazard ranking system and vulnerability rating explained in section 3.2.1 and 3.2.2.

The hazard rating for wildfires in Nevada is a "high risk hazard."

Nevada's Extreme Wildfire Hazard Communities A key element of the **Healthy Forests Initiative** announced by the White House in 2002 is the implementation of core components of the ***National Fire Plan Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10- year Comprehensive Strategy***. Federal agencies and western state governors adopted the Plan in the spring of 2002 in collaboration with county commissioners, state foresters, and tribal officials. The Plan calls for more active forest and rangeland management to reduce the threat of wildfire in the wildland urban interface.

The Healthy Forest Restoration Act (H.R. 1904) was signed into law in December of 2003. The act creates provisions for expanding the activities outlined in the National Fire Plan. During this year the Nevada Fire Safe Council received National Fire Plan funding through the Department of Interior Bureau of Land Management to conduct a Community Risk/Hazard Assessment in at-risk communities across Nevada. The communities to be assessed are among those named in the 2001 Federal Register list of Communities-at-Risk within the vicinity of Federal lands (66 FR 160). The list identifies Nevada communities adjacent to Federal lands that are most vulnerable to wildfire threat in Nevada.

During 2004, field teams comprised of fire behavior specialists, foresters, rangeland fuels specialists, and field technicians visited over 250 communities in Nevada's seventeen counties to assess both the risk of ignition and the potential fire behavior hazard. With the use of procedures accepted by Nevada's wildland fire agencies, these specialists focused their analysis on the wildland urban interface areas where homes and wildlands meet. This effort is known as the Nevada Community Wildfire Risk/Hazard Assessment Project*. Please see Table 3-13A for a summary of the project's results.

The specific goals of the Nevada Community Risk/Hazard Assessment Project are the following:

- Reduce the threat of wildland fire to the communities.
- Raise the level of public awareness about ignition risk factors and fire safe practices in the wildland urban interface.
- Improve local coordination for suppression activities.
- Identify and pursue firefighting resource needs (equipment and infrastructure).
- Describe proposed risk and hazard mitigation projects in enough detail to aid communities in applying for future implementation funds.

Nevada Community Wildfire Risk / Hazard Assessment Project, Resource Concepts, Inc., 1.0 Introduction

County	Extreme	High	Moderate	Low	Total

Table 3-13A

Carson City	**0**	**1**	**2**	**1**	**4**
Churchill	**0**	**1**	**2**	**3**	**6**
Clark	**4**	**3**	**5**	**18**	**30**
Douglas	**1**	**16**	**7**	**4**	**28**
Elko	**3**	**13**	**15**	**4**	**35**
Esmeralda	**0**	**0**	**4**	**1**	**5**
Eureka	**0**	**1**	**3**	**2**	**6**
Humboldt	**0**	**1**	**6**	**3**	**10**
Lander	**0**	**2**	**1**	**3**	**6**
Lincoln	**2**	**1**	**4**	**0**	**7**
Lyon	**0**	**1**	**8**	**4**	**13**
Mineral	**0**	**1**	**4**	**1**	**6**
Nye	**2**	**1**	**4**	**3**	**10**
Pershing	**1**	**1**	**6**	**0**	**8**
Storey	**1**	**2**	**2**	**0**	**5**
Washoe	**0**	**6**	**20**	**5**	**31**
White Pine	**0**	**1**	**7**	**0**	**8**
Total	16	50	100	52	218

Community at risk hazard ratings by county

The Community Risk/Hazard Assessments were conducted systematically. The assessment teams observed and recorded the factors that significantly influence the risk of wildfire ignition along the wildland-urban interface, and inventoried features that can influence hazardous conditions in the event of a wildfire. Interviews with local fire agency and emergency response personnel were completed to assess the availability of suppression resources and identify opportunities for increased community preparedness. A description of the existing fuel hazard and fire behavior potential was discussed and presented with photos for each community.

Four primary factors that affect potential fire hazard were assessed to arrive at the community hazard assessment score: community design, structure survivability, availability of fire suppression resources, and physical conditions such as the vegetative fuel load and topography. An ignition risk rating of low, moderate, or high was assigned to each community. The rating was based upon historical ignition patterns, interviews with local fire personnel, field visits to each community, and professional judgment based on experience with wildland fire ignitions in the Great Basin.

The results of each community assessment are formatted to facilitate ease of reference and reproduction for individual communities. Each community is mapped and recommendations to improve fire safety are described and summarized in table form. Summary sheets highlighting important aspects of Defensible Space and Homeowner Responsibilities are formatted for widespread distribution. These tools will aid local, state and federal agencies in strategic planning, raising public awareness, and seeking funding for future risk and hazard reduction projects. Mitigating the risks and hazards identified by these assessments is not only crucial to the long term goals of the National Fire Plan, but also to the short and long-term viability of Nevada's communities, natural resources, infrastructures, and watersheds. As of June 2007, twelve of the seventeen counties have signed and approved their plans as Community Wildfire Protection Plans (CWPPs).

The initial CWPP assessment covered communities at risk defined in the 2001 Federal Register in the interface, intermix and occluded conditions. This assessment simply represented a snapshot in time of the conditions in the identified communities. However, wildland fire conditions continue to change and new and existing communities are impacting the wildland environment causing the need for ongoing collaborative review and updating of the original assessments as well as creating new assessments. Currently, the Bureau of Land Management has contracted with a company to conduct the second assessment, the scope of which will cover the rural condition as well as areas of the state that were not included in the first assessment.

A part of the State of Nevada Division of Forestry's fire planning, mitigation, and response is the preparation of Community Wildfire Protection Plans (CWPP) for each county in the State. Ed Smith and Sonya Sistare from the University of Nevada Cooperative Extension reviewed the CWPPs and prepared a report, *Course of Study Reports for Nevada's Extreme Wildfire Hazard Communities,* outlining the risk factors that identify communities with wildfire risks. Table 3-13B is a summary of their report.

Table 3-13B
Nevada's Extreme Communities

Nevada's Extreme Communities

Ignition Risk and Hazard Assessment Overview[1]

Name	IGNITION RISK ASSESSMENT	Summary rating	CONTRIBUTING FACTORS	History of lightning strikes	Camping activities	High level of visitor/recreational acitities	Understory provides receptive fuel bed for ignition	Thick brush/trees provide receptive fuel bed for ignition	Improperly maintained powerline corridors	High fuel loads	High winds	HAZARD RATING ASSESSMENT	Summary score
CLARK COUNTY													
Kyle Canyon		High		✓	✓	✓							95
Lee Canyon		High		✓	✓	✓							88
Mountain Springs		High				✓	✓						84
Trout Canyon		High						✓			✓		95
DOUGLAS COUNTY													
Bodie Flats		High		✓		✓				✓			81
Chimney Rock		High								✓			83
ELKO COUNTY													
Jarbidge		Mod-High		✓						✓			85
Jiggs/Smith Creek		High		✓	✓	✓				✓			79
Ruby Valley Indian Allotments		Moderate		✓						✓			76
LAKE TAHOE													
Allison/Jennifer		High		✓		✓							82
Crystal Bay		high				✓			✓		✓		78
Incline Village Interior		high		✓		✓			✓				85
Rocky Point		high		✓		✓			✓				91
Saddlehorn/Tumbleweed		high		✓		✓			✓				80
Tyrolian Village		high		✓		✓							85
Upper Tyner		high		✓		✓							77
LINCOLN COUNTY													
Mt. Wilson[2]		High		✓			✓	✓	✓	✓			108
Pioche/Caselton Heights[3]		High		✓				✓		✓			76
NYE COUNTY													
Ione		High		✓	✓	✓				✓			97
Manhattan		High		✓		✓				✓			80
PERSHING COUNTY													
Unionville		High		✓					✓				78
STOREY COUNTY													
Virginia Highlands[4]		High		✓		✓							n/a

Name	COMMUNITY DESIGN	Wildland-Urban Interface Condition	Number of homes	Ingress/Egress	Width of Road	Accessibility	Secondary Roads	Visible Street Signs	Visible address	Utilities-ignition risk	CONSTRUCTION MATERIALS	Non-combustible roof	Non-combustible siding	Unenclosed structures
CLARK COUNTY														
Kyle Canyon		Interface	335	Moderate	Moderate	Inadequate	Moderate	Inadequate	Adequate	Moderate		Adequate	Inadequate	Inadequate
Lee Canyon		Intermix	68	Moderate	Moderate	Inadequate	Moderate	Adequate	Inadequate	High		Adequate	Inadequate	Inadequate
Mountain Springs		Intermix	36	Moderate	Adequate	Adequate	Inadequate	Adequate	Inadequate	Moderate		Adequate	Adequate	Adequate
Trout Canyon		Intermix	35	Inadequate	Moderate	Inadequate	Inadequate	Inadequate	Inadequate	Moderate		Adeuqate	Adequate	Inadequate
DOUGLAS COUNTY														
Bodie Flats		Intermix	164	Adequate	Adequate	Adequate	Adequate	Inadequate	Moderate	Moderate		Adequate	Adequate	Moderate
Chimney Rock		Intermix	554	Moderate	Adequate	Moderate	Adequate	Adequate	Adequate	Moderate		Inadequate	Adequate	Inadequate
ELKO COUNTY														
Jarbidge		Intermix	76	Moderate	Adequate	Adequate	Moderate	Inadequate	Inadequate	Moderate		Adequate	Inadequate	Moderate
Jiggs/Smith Creek		Intermix	14	Moderate	Moderate	Adequate	Inadequate	Inadequate	Inadequate	Moderate		Adequate	Adequate	Mod-inadequate
Ruby Valley Indian Allotments		Interface	7	Moderate	Moderate	Adequate	Moderate	Adequate	Inadequate	Moderate		Adequate	Adequate	Inadequate
LAKE TAHOE														
Allison/Jennifer		Intermix	280	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Moderate		Inadequate	Adequate	Inadequate
Crystal Bay		Intermix	157	Adequate	Adequate	Adequate	Moderate	Adequate	Adequate	Inadequate		Moderate	Adequate	Inadequate
Incline Village Interior		Intermix	2980	Adequate	Moderate	Inadequate	Moderate	Adequate	Adequate	Inadequate		Inadequate	Adequate	Inadequate
Rocky Point		Intermix	7	Moderate	Adequate	Adequate	adequate	n/a	Adequate	Moderate		Inadequate	Adequate	Inadequate
Saddlehorn/Tumbleweed		Intermix	642	Adequate	Adequate	Adequate	adequate	Adequate	Adequate	Moderate		Inadequate	Adequate	Inadequate
Tyrolian Village		Intermix	205	Moderate	Adequate	Inadequate	Inadequate	Adequate	Adequate	Moderate		Moderate	Adequate	Inadequate
Upper Tyner		Intermix	245	Moderate	Adequate	Adequate	Adequate	Adequate	Adequate	Moderate		Moderate	Adequate	Inadequate
LINCOLN COUNTY														
Mt. Wilson[2]		Intermix	36	Moderate	Moderate	Moderate	Inadequate	Inadequate	Inadequate	High		Adequate	Inadequate	Inadequate
Pioche/Caselton Heights[3]		Intermix	350	Adequate	Adequate	Moderate	Inadequate	Adequate	Adequate	Moderate		Adequate	Adequate	Inadequate
NYE COUNTY														
Ione		Intermix	18	Moderate	Moderate	Inadequate	Adequate	Inadequate	Inadequate	Moderate		Inadequate	Inadequate	Moderate
Manhattan		Intermix	58	Moderate	Moderate	Inadequate	Adequate	Adequate	Adequate	Adequate		Adequate	Adequate	Moderate
PERSHING COUNTY														
Unionville		Intermix	20	Inadequate	Moderate	Inadequate	Adequate	n/a	Moderate	Moderate		Adequate	Adequate	Adequate
STOREY COUNTY														
Virginia Highlands[4]		Intermix	454	Adequate	Moderate	Adequate	Inadequate	Inadequate	Inadequate	Moderate		Adequate	Inadequate	n/a

Name	DEFENSIBLE SPACE	Lot Size	Defensible space	FIRE BEHAVIOR	Fuels	Fire Behavior	Slope	Aspect	SUPPRESSION CAPABILITIES	Available water source	Fire protection	Primary fire protection service	Supporting fire protection service	Additional support	ADDITIONAL FACTORS	Existing Fire Safe Council Chapter
CLARK COUNTY																
Kyle Canyon		High density	Inadequate		Extreme	Extreme	Very steep	Extreme		Adequate	Adequate	NDF	Kyle VFD	USFS		Yes
Lee Canyon		High density	Inadequate		High	High	Very steep	Moderate		Adequate	Adequate	NDF	Kyle VFD	USFS		Yes
Mountain Springs		Mod. density	Inadequate		Extreme	Extreme	Steep	Extreme		Moderate	Inadequate	VFD	USFS			Yes
Trout Canyon		Mod. density	Inadequate		Extreme	Extreme	Slight-mod.	High		Moderate	Inadequate	No formal	CC Rural	USFS		No
DOUGLAS COUNTY																
Bodie Flats		High density	Inadequate		Extreme	Extreme	Steep	Very high		Moderate	Moderate	VFD	BLM			No
Chimney Rock		High density	Inadequate		Extreme	Extreme	Very steep	High		Adequate	Adequate	T-DFPD	USFS			Yes
ELKO COUNTY																
Jarbidge		High density	Inadequate		Extreme	Extreme	Very steep	Extreme		Adequate	Moderate	VFD	Jackpot FD	NDF, USFS		No
Jiggs/Smith Creek		Low density	Mod-inadequate		High	Extreme	Slight-mod	High		Inadequate	Mod-inadequate	NDF	VFD & Elko FD	BLM		No
Ruby Valley Indian Allotments		Mod. density	Inadequate		High	High	Slight-mod	Low		Inadequate	Mod-inadequate	No formal	Ruby VFD	NDF, BLM		No
LAKE TAHOE																
Allison/Jennifer		High density	Inadequate		Extreme	Extreme	Very steep	Extreme		Adequate	Adequate	NLTFPD	USFS			No
Crystal Bay		High density	Inadequate		Extreme	Extreme	Very steep	Extreme		Adequate	Adequate	NLTFPD	USFS			No
Incline Village Interior		High density	Inadequate		High	Extreme	Steep	Extreme		Adequate	Adequate	NLTFPD	USFS			Yes
Rocky Point		High density	Inadequate		Extreme	Extreme	Very steep	High		Inadequate	Adequate	NLTFPD	USFS			No
Saddlehorn/Tumbleweed		High density	Inadequate		High	Extreme	Very steep	Extreme		Adequate	Adequate	NLTFPD	USFS			No
Tyrolian Village		High density	Inadequate		Extreme	Extreme	Very steep	Extreme		Adequate	Adequate	NLTFPD	USFS			Yes
Upper Tyner		High density	Inadequate		High	Extreme	Very steep	Extreme		Adequate	Adequate	NLTFPD	USFS			No
LINCOLN COUNTY																
Mt. Wilson[2]		Mod. density	Inadequate		Extreme	Extreme	Very steep	Extreme		Inadequate	Inadequate	No formal	Pony Springs	BLM, NDF		Yes
Pioche/Caselton Heights[3]		High density	Inadequate		High	High	Mod-steep	Moderate		Adequate	Adequate	VFD	BLM, NDF	VFD		No
NYE COUNTY																
Ione		High density	Adequate		Extreme	Extreme	Steep	Extreme		Inadequate	Inadequate	No formal	Gabbs VFD	Berlin S.P.		No
Manhattan		Mod. density	Inadequate		Extreme	Extreme	Steep	Extreme		Moderate	Moderate	VFD	other VFDs	BLM, NDF		Yes
PERSHING COUNTY																
Unionville		Mod. density	Adequate		High	Extreme	Very steep	Extreme		Inadequate	Inadequate	No formal	Imlay VFD			No
STOREY COUNTY																
Virginia Highlands[4]		High density	Inadequate		Mod-extreme	Extreme	Steep	Extreme		Adequate	Adequate	SCFD	NDF			Yes

Color Coding Key for Significant Contributing Factors

- Problem areas that can probably be modified through education and increased awareness
- Problem areas that can possibly be modified through education and increased awareness
- Problem areas that cannot likely be modified through education and increased awareness

✓ = key factor

Compiled by Sonya Sistare for...

Living With Fire

A program of University of Nevada Cooperative Extension

[1] Adapted from the Nevada Community Wildfire Risk/Hazard Assessment Project. Resource Concepts, Inc. 2004, 2005, 2006

[2] Additional data adapted from the Community Wildfire Risk Assessment and Fuel Reduction Plan for the Mt. Wilson Guest Ranch Community in Lincoln County, Nevada. Resource Concepts, Inc. 2002.
Report-scoring system varied slightly and the rating category and some responses are inferred.

[3] Additional data adapted from the Community Wildfire Risk Assessment and Fuel Reduction Plan for the Towns of Pioche and Caselton Heights in Lincoln County, Nevada. Resource Concepts, Inc. 2002
Report-scoring system varied slightly and the rating category and some responses are inferred.

[4] Additional data adapted from the Community Wildfire Risk Assessment and Fuel Reduction Plan for the Virginia Highlands Community, Storey County, Nevada. Resource Concepts, Inc. 2002
Report-scoring system varied slightly and the rating category and some responses are inferred.

The factors used to rate the State of Nevada's communities are the following:

1. Contributing factors
    a. History of lightning strikes
    b. Camping activities
    c. High level of visitors/recreational activities
    d. Under-story provides receptive fuel bed for ignition
    e. Thick brush/trees provide receptive fuel bed for ignition
    f. Improperly maintained power line corridors
    g. High fuel loads
    h. High winds
2. Community Design
    a. Wildland-Urban Interface Condition
    b. Number of homes
    c. Ingress/Egress
    d. Width of Road
    e. Accessibility
    f. Secondary Roads
    g. Visible Street Signs
    h. Visible address
    i. Utilities-ignition risk
3. Construction Materials
    a. Non-combustible roof
    b. Non-combustible siding
    c. Unenclosed structures
4. Defensible Space
    a. Lot size
    b. Defensible Space
5. Fire Behavior
    a. Fuels
    b. Fire Behavior
    c. Slope
    d. Aspect
6. Suppression Capability
    a. Available water source
    b. Fire protection
    c. Primary fire protection service
    d. Supporting fire protection service
    e. Additional support
7. Additional Factors
    a. Existing Fire Safe Council Chapter

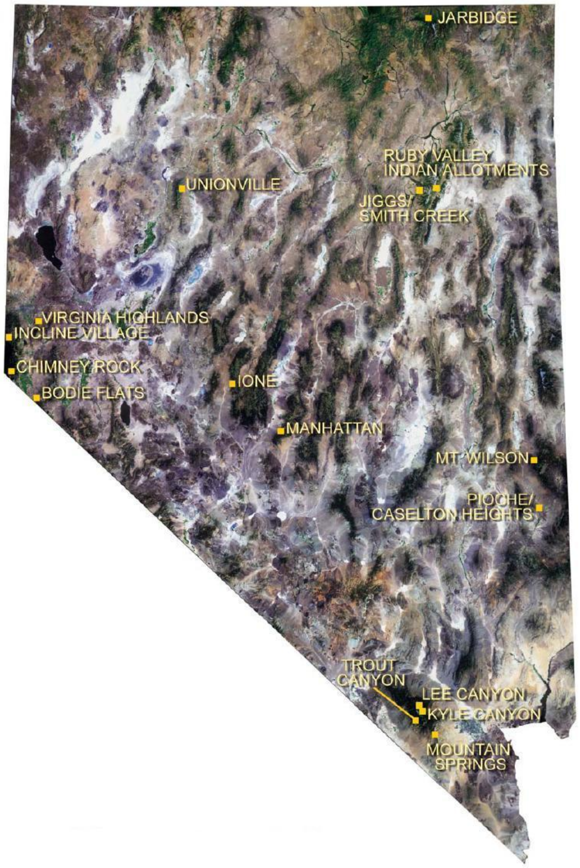


Figure 3-29 Map of Extreme Wildfire Risk Communities

This following list contains the names of the communities designated as having extreme hazard risks, using the listed factors on the previous page.

Clark County

Kyle Canyon

Lee Canyon

Mountain Springs

Trout Canyon

Douglas County

Bodie Flats

Chimney Rock

Elko County

Jarbridge

Jiggs/Smith Creek

Lake Tahoe

Allison/Jennifer

Crystal Bay

Incline Village Interior

Rocky Point

Saddlehorn/Tumbleweed

Tyrolian Village

Upper Tyner

Lincoln County

Mt. Wilson

Pioche/Caselton Heights

Nye County

Ione

Manhattan

Pershing County

Unionville

Storey County

Virginia Highlands

The following table lists all the communities that have been rated using the information provided by the CWPPs.

Table 3-14

Wildfire Hazard Rating for Nevada Communities

Cities	Elev_Ft	County Name	Communities within Cities assessed; hazard rating
Carson City	4730	Carson City	Clear Creek- high; Carson City & Carson Indian Colony- moderate; Stewart- low
Empire	4600	Carson City	
Cold Springs	5565	Churchill	Moderate
Eastgate	5100	Churchill	High
Fallon	3963	Churchill	Low
Fallon Naval Air Station		Churchill	Low
Fallon Outskirts		Churchill	Low
Middlegate	4605	Churchill	Moderate
Arden	2491	Clark	Low
Blue Diamond	3400	Clark	Low
Boulder City	2501	Clark	Low
Bunkerville	1529	Clark	Low
Cactus Springs	3230	Clark	Moderate
Cal-Nev-Ari	2570	Clark	Low
Glendale	1526	Clark	Low
Goodsprings	3718	Clark	Moderate
Henderson	1881	Clark	Low
Indian Springs	3160	Clark	Low
Kyle Canyon Summer Home Area	7627	Clark	Extreme
Las Vegas	2000	Clark	Low
Laughlin	535	Clark	Low
Lee Canyon Summer Home Area	8300	Clark	Extreme
Logandale	1362	Clark	Low
Mesquite	1608	Clark	Low
Moapa Valley	1329	Clark	Moderate
Mountain Springs	5413	Clark	Extreme
Nelson	2954	Clark	High
North Las Vegas	1845	Clark	Low
Overton	1263	Clark	Low
Primm	2625	Clark	Low
Sandy Valley	2641	Clark	Moderate
Searchlight	3470	Clark	Moderate
Sloan	2830	Clark	Low
Double Springs (historical)/Spring Valley	5952	Douglas	High
Dresslerville	4892	Douglas	Moderate
Elk Point/Zephyr Heights/Round Hill	6280	Douglas	eHigh

Cities	Elev_Ft	County Name	Communities within Cities assessed; hazard rating
Gardnerville	4746	Douglas	Low
Gardnerville Ranchos	4863	Douglas	Low
Genoa	4788	Douglas	High
Glenbrook	6260	Douglas	High
Holbrook Junction	5400	Douglas	High
Indian Hills/Jacks Valley	4740	Douglas	Moderate
Johnson Lane	4818	Douglas	Moderate
Kingsbury	6800	Douglas	High
Minden	4721	Douglas	Low
Sheridan	4806	Douglas	High
Skyland/Cave Rock	6260	Douglas	High
Stateline	6260	Douglas	Moderate
Topaz Lake	5080	Douglas	Moderate
Topaz Ranch Estates		Douglas	High
Carlin	4900	Elko	Moderate
Charleston	5947	Elko	Rural
Contact	5560	Elko	High
Currie	5800	Elko	Moderate
Deeth/Starr Valley	5335	Elko	High
Elburz	5210	Elko	Moderate
Elko	5067	Elko	Moderate
Jackpot	5240	Elko	Low
Jarbidge	6218	Elko	Extreme
Jiggs/Smith Creek	5482	Elko	Extreme
Lamoille	5887	Elko	High
Lee/South Fork Indian Reservation	5760	Elko	High
Midas	5745	Elko	High
Montello	4880	Elko	Low
Mountain City	5620	Elko	High
North Fork	6140	Elko	Moderate
Oasis	5865	Elko	Moderate
Osino	5134	Elko	High
Owyhee	5397	Elko	Moderate
Ruby Valley	5920	Elko	Ruby Valley Indian Reservation- extreme; Ruby Lake Estates- high; Ruby Lake National Wildlife Refuge & Hatchery- moderate
Ryndon	5170	Elko	Moderate
Spring Creek	5700	Elko	Moderate
Tuscarora	6118	Elko	High
Wells	5630	Elko	Low
West Wendover	4450	Elko	Low
Dyer/Fish Lake Valley	4886	Esmeralda	Low
Gold Point	5388	Esmeralda	Moderate
Goldfield	5689	Esmeralda	Moderate
Lida	6161	Esmeralda	Moderate
Silver Peak	4320	Esmeralda	Moderate
Beowawe	4690	Eureka	Moderate
Crescent Valley	4812	Eureka	Low
Dunphy	4630	Eureka	Low

Cities	Elev_Ft	County Name	Communities within Cities assessed; hazard rating
Eureka	6481	Eureka	High
Shoshone	4629	Eureka	
Denio	4200	Humboldt	Moderate
Denio Junction	4218	Humboldt	Low
Golconda	4400	Humboldt	Moderate
McDermitt	4424	Humboldt	High
Paradise Hill/Paradise Ranchos	4482	Humboldt	Low
Paradise Valley	4530	Humboldt	Moderate
Quinn River Crossing	4080	Humboldt	Rural
Valmy	4492	Humboldt	Moderate
Winnemucca	4299	Humboldt	Moderate
Austin	6527	Lander	High
Battle Mountain	4512	Lander	Low
Battle Mountain		Lander	Low
Grass Valley	5900	Lander	Rural
Hilltop	6600	Lander	Low
Kingston	5940	Lander	High
Alamo	3449	Lincoln	Moderate
Ash Springs	3630	Lincoln	Rural
Caliente	4395	Lincoln	Moderate
Hiko	3869	Lincoln	Rural
Panaca	4738	Lincoln	Moderate
Pioche/Caselton Heights	6064	Lincoln	Extreme
Rachel	4830	Lincoln	Moderate
Ursine/Eagle Valley	5585	Lincoln	High
Dayton	4440	Lyon	Moderate
Fernley	4153	Lyon	Low
Mark Twain Estates	4400	Lyon	Moderate
Mason Valley	4423	Lyon	Moderate
Mound House (historical)	4960	Lyon	Moderate
Silver City	5060	Lyon	High
Silver Springs	4209	Lyon	Low
Smith Valley	4726	Lyon	Moderate
Stagecoach	4304	Lyon	Low
Wabuska	4299	Lyon	Moderate
Weed Heights	4640	Lyon	Moderate
Weeks (historical)/Fort Churchill	4205	Lyon	Moderate
Yerington	4390	Lyon	Low
Hawthorne	4330	Mineral	Low
Luning	4680	Mineral	Moderate
Marietta	4940	Mineral	High
Mina	4546	Mineral	Moderate
Schurz	4120	Mineral	Moderate
Walker Lake	4120	Mineral	Moderate
Amargosa Valley	2655	Nye	Moderate

Cities	Elev_Ft	County Name	Communities within Cities assessed; hazard rating
Beatty	3308	Nye	Moderate
Belmont	7440	Nye	High
Carvers	5625	Nye	Moderate
Gabbs	4597	Nye	Moderate
Hadley/Round Mountain	5757	Nye	Low
Ione	6800	Nye	Extreme
Manhattan	7000	Nye	Extreme
Pahrump	2690	Nye	Low
Tonopah	6030	Nye	Low
Humboldt	4225	Pershing	High
Imlay	4195	Pershing	Moderate
Lovelock	3975	Pershing	Moderate
Mill City	4220	Pershing	Moderate
Oreana	4158	Pershing	Moderate
Rye Patch	4252	Pershing	Moderate
Unionville	5050	Pershing	Extreme
Gold Hill	5820	Storey	High
Lockwood	4640	Storey	Moderate
Virginia City	6220	Storey	High
Virginia City Highlands	5990	Storey	Extreme
Cold Springs	5055	Washoe	Moderate
Crystal Bay	6360	Washoe	Extreme
Empire	4040	Washoe	Low
Gerlach	3951	Washoe	Moderate
Golden Valley	5095	Washoe	Moderate
Incline Village	6420	Washoe	Extreme
Lemmon Valley	4951	Washoe	Moderate
Mogul/I-80 Corridor West	4701	Washoe	Moderate
Nixon	3938	Washoe	Moderate
Pleasant Valley	4775	Washoe	Moderate
Reno	4498	Washoe	Moderate
Reno Northwest		Washoe	Moderate
Reno Southeast		Washoe	Moderate
Reno Southwest		Washoe	Low
Reno-Stead	5010	Washoe	Low
Spanish Springs	4534	Washoe	Moderate
Sparks	4410	Washoe	Low
Steamboat	4600	Washoe	Moderate
Sun Valley	4720	Washoe	Moderate
Sutcliffe	3900	Washoe	Moderate
Verdi	4905	Washoe	Moderate
Wadsworth	4076	Washoe	Low
Washoe City	5060	Washoe	Moderate
Washoe Valley East		Washoe	Moderate
Baker	5310	White Pine	Moderate

Cities	Elev_Ft	County Name	Communities within Cities assessed; hazard rating
Cherry Creek	6119	White Pine	High
Ely	6427	White Pine	Moderate
Lund	5560	White Pine	Moderate
McGill	6210	White Pine	Moderate
Pleasant Valley (historical)	6270	White Pine	Moderate
Preston	5630	White Pine	Moderate
Ruth	6870	White Pine	Moderate
Shoshone	5785	White Pine	Rural
Strawberry (historical)	5940	White Pine	Rural

Other Communities not geocoded to date:

Clark County
Trout Canyon- extreme
Cold Creek- high
Torino Ranch- high
Cottonwood Cove- low
Palm Garden Estates- low

Douglas County
Bodie Flats- extreme
Chimney Rock- extreme
China Springs- high
Fish Springs- high
Job's Peak Ranch- high
North Foothill Road Corridor- high
Pine Nut Creek- high
Logan Shoals- high
Alpine View- moderate
Ruhenstroth- moderate
East Valley- low

Elko County
Adobe Heights- high
Adobe Ranchos- high
Lucky Nugget I & II- high
Ten Mile- high
Gold Creek- moderate
Hidden Valley/Coal Mine- moderate
Humboldt Ranchettes- moderate
Plot Valley- moderate
Wild Horse Estates- moderate
Clover Valley- rural
Goose Creek- rural
Independence Valley- rural

Eureka
Diamond Valley- moderate

Humboldt
Grass Valley- moderate
Orovada- low

Lander
Gilman Springs- moderate
Altamira Farms- rural
Carico Valley- rural
Smoky Valley- rural

Lincoln
Mt. Wilson- extreme

Pershing County
Grass Valley- moderate

Storey County
Six Mile- moderate

Washoe
Antelope Valley- high
Rancho Haven- high
Red Rock- high
Warm Springs Valley- high
Anderson Acres- moderate
Galena- moderate
Palomino Valley- moderate
Silver Knolls- moderate

Total Communities Rated	**242**
Extreme Rated Communities	**17**
High Rated Communities	**51**
Moderate Rated Communities	**103**
Low Rated Communities	**53**
Rural Communities (not rated but assessed)	**18**

The University of Nevada—Reno (UNR) Cooperative Extension coordinated a WUI summit in September 2007. The purpose of the meeting was to bring State, local and federal agencies together to provide information to communities that are rated as extreme risks. By promoting awareness, the intent was to stimulate the community's desire to mitigate the wildfire risk through a grassroots level approach. The members to the summit agreed to support the WUI and make it an annual event.

Due to Nevada's geography and environment, wildland fires will continue to occur. Increased public awareness, risk management, and control of new land development at the local level are necessary to mitigate this risk.

3.3.19.4 Vulnerability and Analysis of Potential Losses.

The analysis of this hazard is ongoing at UNR, BMG. The completion of this process will continue through February 2008. The data will be integrated into this plan upon its completion. The revision of the building stock in HAZUS will provide a tool to determine the potential losses from wildfire for facilities owned by each county and state.

The next iteration of the Plan will include this information.

Please see Section 3.5.2, table 3-18 for estimated losses to State facilities.

3.3.20 Windstorm *(Moderate Risk Hazard)*

3.3.20.1 *Nature*

Winds are horizontal flows of air that blow from areas of high pressure to areas of low pressure. Wind strength depends on the difference between the high- and low-pressure systems and the distance between them. Therefore, a steep pressure gradient causing strong winds can result from a large pressure difference or a short distance between a high- and low-pressure system, or a combination of these factors.

Strong and/or severe winds often precede or follow frontal activity, including cold fronts, warm fronts, and drylines. Generally, in the southwestern United States, frontal winds can remain at 20-30 mph for several hours and reach peak speeds of more than 60 mph. Winds equal to or greater than 57 mph are referred to as severe winds.

In addition to strong and/or severe winds caused by large regional frontal systems, local thermal winds are caused by the differential heating and cooling of the regional topography. In a valley/mountain system, as the rising ground air warms, it continues upslope as wind and is replaced by inflow from outside the valley. The intensity of the resulting wind depends on a number of factors, including the shape of the valley, amount of sunlight, and presence of a prevailing wind.

3.3.20.2 *History*

Wind and windstorms are common events in Nevada, especially during the winter and spring months. An example of high winds is the nighttime down-slope wind that blows out into the Reese River Valley at Austin. At times, when there is a large pressure change over a short distance, these winds become strong causing extensive damage.

Mobile homes, power lines, billboards, airplanes, vehicles, roofs and other structures have been damaged by severe winds. Due to the high incidence of damage to mobile homes, insurance companies, in Nevada have adopted policies that require tie downs. The Nevada Department of Commerce enforces regulations requiring mobile homes to be securely anchored (NRS 289.280).

The following list describes some extreme wind events in Nevada. Only those events during the l

- In the late 1860s a small smelter and mill were built in Dry Valley, not far from Echo Canyon in Echo State Park in Lincoln County. The small tent camp was called Moodyville and boasted a population of 60 in 1872. A severe windstorm destroyed the camp in 1873 and nothing remains of the site. While it is noted that this was a tent camp/town, it is an interesting record in that it is the only recorded event wherein a windstorm erase a (potential) town.

- On February 3, 1998 a down-slope windstorm occurred along the western side of the Paradise Range in northwestern Nye County, producing sustained winds estimated at 70-80 mph with gust approaching 100 mph in Gabbs located 90 miles southeast of Reno. Several mobile homes were either overturned or blown off their moorings and numerous mature trees were uprooted. Also, there was widespread structural damage to small buildings around the mining facility.

Figure 3-30 Picture of windstorm damage in Gabbs. NV Picture Courtesy of NOAA

- On December 14, 2002, a record-breaking windstorm howled through northern Nevada. Winds clocked at 82 mph in Reno causing widespread roof, tree, and fence damage. Approximately 140,000 customers in the Reno-Sparks area were without power after the storm.

- In December 2004, a trailer southbound on Old Highway 395 15 miles south of Reno was blown into the pathway of incoming traffic. The trailer was shredded. Another truck that had stopped for the collision was overturned by the winds. At least four other big rigs were toppled by gale-force winds that socked Washoe Valley.

- On September 16, 2006, a windstorm toppled the cranes on the Hoover Dam bypass project. The windstorm also knocked down 2,300 foot strands of steel cable. A construction site cleanup had to be completed before the engineers could continue the project. Highway 93 was closed for two days because of falling debris.

- December 26-27, 2006, Post-Christmas Windstorm: The strongest wind in over four years blasted across much of eastern California and western Nevada. Widespread gusts of 60-80 mph, with ridge top gusts over 160 mph along the Sierra Crest, resulted in many trees and some power lines blown down, especially in portions of the Lake Tahoe basin. In Washoe Valley, trucks overturned where a peak gust of 91 mph was measured. Isolated roof and fence damage occurred, and downed power lines sparked a few brush fires, which spread by the strong winds.

- December 27, 2006, Strong winds: A separate period of strong winds near Walker Lake during the early morning overturned two tractor trailers on Highway 95.

3.3.20.3 *Location, Severity, and Probability of Future Events*

In the *Hazard Risk Assessment Survey* and *County Hazard Mitigation Plans,* Carson City reported that high winds caused severe damage to mobile home structures. Churchill, Douglas, and Lincoln Counties reported that windstorms were a problem. Eureka County reported that there was significant damage to antennas and communication sites.

Washoe Valley, north of Carson City, reported frequent damaging winds in transportation corridors, especially near the center of the valley along U.S. Highway 395. The most recent example of high winds in the Washoe County area occurred late-December 2006.

In the *Tribal Hazard Mitigation Survey*, Shoshone-Paiute Tribes of Duck Valley considered this hazard as low. This tribal entity mentioned that there was some light structural damage due to this hazard.

Overall, windstorms are considered moderate-risk hazards in Nevada. Their consequences are likely to be small in scope compared to floods, earthquakes, and wildfires.

Due to our mountainous terrain, windstorms occur regularly and are widespread through the State of Nevada. This hazard usually occurs in the winter and spring months, though severe winds are know to occur at anytime. Additionally, high winds quite often accompany severe storms and thunderstorms. This is generally looked upon as a continuing problem. It is noted that as land development continues into those areas noted for severe wind events, property damage will continue to happen. This problem may require modification of building codes as well as public education.

The State Climatologist prepared the following data about winds in excess of 58 miles per hour in each county. The data is not relevant to state declarations but will assist each county in its preparedness and response planning. Wind event data for Storey and Lyon Counties was not found.

DEM has records from December, 2006 showing wind damage to Storey County's public and private infrastructure totaling $12,800. DEM also has records reflecting $92,900 in damages to Lyon County's public and private infrastructure.

Wind Events Greater Than 58mph

Location	**Number of Events**	**Average per Year**
Carson City	7	1.75

Churchill County:

Location	**Number of Events**	**Average per Year**
Dead Camel Mountain	53	2.94
Hawthorne	0	0.00
Fallon NAS	11	0.37

Clark County:

Location	Number of Events	Average per Year
Big Bend	18	2.00
Christmas Tree Pass	5	1.00
Desert NWR	60	15.0
Kyle Canyon	32	4.00
Mountain Springs	15	2.00
Red Rock	94	5.70
Las Vegas AP	2	0.07
Indian Springs	15	0.94
Nellis AFB	8	0.27

Douglas County:

Location	Number of Events	Average per Year
Fish Springs	18	0.9474
Mt. Como	21	6.0000

Elko County:

Location	Number of Events	Average per Year
Antelope Lake	18	1.24
Crane Springs	16	1.88
Independence Valley	1	0.33
Long Hollow	57	3.00
Lower Dixie	2	1.00
Red Point	47	4.70
Rock Spring Creek	26	1.68
Ruby Lake NWR	8	2.29
Ruby Valley	101	50.5
Spring Gulch	59	3.58
Spruce Mountain	33	1.65
Stag Mountain	9	1.00
Elko AP	11	0.37
Owyhee	2	0.14
Wells	3	0.60
Wildhorse Reservoir	5	0.27

Esmeralda County:

Location	Number of Events	Average per Year
Oriental Wash	9	0.47

Royston Hills	28	2.80

Eureka County:

Location	Number of Events	Average per Year
Bailey Ranch	80	7.27
Coils Creek	14	0.88
Combs Canyon	23	1.21
Emigrant Canyon	13	4.33
Flat Spring	141	23.5
Palisade	86	12.3
Eureka	9	0.33

Humboldt County:

Location	Number of Events	Average per Year
Burma Spring	11	1.47
Dry Canyon	18	0.92
Morey Creek	259	25.9
Texas Springs	54	3.27
Winnemucca	2	0.07

Lander County:

Location	Number of Events	Average per Year
Argenta	18	6.00
Austin	78	14.2
Beacon Light	12	0.75
Desatoya Mountain	40	2.11
Red Butte	14	0.88
Battle Mountain	9	0.56

Lincoln County:

Location	Number of Events	Average per Year
Buckhorn Ranch	13	2.17
Caliente	13	2.60
Coyote Wash	23	1.21
Immigration Wash	13	0.81
Kane Springs	195	10.3
Toquop Wash	4	0.50

Mineral County:

Location	Number of Events	Average per Year
Brawley Peaks	168	7.47

Nye County:

Location	Number of Events	Average per Year
Currant Creek	44	2.67
Garden Valley	23	2.30
Pahrump	96	9.60
Pancake	48	4.80
San Juan	2	0.50

Pershing County:

Location	Number of Events	Average per Year
Bluewing Mountain	21	1.08
Coyote Canyon	29	3.87
Siard	32	1.56
Lovelock	21	0.70

Washoe County:

Location	Number of Events	Average per Year
Barrel Springs	18	1.29
Buffalo Creek	15	1.00
Catnip Mountain	53	2.47
Desert Springs	57	2.92
Fox Mountain	7	0.44
Juniper Springs	4	0.29
Little Valley	47	11.8
Reno AP	8	0.27
Stead	0	0.00

White Pine County:

Location	Number of Events	Average per Year
Alligator Ridge	110	6.67
Cedar Pass	14	0.85
Ely	10	1.67

Mather	305	17.4
McGill Junction	37	3.36
Paris	2	0.67

3.3.21 Nevada Climate Office Storm Event Summary by County

The Nevada Climate Office under the direction of Dr. Jeff Underwood provided the following summary of information derived from the National Climate Data Center's website. The information, although not relevant to a state declaration, is valuable to Nevada's counties in their planning for response.

Storm Events Reported by the National Climate Data Center as Damage Causing (1959-2006).

Carson City

Total damage reported as $4,701,000 with 2 people being injured.

By Type

- Hail: 1
- Tornado: 1
- Flood: 2
- Heavy Rain: 4
- Thunderstorm Wind: 3

Churchill County

Total damage reported as $11,000 with 1 person being injured.

By Type

- Dust Devil: 1
- Hail: 4
- Thunderstorm Wind: 8
- Funnel Cloud: 1
- Tornado: 4
- Lightning: 1-

Clark County

Total damage reported as $103,964,000 with 10 deaths, and 30 people injured.

By Type

- Flash Flood: 67
- Hail: 46
- Heat: 1
- High Wind: 6
- Tornado: 11
- Urban/Small Stream Flood: 8
- Wildfire: 1
- Dust Storm: 1
- Funnel Cloud: 3
- Heavy Rain: 3
- Heavy Snow: 1
- Lightning: 13
- Thunderstorm Wind: 37
- Whirlwind:
- Winter Storm: 2

Douglas County

Total damage reported as $2,014,000 with 2 people being injured.

By Type

- Flash Flood: 3
- Heavy Rain: 4
- Lightning: 4
- Thunderstorm Wind: 3
- Dust Devil: 1
- Hail: 3
- High Wind: 5
- Tornado: 13

Elko County

Total damage reported as $663,000 with 30 people being injured.
By Type

- Dry Microburst: 2
- Flash Flood: 14
- Funnel Cloud: 4
- Heavy Snow: 49
- Tornado: 13
- Urban/Small Stream Flood: 2
- Winter Storm: 4
- Blizzards: 2
- Dust Storm: 1
- Flood: 5
- Hail: 22
- High Wind: 14
- Thunderstorm Wind: 59
- Wildfire: 1
- Winter Weather/Mix: 1

Esmeralda County

Total damage reported as $40,000 with 0 injuries.
By Type

- Tornado: 1
- Flash Flood: 3

Eureka County

Total damage reported as $100,000 with 0 injuries.
By Type

- Hail: 6
- High Wind: 1
- Thunderstorm Wind: 7
- Flash Flood: 6
- Heavy Snow: 1
- Tornado: 3
- Winter Storm: 1

Humboldt County

Total damage reported as $123,000 with 0 injuries.
By Type

- Dust Storm: 1
- Hail: 6
- High Wind: 8
- Thunderstorm Wind: 19
- Winter Storm: 2
- Flash Flood: 1
- Heavy Snow: 9
- Tornado: 5
- Wildfire: 1
- Winter Weather/Mix: 1

Lander County

Total damage reported as $9,000 with 1 person being injured.
By Type

- Dust Storm: 1
- Flood: 5
- Heavy Snow: 39

Lincoln County

Total damage reported as $20,990,000 with 0 injuries.
By Type

- Flood: 1
- Heavy Snow: 12
- Tornado: 6

Tornado: 1
Flash Flood: 2
Hail: 14
High Wind: 4
Thunderstorm Wind: 21
Winter Storm: 6
Winter Weather/Mix: 1

Flash Flood: 15
Hail: 6
High Wind: 4
Thunderstorm Wind: 2
Winter Storm: 1

Lyon County

Total damage reported as $593,000 with 1 death, and 1 person injured.

By Type

Flash Flood: 4
Flood: 3
Funnel Cloud: 1
Hail: 5
High Wind: 1
Ice on Road: 1
Tornado: 4
Thunderstorm Wind: 16

Mineral County

Total damage reported as $649,819,000 with 8 deaths, and 63 people injured.

By Type

Blizzards: 1

Dense Fog: 2
Dust Storm: 2
Extreme Cold: 1
Flash Flood: 6
Flood: 2
Fog: 2
Hail: 4
Heat: 1
Heavy Rain: 2
Heavy Snow: 46
High Wind: 63
Thunderstorm Wind: 1
Urban/Small Stream Flood: 1
Winter Storm: 1

Nye County

Total damage reported as $3,563,000 with 1 death, and 2 people injured.

By Type

Flash Flood: 11
Hail: 2
Heavy Snow: 12
High Wind: 13
Lightning: 2
Tornado: 4
Thunderstorm Wind: 18
Urban/Small Stream Flood: 1

Pershing County

Total damage reported as $150,000 with 0 injuries.

By Type

Flash Flood: 1
Flood: 1
Hail: 1
Thunderstorm Wind: 14

Storey County

Total damage reported as $3,477,000 with 0 injuries.

By Type

Flash Flood: 5
Flood: 1
Hail: 2

White Pine County

Total damage reported as $145,000 with 1 person injured.

By Type

Dust Storm: 1
Flash Flood: 7
Flood: 1
Fog: 1
Funnel Cloud: 1
Hail: 5
Heavy Snow: 38
High Wind: 7
Tornado: 7
Thunderstorm Wind: 11
Winter Storm: 2
Winter Weather/Mix: 1

Washoe County

Total damage reported as $654,446,000 with 5 deaths, and 56 people injured.

By Type

Dense Fog: 4
Dust Devil: 1
Extreme Cold: 1
Flash Flood: 12
Flood: 7
Funnel Cloud: 4
Hail: 23
Heat: 1
Heavy Rain: 16
Heavy Snow: 4
High Wind: 20
Lightning: 2
Other: 2
Tornado: 11
Thunderstorm Wind: 42
Urban/Small Stream Flood: 4
Wildfire: 1
Winter Storm: 4
Winter Weather/Mix: 1

3.4 VULNERABILITY ASSESSMENT

The next step of risk assessment is the vulnerability assessment. This section includes assessing vulnerability by jurisdiction and assessing vulnerability of State facilities.

3.4.1 Overview

The vulnerability assessment completed included only the four "high" rated hazards: Dam Failure, Flood, Earthquake, and Wildland Fire. The data compiled was derived from approved local hazard mitigation plans, responses to the hazard survey, UNR's assessment as well the CWPP's for each county.

Inconsistency between the State's assessment and the local assessment exist. Coordination and further analysis of both the local and the State data is necessary to arrive at the correct risk and vulnerability determinations. The resolution of the inconsistencies is a high priority for the Subcommittee.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Assessing Vulnerability by Jurisdiction

Requirement §201.4(c)(2)(ii): The State risk assessment **shall** include an overview and analysis of the State's vulnerability to the hazards described in this paragraph (c) (2), based on estimates provided in local risk assessments as well as the State risk assessment. The State **shall** describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. … .

Element

Does the **new or updated** plan describe the State's vulnerability based on estimates provided in local risk assessments as well as the State risk assessments?

Does the **new or updated** plan describe the State's vulnerability in terms of the jurisdictions most threatened and most vulnerable to damage and loss associated with hazard event(s)?

Does the updated plan explain the process used to analyze the information from the local risk assessments, as necessary?

Does the updated plan reflect changes in development for jurisdictions in hazard-prone areas?

Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

3.4.2 Analysis of State and Local Risk Assessment

The risk analysis was completed exclusively for the four high rated hazards. The UNR, BMG was analyzed The following list is the process used by the University of Nevada, Reno to analyze the risk of flood, earthquake, and dam failure, and wildfire.

Severe weather is a major factor in all hazards. For this reason, and after discussion with the NHMPC, the assessment includes the severe weather factor. The assessment was done statewide but on a county-by-county basis. As stated in Section 3.2.5, the Hazard Mitigation Task Force reviewed the risk assessments found in the FEMA-approved local and tribal hazard mitigation plans.

That data was integrated into each of the profiled hazards in this Plan. Additional sources of data for the analysis include:

- State and federal emergency declarations
- The 2004 State Hazard Mitigation Plan
- The Community Wildfire Protection Plans
- Other documents cited in Section 7 – Information About Each County's Risk Assessment
- Data from legal approved Mitigation Plans provided under the Location, Severity, and Probability of Future Occurrences section of each hazard.
- Maps of flood and dam failure vulnerability found in major rivers – found in Appendix K
- Maps of earthquake vulnerability – found in Appendix H

The Subcommittee is aware additional compilation of data, analysis and summarization of data is necessary in this plan, most notably for the wildland fire and dam failure high hazards. The Subcommittee with support from the lead agencies and especially UNR, BMG, will continue to enhance the content and quality of this plan. The established meetings will ensure this work is done continuously through the three-year grace period.

Earthquakes

Earthquake-related information will be derived from the United States Geological Survey, the Nevada Seismological Laboratory, the Nevada Bureau of Mines and Geology, and FEMA's HAZUS loss-estimation model, which incorporates data from the other sources.

The compilation utilized the county comparative earthquake scenarios produced by the level 2 update project, additional county and community scenarios as required for the State Mitigation Plan Update, and probabilistic earthquake analysis generated by the U.S. Geologic Survey and HAZUS-MH software. This provided a summary of the possible losses (economic, human, and infrastructure) that may be expected from potential earthquake events in Nevada as well as probabilities for comparable events to actually occur. Data theme outline and planned deliverables are listed below.

Earthquakes

1. Define spatial boundaries of analysis

State of Nevada.
Locate and map critical state facilities.

2. Describe the hazard

Describe potential earthquake losses to state facilities both regionally and locally.
Summarize potential earthquake losses to state facilities both regionally and locally.
Define extremes of the earthquake potential.
Define the general impacts of earthquakes.
Summarize potential earthquake losses to Nevada.

3. Describe the data sets available for analysis

Hazus level one data.
Hazus level two data currently being developed.
U.S. Census 2000 data and local updates.
Digital elevation data (DEM) from USGS (30 and 10 meter)
Earthquake fault data (NBMG and USGS)
Critical state facilities (digital version will be developed by this project)

4. Methods to assess hazard and impacts within jurisdiction

a. Identify the hazard for Nevada.

Analysis of existing data from NBMG archives.
Identification of potential earthquake risks near Nevada communities.
Input from geologists, engineers, planners, and other officials.

b. Profiling the hazard for Nevada.

Look at past occurrence of earthquakes in Nevada.
Define spatial distribution of earthquake faults.
Estimate earthquake probability.
Use ArcGIS/HAZUS to model and map the earthquake hazard within Nevada.

c. Assess earthquake vulnerability within Nevada.

Analyze earthquake fault locations within Nevada.
Analyze known earthquakes.
Identify populations at risk (HAZUS-MH, Census Tiger Files)
Identify property at risk

5. Deliverables

a. Maps of potential earthquake hazards in Nevada (Appendix H)
b. Statistical analysis of hazard (provided with graphics, maps, and text) (Section 3.3.4)

Dams

The Nevada Department of Conservation and Natural Resources, Division of Water Resources, State Engineers Office, maintains a digital dam database for Nevada that contains location, size, and a basic hazard rating. Utilizing this database we will identify potential at-risk communities that are located below these facilities and summarize the potential economic, human, and infrastructure losses for selected sites that could be at risk due to a major dam failure. The data-theme outline and planned deliverables are listed below. Appendix I includes a list of existing dams in Nevada.

Dams

1. Define spatial boundaries of analysis - *Pending the HAZUS update*

State of Nevada.
Locate and map critical state facilities.
Locate and map current dams in Nevada.

2. Describe the hazard – See Section 3.3.2

Describe potential losses to critical state facilities caused by dam failure.
Summarize potential losses to critical state facilities caused by dam failure. Table 3-17
Describe the general impacts associated with dam failure.

3. Describe the data sets available for analysis - *Pending the HAZUS update*

Hazus level one data.
Hazus level two data currently being developed.
U.S. Census 2000 data and local updates.
Digital elevation data (DEM) from USGS (30 and 10 meter).
Dam location list from Nevada State Engineers Office.
Critical state facilities (digital version will be developed by this project).

4. Methods to assess hazard and impacts within jurisdiction

a. Identify the hazard for Nevada.

Analysis of existing dam locations.
Identification of potential dam failure risks near Nevada communities.
Input from geologists, engineers, planners, and other officials.

b. Profiling the hazard for Nevada.

Look at past occurrence of dam failures in Nevada.
Define spatial distribution of dam facilities in Nevada.
Use ArcGIS to model and map dam locations within Nevada.

c. Assess dam failure vulnerability within Nevada.

Identify populations at risk (HAZUS-MH, Census Tiger Files)
Identify property at risk

5. Deliverables

a. Map of dam locations in Nevada. *Pending the HAZUS update*

Other Natural Hazards

For other, low- to medium-risk natural hazards, NBMG (Dr. Jonathan Price) reevaluated and updated the existing plan to incorporate new information on geological hazards, including subsidence, collapsible and expansive soils, and landslides.

Riverine Floods – See Section 3.3.8

1. Define spatial boundaries of analysis

State of Nevada.
Locate and map critical state facilities. *Pending the HAZUS update*

2. Describe the hazard

Describe potential flood losses to state facilities both regionally and locally.
Summarize potential flood losses to state facilities both regionally and locally.
Define extremes of flood potential in Nevada.
Define the general impacts of floods.
Summarize potential flood losses to Nevada.

3. Describe the data sets available for analysis

Hazus level one data.
Hazus level two data currently being developed.
U.S. Census 2000 data and local updates.
Digital elevation data (DEM) from USGS (30 and 10 meter)
Historic flood data (NBMG and USGS)
Critical state facilities (digital version will be developed by this project)

4. Methods to assess hazard and impacts within jurisdiction

a. Identify the hazard for Nevada.
- Analysis of existing data from NBMG archives.
- Identification of potential flood risks associated with Nevada communities.
- Input from climatologists, engineers, planners, and other officials.

b. Profiling the hazard for Nevada.
- Look at past occurrence of floods in Nevada.
- Estimate flood probability.
- Use ArcGIS/HAZUS-MH to model and map the flood hazard within Nevada.

5. Deliverables

a. Maps of potential flood hazards in Nevada. Appendix K
b. Statistical analysis of hazard (provided with graphics, maps, and text)

Wildland Fire – The analysis of this hazard is ongoing at UNR, BMG. The completion of this process will continue through February 2008. The data will be integrated into this plan upon its completion.

Define spatial boundaries of analysis

State of Nevada.
Locate and map critical state facilities. *Pending the HAZUS update*

2. Describe the hazard

Describe potential wildland fire losses to state facilities both regionally and locally. – *Pending the HAZUS update*
Summarize potential wildland fire losses to state facilities both regionally and locally. – *Pending the HAZUS update*
Define extremes of wildland fire potential in Nevada.
Define the general impacts of wildfire.
Summarize potential wildfire losses to Nevada.

3. Describe the data sets available for analysis

Hazus level one data.
Hazus level two data currently being developed.
U.S. Census 2000 data and local updates.
Digital elevation data (DEM) from USGS (30 and 10 meter)
Historic wildfire data (NBMG and NDF)
Critical state facilities (digital version will be developed by this project)

4. Methods to assess hazard and impacts within jurisdiction

a. Identify the hazard for Nevada.

Analysis of existing data from NBMG and NDF archives.
Identification of potential wildfire risks associated with Nevada communities.
Input from climatologists, forestry staff, planners, and other officials.

b. Profiling the hazard for Nevada.

Look at past occurrence of wildfire in Nevada.
Estimate wildfire probability.
Use ArcGIS/HAZUS-MH to map the wildfire hazard within Nevada.

5. Deliverables

a. Maps of potential wildfire hazards in Nevada.
b. Statistical analysis of hazard (provided with graphics, maps, and text)

3.4.3 Threat Ranking of Local Jurisdictions

The Nevada Hazard Mitigation Planning Committee recognizes that the rankings created by the counties themselves are not entirely consistent with the statewide assessments of hazards and risks presented earlier in this section. For example, Lincoln County does not appear in the top 9 of Nevada's 17 counties in any of the four approaches to earthquake vulnerability using HAZUS, as presented in Section 3.3.4.4. As this plan is updated, the State will work with the counties to convey the most up-to-date information from risk or vulnerability assessments, such as the HAZUS results presented in Sections 3.3.4.4 for earthquakes, Section 3.3.8.4 for floods, and Section 3.3.19.3.4 for Wildfire.

Local jurisdiction vulnerability to the four high-ranked hazards are found in the sections listed below:

- Dam Failure and Flood — Section 3.3.8.4
Tables 3 -11 and 3-12
- Earthquake — Section 3.3.4.4
Tables 3-6 and 3-7
- Wildfire — Section 3.3.19.4

The following table contains the most threatened jurisdictions by hazard as analyzed:

Table 3 -15
Threat Ranking

Local Jurisdiction	Wildfire Risk			Earthquake Risk			Flood Risk			Dam Failure Risk			Most Threatened Ranking
	L	M	H	L	M	H	L	M	H	L	M	H	
Carson City			√			√			√	√			=16
Clark			√	√					√	√			=12
Churchill		√				√	√				√		=12
Douglas			√			√			√	√			=16
Elko			√		√		√			√			=10
Esmeralda		√		√			√			√			=6
Eureka		√		√			√			√			=10
Humboldt		√			√			√		√			=10
Lander			√	√			√			√			=8
Lincoln			√			√			√	√			=16
Lyon		√		√			√			√			=8
Mineral		√		√			√			√			=6
Nye			√			√			√	√			=16
Pershing			√		√		√			√			=10
Storey			√			√	√			√			=12
Washoe			√			√			√	√			=16
White Pine		√				√	√			√			=10

Risk Values: L=1, M=3, H=5

According to the above table the most threatened jurisdictions are the following:

- ►Carson City
- ►Lincoln County
- ►Washoe County
- ►Douglas County
- ►Nye County

3.4.4 Changes in Development

Population Growth in Nevada:

The table below is derived from the U.S. Census Bureau's website
http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US32&-_box_head_nbr=GCT-T1-R&-ds_name=PEP_2006_EST&-_lang=en&-format=ST-2S&-_sse=on

It provides a ranking of growth by county.

Rank		July 1, 2006	July 1, 2005	July 1, 2004	Pop Difference 2004 to 2007	% gained
	Nevada	2,495,529	2,412,301	2,332,484	163,045.00	7%
	COUNTY					
1	Clark County	1,777,539	1,709,364	1,648,291	129,248.00	5%
2	Washoe County	396,428	389,775	380,564	15,864.00	1%
3	Carson City	55,289	55,877	55,939	(650.00)	0%
4	Lyon County	51,231	47,344	43,317	7,914.00	0%
5	Elko County	47,114	45,576	44,464	2,650.00	0%
6	Douglas County	45,909	46,046	45,876	33.00	0%
7	Nye County	42,693	40,395	37,643	5,050.00	0%
8	Churchill County	25,036	24,680	24,294	742.00	0%
9	Humboldt County	17,446	17,155	16,901	545.00	0%
10	White Pine County	9,150	8,919	8,532	618.00	0%
11	Pershing County	6,414	6,390	6,381	33.00	0%
12	Lander County	5,272	5,105	5,079	193.00	0%
13	Mineral County	4,868	4,896	4,917	(49.00)	0%
14	Lincoln County	4,738	4,517	4,323	415.00	0%
15	Storey County	4,132	4,045	3,726	406.00	0%
16	Eureka County	1,480	1,412	1,418	62.00	0%
17	Esmeralda County	790	805	819	(29.00)	0%

The greatest increase is found in Clark and Washoe Counties. This growth trend is likely to continue as employment is found in the two most populated and industrialized counties. This rapid growth represents challenges to the planning of land use especially as communities within the top 5 counties compete for available qualified employees/staff in order to enforce existing codes and regulations. Enforcement of codes, regulations become cumbersome with rapid growth and the communities are ultimately responsible for this enforcement following the Home rule found in Nevada. A challenge, especially for wildfire and flood hazards is the stewardship of federally owned lands which impacts private land.

- The increase in population places more people at risk for the high risk hazards, earthquake, wildfire, dam failure and flood.
  - Building along faults, locations prone to superior shaking during and earthquake.
  - Development of residential locations within areas prone to wildfire without the required defensible space, water storage, or building materials
  - Flood and dam failure concerns are linked as the dams are built along the creeks, rivers and waterways.
  - Nevada is an arid state, de-watering issues such as land subsidence and fissures are becoming a concern for local and state government.

Challenges to land use planning:

- Enforcement – lack of staffing in rural counties due to the county's economic, administrative and technical capabilities.
- Home rule – State laws are not effective until counties and cities adopt and enforce them.
- Federal ownership of land – although sales of land have been frequent, over 85% of the land in Nevada is federal property. It is often the case with new development that it is flanked in several directions by federally owned land making the mitigation of hazards cumbersome.

  - *Possible solutions 1)* Provide incentives to communities for providing the added enforcement of existing codes and for the creation of stricter requirements 3) enhancement of land use planning capabilities 4) Water reclamation projects, 5) Development restrictions on water saving features to new homes 6) Incentives for new and existing homeowners to mitigate the risk to their homes from the possible hazards. 6) Increased public awareness for all hazards.

As part of updating this Plan, the most recent version of HAZUS was run for a series of earthquake and flood scenarios. An earthquake that has happened in the geological past was chosen on a fault near each county seat. Results for these earthquakes are discussed and tabulated in Section 3.3.4.4. For wildfires, considering that all counties in Nevada are subject to severe droughts and wildfires, the HAZUS building-exposure information in Table 3-8 in Section 3.3.4.4 provides a proxy for maximum potential fire loss. For floods, HAZUS was run for 100-year floods on the major rivers within the state (Carson, Humboldt, Muddy, Truckee, Virgin, and Walker. Results are discussed and tabulated in Section 3.3.8.4. For potential failures of major dams on the Truckee (and its tributaries in California), Carson, and Humboldt Rivers, the 100-year flood values serve as a proxy for potential losses. HAZUS scenarios for failures of the two dams on the Colorado River in Nevada (Hoover and Davis) have not been analyzed; Hoover Dam is discussed in Section 3.3.2.3

3.5 Assessing Vulnerability of State Facilities

The requirements for assessing vulnerability of State facilities, as stipulated in the DMA 2000 and ithe regulations implementing the act, described below.

DMA 2000 REQUIREMENTS: ASSESSING VULNERABILITY
Assessing Vulnerability of State Facilities
Requirement §201.4(c)(2)(ii): State owned critical or operated facilities located in the identified hazard areas shall also be addressed … .
Element
Does the **new or updated** plan describe the types of State owned or operated critical facilities located in the identified hazard areas?
Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

3.5.1 Types of State Owned or Operated Critical Facilities in Hazard Areas

The following discussion of state owned facilities is taken from the October 2004 version of the Standard Multi-Hazard Mitigation Plan. Tables 3-16, 3-17 and 3-18 in Section 3.5.2 are still valid. They will be reviewed and updated when the new HAZUS version is available to process updated information.

The figures remain the same with an average building cost of $200 per square foot. Again, these tables will be updated with the release of the new HAZUS version which will allow us to process the changes made to the out-of –the box information found currently in the HAZUS data base.

Definition

State owned critical facilities are those that will impact the delivery of vital services, can cause greater damages to other sectors of the community or can put special populations at risk. However, the State recognizes that it is also important to focus on non State owned critical assets that, were they impacted by a disaster would have the greatest negative impact on life and the economy in Nevada. The next iteration of the plan will identify and evaluate those critical assets that are imperative to the sustainability of the State of Nevada.

Critical Facilities Tables
For reference, the following tables use the codes below.

Critical Column:

C = Critical Facility; **N** = Not Critical Facility; **U** = Criticality Undetermined

Flood Zone Column:

Zone A - Area subject to inundation by the 100-year flood determined by approximate study methods.

Zone AE - Area subject to inundation by the 100-year flood with base flood elevations determined by detailed hydraulic analyses.

Zone AH - Area subject to inundation by the 100-year flood (usually areas of ponding) where average flood depths are between 1 and 3 feet.

Zone AO - Area subject to inundation by the 100-year flood (usually sheet flow on sloping terrain) where average flood depths are between 1 and 3 feet.

Zone B or Shaded X - Area subject to inundation by the 500-year flood; area subject to inundation by the 100-year flood where average flood depths area less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 100-year flood.

Zone C or X - Area of minimal flooding determined to be outside of the 500-year floodplain.

Zone D - Area in which flood hazard has not been determined.

3.5.2 Estimating Potential Losses by Jurisdiction

The requirements for estimating potential losses by jurisdiction, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: ESTIMATING POTENTIAL LOSSES

Estimating Potential Losses by Jurisdiction

Requirement §201.4(c)(2)(iii): The State risk assessment **shall** include an overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment.

Requirement §201.4(d): **Plan must be reviewed and revised to reflect changes in development . . .**

Element

Does the **new or updated** plan present an overview and analysis of the potential losses to the identified vulnerable structures?

Are the potential losses based on estimates provided in local risk assessments as well as the State risk assessment?

Does the updated plan reflect the effects of changes in development on loss estimates?

Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

As part of updating this Plan, the most recent version of HAZUS was run for a series of earthquake and flood scenarios. An earthquake that has happened in the geological past was chosen on a fault near each county seat. Results for these earthquakes are discussed and tabulated in Section 3.3.4.4. For wildfires, considering that all counties in Nevada are subject to severe droughts and wildfires, the HAZUS building-exposure information in Table 3-8 in Section 3.3.4.4 provides a proxy for maximum potential fire loss. For floods, HAZUS was run for 100-year floods on the major rivers within the state (Carson, Humboldt, Muddy, Truckee, Virgin, and Walker. Results are discussed and tabulated in Section 3.3.8.4. For potential failures of major dams on the Truckee (and its tributaries in California), Carson, and Humboldt Rivers, the 100-year flood values serve as a proxy for potential losses. HAZUS scenarios for failures of the two dams on the Colorado River in Nevada (Hoover and Davis) have not been analyzed; Hoover Dam is discussed in Section 3.3.2.3

3.5.3 Estimating Potential Losses of State Facilities

The requirements for estimating potential losses of State facilities, as stipulated in the DMA 2000 and its implementing regulations, are described below. The Division of Water Resources estimates the dam failure losses will be similar to flood losses. Therefore, we do not present specific data for dam failure. Potential losses to State facilities were estimated for the four high-ranking hazards exclusively.

DMA 2000 REQUIREMENTS: ESTIMATING POTENTIAL LOSSES

Estimating Potential Losses of State Facilities

Requirement §201.4(c)(2)(iii): The State **shall** estimate the potential dollar losses to State-owned or -operated buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.4(d): **Plan must be reviewed and revised to reflect changes in development . . .**

Element

Does the **new or updated** plan present an estimate of the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities in the identified hazard areas?

Source: FEMA, Standard State Hazard Mitigation Plan Review Crosswalk 2006

3.5.3.1 Earthquake Loss estimation for state facilities

The University Nevada, Reno (UNR), Bureau of Mines and Geology (BMG) calculated the losses listed below using the identified ***"Nevada State Owned Building List"*** data found in the 2004 SHMP, and using the same replacement value of $200 per square foot.

1. All State buildings listed equal 18,160,364 sq. ft.
2. Critical State Buildings equal 17,144,729 sq. ft.
3. Replacement value all buildings $3,632,072,800.
4. Replacement value Critical buildings $3,428,945,800.

Please see Table 3-16 for specific information.

UNR's BMG ran a probabilistic HAZUS run for Nevada annualized over a 100-yr period. A HAZUS run using the out-of-the box default data, which does not include many State or local government structures, produced an annualized loss rate of 0.00044213 or 0.044213 percent. This came to $52,182,778 per year when calculated against the total dollar value of the existing building stock for Nevada as identified in HAZUS.

Using this loss rate, calculating it against the values obtained from the mitigation report table, it results in an annualized rate of loss of $1,605,833 for all state buildings listed and $1,516,025 for critical state buildings.

A similar run, with a ratio approach to obtain potential structural and nonstructural loss for critical State buildings in the Reno area in the event of a single 7.1 earthquake yields a loss of - $13,508,414 and for the Las Vegas area in the event of a 6.9 earthquake - $4,371,721.

In the words of the State Seismologist, "Although the average annualized loss to critical State facilities predicted from this HAZUS analysis is only $1.5 million per year, a single likely earthquake in the Reno-Carson City area (magnitude 7.1 on the Carson Range frontal fault zone) is predicted to cause $13.5 million in damage to critical State facilities. A single likely earthquake in the Las Vegas area (magnitude 6.9 on the Frenchman fault) is predicted to cause $4.4 million in damage to State critical facilities."

3.5.3.2 Loss Estimation for Flood and Dam Failure for state facilities

The Subcommittee agreed to use the $200 per square foot replacement value for the calculation of losses resulting from buildings located within the 100 and 500-year flood zone. The State Flood Insurance Program Manager, based on historical data, concluded a building loss of approximately 30% for buildings located within the 100-year flood zone and 10% for those located in the 500-year flood zone. Based on the above data, the estimated losses for State-owned critical and non-critical facilities during a 100-year and 500- year flood are at the end of the Flood Vulnerability and Loss Estimation table. Please see Table3-17 for the results of the Flood and Dam Failure loss estimates.

3.5.3.3 Loss Estimation for Wildland/Urban Interface Fires for state facilities

The members of the Planning Subcommittee agreed to use the cost of $200 sq ft for building a structure as the value to calculate losses in State buildings due to a fire. To cover the value of contents, add 50 percent to the total cost based on historical data, an average cost to include0 cleaning of smoke damage, loss of function, equipment, and supplies. The formula is Loss = (Area X $200) + ((Area X $200) X .50). Please see the Table 3-18 for the calculation of estimated losses as discussed above.

In consultation with the Nevada Division of Forestry, the loss to wildland is based on the use of the land. Each one of the different uses, Wildlife Habitat, Forage/Grazing (AUM's) Recreation (hiking), Hunting/Fishing, Timber Watershed (Storage and Infiltration) and Aesthetics, has its own value. A good strategy for the State is to complete a survey to determine the use of the land owned and managed by the State. The acres owned and or managed by the State approximate 0.4 percent of Nevada's total acreage. Please see the State Bureau of Lands website http://dcnr.nv.gov/nrp01/table1-3.htm for details. To determine the vulnerability of specific State owned building, an in depth survey is necessary. A cursory review of state owned facilities and their location was done by the Division of

Forestry. The results of the review provided a low, medium and high risk rating for all state facilities. It is the intent of the Subcommittee to use HAZUS updated building stock data, once it is updated, and assign the appropriate rating to the critical facilities, determine a value for each facility and create a revised table with appropriate loss estimations for the next iteration of this plan. The Division of Risk Management, Buildings and Grounds as well as State Public Works Board have agreed to review and update the information accordingly during the quarterly Subcommittee meetings.

The data for the facilities at risk of wildfire in each county is found in the respective CWPP. However, analysis of cost for each of the facilities and its criticality is necessary and will be a task for taken on by the update of the HAZUS version which will allow for the inclusion of new building stock data for each county.

Table – 3-16
STATE OWNED CRITICAL FACILITIES AND EARTHQUAKE VULNERABILITY

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Alamo	Trans	Maint	Fuel Depot		1976	215	C	High
Alamo	Trans	Maint	Maintenance Station		1976	7222	C	High
Anderson	CNR	Wildlife	Fire station		1940	0	C	High
Austin	CNR	Wildlife	Office		0	0	C	High
Austin	Trans	Maint	Maintenance station		1987	6660	C	High
Carson City	Admin	B & G	Blasdel	209 E. Musser St.	1956	41679	C	High
Carson City	Admin	B & G	Buildings & Grounds	406 E. Second St.	0	0	C	High
Carson City	Admin	B & G	Capitol	101 N. Carson	1870	54778	C	High
Carson City	Admin	B & G	Education (Old Fremont School)	700 East 5th Street	0	0	C	High
Carson City	Admin	B & G	Governor's Mansion	600 Mountain St.	1907	19361	C	High
Carson City	Admin	B & G	Kinkead	505 East King Street	1974	84966	C	High
Carson City	Admin	B & G	Octagon, Capitol Annex	101 N. Carson	1906	9864	C	High
Carson City	Admin	B & G	Old Carson City Courthouse	198 N. Carson Street	1920	14680	C	High
Carson City	Admin	B & G	Old Supreme Court	100 N. Carson St.	0	0	C	High
Carson City	Admin	B & G	Old Supreme Court & Library (Hero's Me	198 S. Carson St.	1935	26299	C	High
Carson City	Admin	B & G	Paul Laxalt State Building (Tourism)	401 N. Carson St.	1891	19076	C	High
Carson City	Admin	B & G	Supreme Court	201 S. Carson St.	1991	118900	C	High
Carson City	Admin	CCYC	Clear Creek Youth Center		1960	67872	C	High
Carson City	Admin	Mail	Printing Office (old)	402 E. Second St.	0	0	C	High
Carson City	Admin	Mail	State Mail Bldg Remodel	Third Street	1996	0	C	High
Carson City	Admin	MtrPool	Motor Pool	750 E. King St.	1988	3987	C	High
Carson City	Admin	Print	Printing Office	301 S. Stewart St.	1963	24869	C	High
Carson City	CA	Indian	Indian Hills Museum Warehouse	2061 Topsy Lane	1980	15440	C	High
Carson City	CA	Library	State Library	100 S. Stewart St.	1993	250507	C	High
Carson City	CA	Mus&Hist	Director's Office Building	708 N. Curry Street	1910	1500	C	High
Carson City	CA	Mus&Hist	Nevada State Museum	600 N. Carson St.	1871	43099	C	High
Carson City	CA	Museum	Museum Warehouse/Textile Center	2351 Arrowhead Dr.	1960	6000	C	High
Carson City	CA	NSRM	V&T Interpretive Center	2180 S. Carson St.	1988	53536	C	High
Carson City	CNR	Forestry	Genoa Station		1900	0	C	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Carson City	CNR	Forestry	Washoe Forestry HQ	123 W. Nye Ln.	1979	0	C	High
Carson City	Correct	HonCamp	Honor Camp		0	0	C	High
Carson City	Correct	NNCC	Main Gate House, Corrections Facility	1721 Snyder Ave.	1973	279200	C	High
Carson City	Correct	NNCC	Regional Medical Facility (Unit 8)	1750 Snyder	1993	61138	C	High
Carson City	Correct	NNCC	Visitor's Center II, M-13		1974	4768	C	High
Carson City	Correct	NNCC	Yard office, M-20		0	196	C	High
Carson City	Correct	NNHC/OLD	Conservation Camp Warehouse		1986	1152	C	High
Carson City	Correct	NNHC/OLD	Conservation Camp, Main office		1983	1296	C	High
Carson City	Correct	NNHC/OLD	Sewage Ejection Pumphouse		0	0	C	High
Carson City	Correct	NSP	Corrections Facility	3301 East 5th St. PO Box 607	1925	195322	C	High
Carson City	Correct	NSP	Work Shops		1950	3877	C	High
Carson City	Correct	RMF	Regional Medical Facility		1993	63000	C	High
Carson City	Correct	WSCC	80 bed pre-fab housing	PO BOX 7000	1980	6104	C	High
Carson City	Correct	WSCC	Admin & Housing/Gatehouse/Education	3301 E. 5th St.	0	100442	C	High
Carson City	DETR	ESD	State Administrative Office	500 E. Third St.	1960	30924	C	High
Carson City	DOIT	FacMgmt	Computer Facility	575 E. Third St.	1970	12336	C	High
Carson City	HumRes	NNCH	Administration/Cottages/Garage	711 E. 5th St.	0	28578	C	High
Carson City	Legis	Legis	Legislative Council Bureau Office		0	29207	C	High
Carson City	Legis	Legis	Legislature Building	401 S. Carson St.	0	183836	C	High
Carson City	Legis	Legis	Parking Garage	S. Stewart St.	1990	144452	C	High
Carson City	Military	NNG	150th Maintenance/State Admin. Buildin	2448 Fairview Drive	2002	11000	C	High
Carson City	Military	NNG	Carson City Ammo	East 5th Street	1973	600	C	High
Carson City	Military	NNG	Carson City OMS/CSMS/Haz Mat Waste Sto	2444 Fairview	2002	39699	C	High
Carson City	Military	NNG	GSA Fleet Building/Storage	2444 Fairview	2002	36550	C	High
Carson City	Military	NNG	HQ STARC Armory	2444 Fairview	2002	10400	C	High
Carson City	Military	NNG	Lawrence E. Jacobsen Ctr (aka Area Com	2460 Fairview Drive	2002	79738	C	High
Carson City	Military	NNG	OTAG Annex	2444 Fairview Drive	2002	3978	C	High
Carson City	Military	NNG	OTAG Building	2444 Fairview Drive	2002	31500	C	High
Carson City	MV & PS	DMV	DMV Computer Facility/Warehouse/Office	555 Wright Way	1998	108255	C	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Carson City	MV & PS	PS	Emergency Management	2478 Fairview Drive	2004	0	C	High
Carson City	MV & PS	PS	Training Facility	2101 Snyder Ave.	1985	11000	C	High
Carson City	Trans	HQ	Annex Building		1977	8415	C	High
Carson City	Trans	HQ	Headquarters Building	5151 S. Carson St.	1965	155060	C	High
Carson City	UCCSN	WNCC	Brisltecone Main Bldg and Additions, C	2201 W. College Parkway	0	232229	C	High
Cold Springs	Trans	Maint	Fuel Depot/ Maint. Station		1969	11084	C	High
Fallon	CNR	Wildlife	Regional Office	380 W. "B" St.	1981	3120	C	High
Fallon	DETR	ESD	Fallon Local Office	121 Industrial Way	1978	2264	C	High
Fallon	Military	NNG	Armory	895 E. Richards	1962	10404	C	High
Fallon	Trans	Maint	Fuel Depot		1963	10000	C	High
Fallon	UCCSN	WNCC	Campus #2 bldg		1988	7680	C	High
Fallon	UCCSN	WNCC	Community College, classrooms		1980	10800	C	High
Fallon	UCCSN	WNCC	Portable bldg		1983	0	C	High
Fernley	Trans	Maint	Fuel Depot		1969	195	C	High
Fernley	Trans	Maint	Maintenance Station		1969	3741	C	High
Fernley	Trans	Maint	Pump House		1969	100	C	High
Galena	Trans	Maint	Fuel Depot		1996	48	C	High
Galena Creek	CNR	Forestry	Fire Station		1970	0	C	High
Galena Creek	CNR	Forestry	Garage		0	0	C	High
Gardnerville	Trans	Maint	Maintenance Station		1989	6720	C	High
Glendale	Trans	Maint	Maintenance Station		1947	2850	C	High
Goldfield	Trans	Maint	Fuel Depot		1978	144	C	High
Goldfield	Trans	Maint	Maintenance station		1978	6220	C	High
Hawthorne	Military	NNG	Armory	9th & Sunset	1961	10404	C	High
Hawthorne	Trans	Maint	Fuel Depot		1957	192	C	High
Hawthorne	Trans	Maint	Maintenance Station		1957	2265	C	High
Incline	Trans	Maint	Fuel Depot/Maint.		1962	10204	C	High
Incline Village	DETR	ESD	Incline Village Local Office	894 Southwood Blvd.	1979	2400	C	High
Jack's Valley	CNR	Forestry	Fire Station		1988	0	C	High
Mina	Trans	Maint	Fuel Depot/ Maint.		1953	7800	C	High
Minden	CNR	Forestry	Hanger/Dispatch Center	2311 Firebrand Road	1990	6400	C	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Minden	UCCSN	WNCC	Douglas County Branch	1680 Bently Parkway S.	1997	15000	C	High
Montezuma Mtn	Trans	Comm	Prefab Building		0	120	C	High
Montgomery Pass	CNR	Parks	Pump house		1977	160	C	High
Mount Rose	Trans	Maint	Maintenance Station		1954	1848	C	High
Nixon	Trans	Maint	Maintenance Station		1966	2440	C	High
Peavine Mtn.	CNR	Forestry	Fire Station		1961	0	C	High
Reno	Admin	B & G	Special Children's Clinic	2667 Enterprise Rd.	1980	12705	C	High
Reno	CNR	Wildlife	Radio Shop/Warehouse		1969	1152	C	High
Reno	Correct	NNRC	Culinary / Dishwashing / Maint./Genera	2595 E. Second St.	0	27064	C	High
Reno	DETR	ESD	Reno Local Office	70 W. Taylor St.	1964	14373	C	High
Reno	HumRes	NNCAS	Addition		1996	3420	C	High
Reno	HumRes	NNCAS	Administration Bldg C at UNR		1977	13792	C	High
Reno	HumRes	NNCAS	Housing Unit A at UNR		1977	0	C	High
Reno	HumRes	NNCAS	Housing Unit B at UNR		1977	0	C	High
Reno	Military	NNG	Plumb Lane Armory	685 E. Plumb Lane	1995	15457	C	High
Reno	MV & PS	DMV	DMV - Reg, DL /Inspection Station	305 Galletti Way	1975	30567	C	High
Reno	MV & PS	PS	Regional Headquarters / Radio Garage	357 Hammill Lane	1994	19763	C	High
Reno	Trans	Maint	District Office		1965	11100	C	High
Reno	Trans	Maint	Fuel Depot 1		1963	120	C	High
Reno	Trans	Maint	Fuel Depot 2		1988	75	C	High
Reno	Trans	Maint	Maintenance Station		1963	29726	C	High
Reno	UCCSN	DRI	DRI Northern Science Center and Additi	7010 Dandini Blvd.	0	167238	C	High
Reno	UCCSN	TMCC	Collage Campus	7000 Dandini Blvd.	1996	462467	C	High
Reno	UCCSN	UNR	University of Nevada, Reno		1960	4010839	C	High
Silver Springs	CNR	Forestry	Administration Bldg. at Honor Camp		1991	2400	C	High
Silver Springs	CNR	Forestry	Garage at Honor Camp		0	1200	C	High
Silver Springs	CNR	Forestry	Hazardous Materials Shed at Honor Camp		1991	96	C	High
Silver Springs	CNR	Parks	Base camp for seasonal employees		1976	588	C	High
Silver Springs	Correct	SSCC	Culinary/Dining		1991	4150	C	High
Silver Springs	Correct	SSCC	Correctional Facility		1991	18967	C	High
Sparks	Agri	Agri	Warehouse / Eqpt Yard	295 Galletti Way	1960	1300	C	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Sparks	Agri	Agri	Weights & Measures	2150 Frazer St.	1971	4100	C	High
Sparks	DETR	ESD	Reno/Sparks Industrial Office	420 Galletti Way	0	3900	C	High
Sparks	HumRes	MHMRD	Lakes Crossing Security Unit, Bldg#130	500 Galletti Way	0	23994	C	High
Sparks	HumRes	NMHI	Administration Bldg #1 Human Resources	480 Galletti Way	0	215374	C	High
Sparks	HumRes	NMHI	SLA Duplex, Bldg #14, (leased to SRC)	605 S. 21st St.	1951	1524	C	High
Sparks	HumRes	SRC	Administration Bldg. 605 Storage Shed		1988	720	C	High
Sparks	HumRes	SRC	Administration Bldg. 605 Storage Shed		1985	576	C	High
Sparks	HumRes	SRC	SRC Administration, Bldg #605	605 S. 21st St.	1979	7117	C	High
Sparks	HumRes	SRC	SRC Bldg #604, ICF/MR 2 6-bed homes	604 S. 21st St.	1981	4829	C	High
Sparks	HumRes	SRC	SRC ICF/MR 2 6-Bed Home Bldg #606	606 S. 21st Street.	1981	4829	C	High
Sparks	HumRes	SRC	SRC ICF/MR Dual Diagnosis Bldg #345	345 S. 21st St.	1990	2428	C	High
Sparks	HumRes	SRC	SRC ICF/MR Dual Diagnosis, Bldg #325	325 S. 21st St.	1990	2428	C	High
Sparks	HumRes	SRC	SRC ICF/MR Dual Diagnosis, Bldg #335	335 S. 21st St.	1990	2428	C	High
Sparks	HumRes	SRC	SRC ICF/MR, Bldg #602, 2 6-bed homes	602 S. 21st St.	1979	6725	C	High
Sparks	HumRes	SRC	SRC ICF/MR, Bldg #603, 6-bed home	603 S. 21st St.	1979	3444	C	High
Sparks	HumRes	SRC	SRC Training & Admin, Bldg #600-601	600 S. 21st St.	1970	13386	C	High
Spooner	Trans	Maint	Fuel Depot		1993	4562	C	High
SpoonerSummit	CNR	Forestry	Fire Station		1972	2714	C	High
Stead	Military	NNG	Armory	20000 Army Aviation Dr.	1984	93592	C	High
Stead	Military	NNG	Operations and Maintenance Shop #5	19960 Army Aviation Dr.	1994	5800	C	High
Stead	Military	NNG	Washoe County Training Center	19980 Army Aviation Dr.	1997	55766	C	High
Stead	UCCSN	JobCorp	Bldg #1, Admin, Roberts/ College Campu		1965	136500	C	High
Stead	UCCSN	Stead	College Campus Rooms		1959	176820	C	High
Stewart	Admin	GovCom	Building #012, POST	107 Jacobsen Way	1941	14572	C	High
Stewart	Correct	NNHC/OLD	Administration/housing/.corrections fa	5500 Snyder Ave.	1968	14632	C	High
Stewart	MV & PS	PS	Building #107, OTS/ONCA/SERC/NHP	107 Jacobsen Way	1963	47832	C	High
Verdi	CNR	Forestry	Auxiliary fire station		1987	0	C	High
Verdi	CNR	Forestry	Fire Station		1980	0	C	High
Verdi	CNR	Forestry	Fire Station residence		0	0	C	High
Virginia City	Trans	Maint	Fuel Depot		1960	100	C	High
Virginia City	Trans	Maint	Maintenance Station		1960	1396	C	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Wellington	Trans	Maint	Fuel Depot / Maint. Station / Pump Hou		1950	4220	C	High
Yerington	Military	NNG	Armory	14 Joe Parr Way	1959	16169	C	High
Battle Mountain	Trans	Maint	Fuel Depot/Maint. Station	350 E. 4th	1955	210	C	Medium
Beatty	Trans	Maint	Maintenance Station		1960	4940	C	Medium
Beatty	CNR	Parks	Generator house		1980	64	C	Medium
Beatty	CNR	Parks	Pump House		1970	42	C	Medium
Belmont	CNR	Parks	Courthouse		1900	6288	C	Medium
Big Smokey	Trans	Maint	Fuel Depot/Maint Station		1973	9000	C	Medium
Blue Jay	Trans	Maint	Fuel Depot/Maint Station		1962	9000	C	Medium
Boulder City	HumRes	SNCH	Administration/ cottages / shop /gym		1968	30258	C	Medium
Boulder City	UCCSN	CCSN	Boulder City Campus	Boulder City Campus	0	20780	C	Medium
Boulder City	UCCSN	DRI	Office / Solar Research Facility	1500 Buchanan Blvd.	1977	4078	C	Medium
Boulder City	Veterans	Veterans	Cemetery Administration Building	1900 Buchanan Blvd.	1990	8589	C	Medium
Caliente	HumRes	NGTC	Classrooms, Administration, Dorms, Mai		1994	136671	C	Medium
Carlin	CNR	Forestry	Administration	101 Susie Creek Road	1988	2400	C	Medium
Carlin	Correct	HonCamp	Honor Camp	Susie Creek Road	0	48	C	Medium
Carlin	Trans	Maint	Maint station main shop/Vehicle Storag	Emigrant exit I-80	1958	5720	C	Medium
Contact	Trans	Maint	Fuel Depot/Maint. Station		1941	4044	C	Medium
Currie	CNR	Parks	Office/Shop	825 Hwy 50 East	1995	500	C	Medium
Deeth	CNR	Forestry	Garage/Firestation		0	1800	C	Medium
Elko	Agri	Agri	Agriculture office (Boies Bldg)	1351 Elm St.	1974	3315	C	Medium
Elko	CNR	CNR	Garage/radio shop 619		1983	3840	C	Medium
Elko	CNR	CNR	Garage/radio shop 620		1980	1800	C	Medium
Elko	CNR	Forestry	Fire station 621		0	0	C	Medium
Elko	CNR	Forestry	Fire Station No 1 office/residence		1972	0	C	Medium
Elko	CNR	Forestry	Fire Station No 2 (622)		1971	720	C	Medium
Elko	CNR	Forestry	Fire Station No 2 residence		1971	0	C	Medium
Elko	CNR	Forestry	Fire Station Office/Shop		1980	2400	C	Medium
Elko	CNR	Forestry	Interagency Dispatch Center	725 Aspen Way	2000	6800	C	Medium
Elko	CNR	Forestry	Shop		1960	3840	C	Medium
Elko	CNR	Wildlife	Regional Office	1375 Mt. City Hwy.	1973	2047	C	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Elko	DETR	ESD	Elko Local Office	172 6th St.	1985	4000	C	Medium
Elko	HumRes	NYTC	Administration		1962	3847	C	Medium
Elko	Military	NNG	Armory	1375 13th St.	1961	12404	C	Medium
Elko	Misc	Misc	State Agencies Bldg.	850 Elm St.	1979	20000	C	Medium
Elko	Trans	Admin	Administration, District office	1951 Idaho St	1954	80465	C	Medium
Elko	UCCSN	GBC	College Campus	1500 College Parkway	1996	213960	C	Medium
Elko	UCCSN	GBC	High Tech Center	1290 Burns Road	2001	34542	C	Medium
Ely	CNR	Forestry	Fire House/Shed		1987	1495	C	Medium
Ely	CNR	Forestry	Forestry office		1987	1220	C	Medium
Ely	CNR	Wildlife	Regional Administrative Office		1955	1440	C	Medium
Ely	CNR	Wildlife	Wildlife Field Office		2000	1719	C	Medium
Ely	Correct	ESP	Bldg #14, Gatehouse/ Corrections Facil	4569 N. State Route 490	1987	395350	C	Medium
Ely	Correct	HonCamp	Admin/Housing		1984	22968	C	Medium
Ely	Military	NNG	Armory	125 Mill St.	1959	9877	C	Medium
Ely	Trans	Maint	Fuel Depot	1401 Ave. F	1968	10456	C	Medium
Ely	UCCSN	GBC	Goeringer Center	2115 Bobcat Drive	1996	12000	C	Medium
Eureka	CNR	Wildlife	Office		0	0	C	Medium
Eureka	Trans	Maint	Maintenance Station		1955	2720	C	Medium
Henderson	Military	NNG	Armory	151 E. Horizon	1971	22690	C	Medium
Henderson	MV & PS	PS	I.A. & Fire Marshal	2398 S. Boulder Hwy	0	0	C	Medium
Henderson	UCCSN	CCSN	Henderson Campus	Henderson Campus	0	167000	C	Medium
IndependenceValley	Trans	Maint	Fuel Depot/Maint./Vech. Storage		1960	11195	C	Medium
Indian Springs	CNR	Forestry	NDF Office/Shops/storage		1988	8050	C	Medium
Indian Springs	Correct	HDSP	Correction Facility		2000	300300	C	Medium
Indian Springs	Correct	SDCC	Administration A correction Facility	Cold Creek Road	1980	353895	C	Medium
Indian Springs	Trans	Maint	House 2		0	930	C	Medium
Jean	Correct	HonCamp	Control Office Building B/Housing/Util		2000	30215	C	Medium
Jean	Correct	SNCC	Administration/visitor's	No. 1 Prison Row	1978	185950	C	Medium
Kyle Canyon	CNR	Parks	Maintenance/Storage Bldg/Admin office		1980	2750	C	Medium
Lake Mead	CNR	Parks	Sewer pump station	Cave Rock	1977	80	C	Medium
Lake Mead	CNR	Parks	Sewer Plant		1996	0	C	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Las Vegas	Admin	B & G	Belrose Bldg	620 Belrose St.	1973	41075	C	Medium
Las Vegas	Admin	B & G	Bradley Building	2501 E. Sahara Ave.	1974	27864	C	Medium
Las Vegas	Admin	B & G	Campos	215 East Bonanza	1954	33000	C	Medium
Las Vegas	Admin	B & G	CDL, Express (DMV)	4110 Donovan Way	1971	29000	C	Medium
Las Vegas	Admin	B & G	Maintenance Bldg/NHP Garage	2621 E. Sahara Ave.	1989	9895	C	Medium
Las Vegas	Admin	B & G	Sawyer Office Building	555 E. Washington Ave.	1995	224000	C	Medium
Las Vegas	Admin	Maint	Maintenance		1989	0	C	Medium
Las Vegas	Admin	MtrPool	Motor Pool	5085 Rent-A-Car Road	1981	1410	C	Medium
Las Vegas	Agri	Agri	Agriculture	2300 McLeod St.	1974	5722	C	Medium
Las Vegas	CNR	Forestry	Fire Station		0	0	C	Medium
Las Vegas	CNR	Forestry	OfficeWarehouse/shop	4747 Vegas Drive	2000	28600	C	Medium
Las Vegas	Correct	HonCamp	Restitution Center		0	0	C	Medium
Las Vegas	HumRes	HumRes	Office Bldg		1974	33090	C	Medium
Las Vegas	HumRes	LVMHC	Admin/Day Care/O P Unit, Bldg #1		1970	0	C	Medium
Las Vegas	HumRes	LVMHC	Adult/Child Inpatient, Bldg #3		1970	0	C	Medium
Las Vegas	HumRes	LVMHC	Central kitchen facility		1976	0	C	Medium
Las Vegas	HumRes	LVMHC	Central Kitchen/commissary	1391 S. Jones Blvd.	1976	0	C	Medium
Las Vegas	HumRes	LVMHC	Storage		1974	0	C	Medium
Las Vegas	HumRes	LVMHC	Warehouse/shop		1982	0	C	Medium
Las Vegas	HumRes	MHMR	Emotionally Disturbed Children		1974	0	C	Medium
Las Vegas	HumRes	SNAMHS	#17 Desert Willow Treatment Center	6161 West Charleston Blvd.	1998	198000	C	Medium
Las Vegas	HumRes	SNCAS	Clinical & Orthogenic Center, Bldg #7	6171 W. Charleston Blvd.	1974	20500	C	Medium
Las Vegas	HumRes	SNMRS	Desert Development Center	1391 S. Jones Blvd.	1976	54656	C	Medium
Las Vegas	MV & PS	DMV	DMV & PS - W/H	8250 W. Flamingo	0	40723	C	Medium
Las Vegas	MV & PS	DMV	DMV Registration/Vehicle Inspection Ce	2701 E. Sahara Ave.	1976	50282	C	Medium
Las Vegas	MV & PS	PS	NDI - Investigation Division	2855 S. Jones Blvd.	1967	2630	C	Medium
Las Vegas	SIIS	SIIS	Industrial Therapy bldg #2		1976	9000	C	Medium
Las Vegas	SIIS	SIIS	Office	1700 W. Charleston Ave.	1983	72000	C	Medium
Las Vegas	SIIS	SIIS	Rehabilitation Center Bldg #1		1976	96830	C	Medium
Las Vegas	Trans	Maint	Computer Building		1981	2500	C	Medium
Las Vegas	Trans	Maint	Construction Office		1958	3311	C	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Las Vegas	Trans	Maint	Crew Building		1986	12000	C	Medium
Las Vegas	Trans	Maint	Fuel Depot		1985	1800	C	Medium
Las Vegas	Trans	Maint	Lab		1958	2996	C	Medium
Las Vegas	Trans	Maint	Main Office		1941	11262	C	Medium
Las Vegas	Trans	Maint	Maintenance Station		1988	44700	C	Medium
Las Vegas	Trans	Maint	Metal Tire St		1985	400	C	Medium
Las Vegas	Trans	Maint	Right-of-Way Office		1958	3284	C	Medium
Las Vegas	UCCSN	CCSN	Campus	Charleston Campus	0	385000	C	Medium
Las Vegas	UCCSN	CCSN	Palo Verde High Tech Center	Summerlin	1998	33000	C	Medium
Las Vegas	UCCSN	CCSN	Wellness Center	Sahara West Campus	1986	7500	C	Medium
Las Vegas	UCCSN	CCSN	Western High Tech Center	Western	1998	33000	C	Medium
Las Vegas	UCCSN	DRI	Southern Nevada Science Center	755 E. Flamingo Rd.	1991	44280	C	Medium
Las Vegas	UCCSN	UNLV	University of Las Vegas		1982	3683704	C	Medium
Lee Canyon	CNR	Forestry	Fire Station		1979	1900	C	Medium
Lovelock	Correct	LCC	Correction Facility	1200 Prison Road	1993	402700	C	Medium
Lovelock	Trans	Maint	Fuel Depot		1958	4500	C	Medium
Mount Charleston	Trans	Maint	Fuel Depot/Maint. Station		1967	7238	C	Medium
North Las Vegas	Military	NNG	Clark County Armory	6400 Range Road	1997	14262	C	Medium
North Las Vegas	MV & PS	DMV	Commercial License office		1995	5486	C	Medium
North Las Vegas	UCCSN	CCSN	College Campus	Cheyenne Campus	1988	278762	C	Medium
North Las Vegas	Veterans	Veterans	Southern Nevada Veteran's Home	Nellis AFB	2000	115500	C	Medium
North Fork	Trans	Maint	Fuel Depot/Maint. Station	Mtn City Hwy	1955	3640	C	Medium
Orovada	Trans	Maint	Fuel Depot /Maint. /Houses		1955	9703	C	Medium
Panaca	Trans	Maint	Maintenance Station		1986	6660	C	Medium
Pequop	Trans	Maint	Fuel Depot		1953	5767	C	Medium
Pioche	CNR	Forestry	Conservation Camp Forestry Office		1987	2400	C	Medium
Pioche	Correct	HonCamp	Main Housing Unit Correctional Facilit		1995	28037	C	Medium
Quinn River	Trans	Maint	Fuel Depot	State Route 140	1955	224	C	Medium
Quinn River	Trans	Maint	Maintenance Station	State Route 140	1955	2055	C	Medium
Ruby Lake	Trans	Maint	Fuel Depot / Maint.		1958	608	C	Medium
Ruby Lake	Trans	Maint	Maintenance station		1958	2700	C	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Searchlight	Trans	Maint	Maintenance Station		1945	1140	C	Medium
Shoshone	Trans	Comm	Prefab Building		0	100	C	Medium
Tonopah	CNR	Forestry	Administration Building	Hwy 376	1990	2452	C	Medium
Tonopah	Correct	HonCamp	Culinary/Housing Units/multi - Purp. r	Hwy 376	1990	25948	C	Medium
Tonopah	Trans	Maint	Fuel depot / Maint Office /Material St		1954	38942	C	Medium
Warm Springs	Trans	Maint	Blue Jay Maintenance Station Gas Depot		1962	3951	C	Medium
Warm Springs	CNR	Parks	Maintenance Office/Pump House	4855 Eastlake Blvd.	1978	400	C	Medium
Warm Springs	CNR	Parks	Office/Pumphouse/Residence	3870 Lakeshore Dr.	1996	1600	C	Medium
Warm Springs	CNR	Parks	Service bldg/shop/office		1979	1920	C	Medium
Wells	CNR	Forestry	Administration		1985	2400	C	Medium
Wells	CNR	Forestry	Cook Shed	Carlin Conservation Camp	0	144	C	Medium
Wells	CNR	Forestry	Fuel Pump House		1988	98	C	Medium
Wells	CNR	Forestry	Garage saw shop		1986	960	C	Medium
Wells	Correct	HonCamp	Housing Unit/Culinary/Admin./ Multi Pu		1984	21120	C	Medium
Wells	Trans	Maint	Fuel Depot	541 Wells Avenue	1953	8260	C	Medium
Winnemucca	CNR	Forestry	Administration		1986	1800	C	Medium
Winnemucca	CNR	Forestry	Fuel Island Bldg / Shops /Office	Humboldt Conservation Camp	0	3047	C	Medium
Winnemucca	Correct	HonCamp	Administration/Housing / Cafeteria / G		1986	26834	C	Medium
Winnemucca	Military	NNG	Armory	735 W. 4th St.	1959	16277	C	Medium
Winnemucca	Trans	Maint	Equipment Repair Shop/Fuel Depot. Main	725 W. 4th St.	1979	26156	C	Medium
Winnemucca	Trans	Maint	Office	1141 W. Winnemucca Blvd	1957	6528	C	Medium
Winnemucca	UCCSN	GBC	ABE/ESL Trailer	5490 Kluncy Canyon Road	1994	720	C	Medium
Winnemucca	UCCSN	GBC	Winnemucca Center	5490 Kluncy Canyon Road	1995	12400	C	Medium
3 Mile Hill	Trans	Comm	Modular Building		0	120	C	
Anderson Acres	CNR	Forestry	Fire Station		0	0	C	
Emigrant Pass	Trans	Maint	Fuel Depot/Garage/Maint.	I-80	1953	11160	C	
Sobre Peak	Trans	Comm	Prefab Building		0	150	C	
Sobre Peak	CNR	Parks	Office Complex		1994	3464	C	

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Wildhorse	CNR	Parks	Main office/shop complex/Residences		1982	4929	C	
Alamo	Trans	RestArea	Pump House		0	240	N	High
Berlin	CNR	Parks	Adobe house		1900	544	N	High
Berlin	CNR	Parks	Assay Office		1900	576	N	High
Berlin	CNR	Parks	Ball mill (main Berlin mill)		1900	9945	N	High
Berlin	CNR	Parks	Camp's cabin		1900	458	N	High
Berlin	CNR	Parks	Camp's shed		1900	560	N	High
Berlin	CNR	Parks	Fossil House		1970	4300	N	High
Berlin	CNR	Parks	Fossil Out Building		1970	280	N	High
Berlin	CNR	Parks	Foster's Blacksmith Shop		1900	483	N	High
Berlin	CNR	Parks	Generator Plant House		1900	480	N	High
Berlin	CNR	Parks	Goat house		1900	462	N	High
Berlin	CNR	Parks	Hoist shack		1900	336	N	High
Berlin	CNR	Parks	House Trailer		0	0	N	High
Berlin	CNR	Parks	Italian house		1900	0	N	High
Berlin	CNR	Parks	Machine shop		1900	2150	N	High
Berlin	CNR	Parks	Mill		1900	0	N	High
Berlin	CNR	Parks	Office (Mine Superintendents Office)		1900	880	N	High
Berlin	CNR	Parks	Phillips house		1900	483	N	High
Berlin	CNR	Parks	Ranger residence (Mine Forman's House)		1900	750	N	High
Berlin	CNR	Parks	Telegraph bldg		1900	0	N	High
Berlin	CNR	Parks	Terry trailer		1966	400	N	High
Berlin	CNR	Parks	Tiffel's cabin / stagecoach stop		1900	693	N	High
Berlin	CNR	Parks	Warehouse		1800	464	N	High
Carson City	CNR	Forestry	Washoe Valley Nursery		1979	0	N	High
Carson City	Correct	Farm	Farm, Barns Etc..	Dairy Farm, 1721 Snyder Ave.	1998	1200	N	High
Carson City	Trans	HQ	Hanger (at Carson Airport)		1978	4320	N	High
Carson City	Trans	Maint	DOT Quonset, storage, training trailer		0	27400	N	High
Fallon	CNR	Wildlife	Annex		1954	0	N	High
Fallon	CNR	Wildlife	Boat Storage Facility		1993	2250	N	High
Fernley	Trans	Maint	Vehicle Storage		1969	1776	N	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Fernley	Veterans	Veterans	Cemetery Administration Bldg.	14 Veterans' Way	1990	2576	N	High
Galena	Trans	Maint	Vehicle Storage		1996	5088	N	High
Glendale	Trans	Maint	Vehicle Storage		1947	5244	N	High
Hawthorne	Trans	Maint	Vehicle Storage		1957	2127	N	High
Key Pittman	CNR	Wildlife	Incubator, chicken coop/residence	PO Box 31, Hiko, NV	0	0	N	High
Key Pittman	CNR	Wildlife	Pumphouse/Residence/Bunkhouse	PO Box 89	0	4555	N	High
Montgomery Pass	Trans	Maint	Maint. Station	Hwy 6	1957	8400	N	High
Montgomery Pass	CNR	Parks	Museum		1937	450	N	High
Mount Rose	Trans	Maint	Sand Storage		1987	1729	N	High
Peavine	Trans	Comm	Prefab Building		0	100	N	High
Pine Grove	Trans	Comm	Prefab Building		0	100	N	High
Reno	Admin	B & G	Warehouse	2250 Barnett Way	1960	29128	N	High
Reno	CA	HistSoc	Historical Society Bldg	1650 N. Virginia St.	1968	22300	N	High
Reno	CNR	Forestry	1-bay garage		0	5663	N	High
Reno	CNR	Wildlife	Boat storage facility		1993	2400	N	High
Reno	CNR	Wildlife	Hunter Education Addition		1990	4882	N	High
Reno	CNR	Wildlife	Regional Office Addition		1972	1195	N	High
Reno	CNR	Wildlife	Regional Office/annex	1100 Valley Rd.	1963	8643	N	High
Reno	Trans	Maint	Building B		1963	20000	N	High
Reno	Trans	Maint	Building C		1963	5120	N	High
Reno	Trans	Maint	Building D		1988	10502	N	High
Reno	Trans	Maint	Vehicle Storage		1978	26835	N	High
Silver Springs	CNR	Parks	Mechanical bldg at beach 7		1978	480	N	High
Silver Springs	CNR	Parks	Residence #1, Marlette mobile		1971	940	N	High
Silver Springs	CNR	Parks	Residence #2, Broadmoor mobile		1972	980	N	High
Silver Springs	CNR	Parks	Residence #3, Century modular		1981	900	N	High
Silver Springs	CNR	Parks	Shop		1980	1200	N	High
Sparks	CNR	Parks	Residence #4, Buckland Residence		0	0	N	High
Spooner Summit	CNR	Parks	Group shelter C-14 /Rangers Office / V		1983	2592	N	High
Stewart	Admin	B & G	Stewart Indian Cultural Ctr.		1923	188602	N	High
Stewart	CNR	Parks	Garage /Res. /Office/Visitor Center	2005 Hwy 28	1970	8563	N	High

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Virginia City	CA	Comstock	South "C: Street	South "C" Street	1950	300	N	High
Virginia City	Trans	Maint	Vehicle Storage		1960	1176	N	High
Baker	CNR	Wildlife	Hatchery	Spring Creek Rearing Station	0	0	N	Medium
Beatty	CNR	Parks	Shop converted to residence		0	600	N	Medium
Beatty	CNR	Parks	Storage trailer		1953	0	N	Medium
Belmont	Trans	RestArea	Well House		1977	213	N	Medium
Boulder City	Trans	RestArea	Welcome Center		1989	1764	N	Medium
Carlin	CNR	Forestry	Carlin Conservation Camp	Carlin Conservation Camp	0	1700	N	Medium
Cathedral Gorge	CNR	Parks	Maint. Office and Ranger Station		0	8000	N	Medium
Currie	Trans	Maint	Maint. Station		1958	4128	N	Medium
Deeth	CNR	Forestry	Storage		0	0	N	Medium
Echo Canyon	CNR	Parks	Fish Cleaning Station/Office/Res.		1990	2293	N	Medium
Elko	CNR	Wildlife	Storage/garage		1975	1728	N	Medium
Elko	HumRes	NYTC	Adventurer cottage Super. House Classr		1966	3990	N	Medium
Elko	HumRes	NYTC	Asst. Superintendent House		0	102190	N	Medium
Ely	CA	Museum	Railroad Museum Ely Freight Barn	100 Ave. A.	0	20865	N	Medium
Eureka	Trans	Maint	Vehicle Storage		1969	2040	N	Medium
Floyd Lamb	CNR	Forestry	Floyd Lamb Nursery	9600 Tule Springs Road	1975	28832	N	Medium
Floyd Lamb	CNR	Parks	Adobe Hut		1940	0	N	Medium
Floyd Lamb	CNR	Parks	Caretaker's house		1940	1204	N	Medium
Floyd Lamb	CNR	Parks	Dairy barn		1940	0	N	Medium
Floyd Lamb	CNR	Parks	Duplex		0	0	N	Medium
Floyd Lamb	CNR	Parks	Foreman's house		1940	1780	N	Medium
Floyd Lamb	CNR	Parks	Generator bldg		0	0	N	Medium
Floyd Lamb	CNR	Parks	Guest house		0	1854	N	Medium
Floyd Lamb	CNR	Parks	Gun Club - Club House		1955	5000	N	Medium
Floyd Lamb	CNR	Parks	Hay barn		0	0	N	Medium
Floyd Lamb	CNR	Parks	Machine Shop		1940	4440	N	Medium
Floyd Lamb	CNR	Parks	Manager / Visitor Center		1940	1755	N	Medium
Floyd Lamb	CNR	Parks	Power house		1940	0	N	Medium
Floyd Lamb	CNR	Parks	Pump house 174		1940	40	N	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Floyd Lamb	CNR	Parks	Pump house 176		0	420	N	Medium
Floyd Lamb	CNR	Parks	Pump house, well #171		0	630	N	Medium
Floyd Lamb	CNR	Parks	Ranger Residence		1978	750	N	Medium
Floyd Lamb	CNR	Parks	Residence FLSP		0	0	N	Medium
Floyd Lamb	CNR	Parks	Spring house & well		1940	280	N	Medium
Floyd Lamb	CNR	Parks	Stables		1940	3320	N	Medium
Floyd Lamb	CNR	Parks	Water tower		1940	370	N	Medium
Floyd Lamb	CNR	Parks	Buckland Station Historic Building		1870	4056	N	Medium
Floyd Lamb	CNR	Parks	Mobile Home		1978	0	N	Medium
Floyd Lamb	CNR	Parks	Museum/Visitor Center		1935	1300	N	Medium
Floyd Lamb	CNR	Parks	Pumphouse, Ghiglia Ranch		1965	100	N	Medium
Floyd Lamb	CNR	Parks	Ranger residence - Van Dyke trailer		1972	952	N	Medium
Floyd Lamb	CNR	Parks	Residence #1, Depaoli Ranch		1983	1600	N	Medium
Floyd Lamb	CNR	Parks	Residence #2, Depaoli Ranch		1983	2166	N	Medium
Floyd Lamb	CNR	Parks	Residence #3, Depaoli Ranch		1983	2128	N	Medium
Floyd Lamb	CNR	Parks	Residence #5	Hwy 95	1950	1026	N	Medium
Floyd Lamb	CNR	Parks	Shop/Office		1992	1200	N	Medium
Floyd Lamb	CNR	Parks	Storage bldg		1935	0	N	Medium
Henderson	MV & PS	DMV	Henderson Office	1399 American Pacific	1997	19305	N	Medium
Indian Springs	CNR	Forestry	Storage Trailer		0	8240	N	Medium
Indian Springs	Trans	Maint	House 1		1956	1300	N	Medium
Indian Springs	Trans	Maint	Maintenance Station		1956	3600	N	Medium
Kyle Canyon	CNR	Forestry	Fire Station		1963	2800	N	Medium
Kyle Canyon	CNR	Parks	District Headquarters		1930	860	N	Medium
Kyle Canyon	CNR	Parks	Employee Residence #1		1981	1056	N	Medium
Kyle Canyon	CNR	Parks	Residence #2		1981	1056	N	Medium
Kyle Canyon	CNR	Parks	Residence #3		1923	890	N	Medium
Kyle Canyon	CNR	Parks	Trailer		1978	0	N	Medium
Kyle Canyon	CNR	Parks	Well House		1960	0	N	Medium
Lake Mead	CNR	Wildlife	Hatchery		0	0	N	Medium
Lake Mead	CNR	Parks	Fee Station	Cave Rock	1991	102	N	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Lake Mead	CNR	Parks	Pump House		1977	24	N	Medium
Lake Mead	CNR	Parks	Well House		1977	1000	N	Medium
Las Vegas	CA	SoNev	Nev. State Museum & Hist. Society	700 Twin Lakes Dr.	1982	32824	N	Medium
Las Vegas	Trans	Maint	Vehicle Storage A		1985	4000	N	Medium
Las Vegas	Trans	Maint	Vehicle Storage B		1985	5000	N	Medium
Lund	Trans	Maint	Maintenance Station		1978	2507	N	Medium
Lund	CNR	Wildlife	Hatchery		1990	45855	N	Medium
Mesquite	Trans	RestArea	Welcome Center		1989	1767	N	Medium
Mesquite	Trans	RestArea	Pump House		1970	120	N	Medium
Mountain Springs	Trans	Maint	Garage /Maint. Station and Houses		1957	5932	N	Medium
North Fork	Trans	Maint	Houses	Hwy 225	1955	1872	N	Medium
North Fork	Trans	Maint	Trailer 1		1982	1000	N	Medium
North Fork	Trans	Maint	Trailer 2		1990	1000	N	Medium
Overton	CA	LostCity	Lost City Buildings	721 S. Moapa Valley Blvd.	1981	23000	N	Medium
Overton	CNR	Wildlife	Employee Storage /Granary /Main Office		1940	8089	N	Medium
Pahrump	UCCSN	CCSN	High Tech Learning Center	551 E. Calvada Blvd.	2001	32004	N	Medium
Quinn River	Trans	Maint	House 1		1955	1560	N	Medium
Quinn River	Trans	Maint	House 2		1955	1560	N	Medium
Quinn River	Trans	Maint	House 3	State Route 140	1970	1014	N	Medium
Quinn River	Trans	Maint	House 4	State Route 140	1970	1014	N	Medium
Quinn River	Trans	Maint	Vehicle storage	State Route 140	1955	2592	N	Medium
Ruby Lake	CNR	Wildlife	Gallager Hatchery		1966	24110	N	Medium
Ruby Lake	Trans	Maint	House 1		1958	1000	N	Medium
Ruby Lake	Trans	Maint	House 2		1958	1000	N	Medium
Ruby Lake	Trans	Maint	House 3		1958	1000	N	Medium
Ruby Lake	Trans	Maint	Vehicle Storage		1958	2440	N	Medium
Ruby Lake	CNR	Parks	Office, shop		1978	1080	N	Medium
Ruby Lake	CNR	Parks	Well House		1980	0	N	Medium
Searchlight	Trans	Maint	House 1		1945	1250	N	Medium
Searchlight	Trans	Maint	Vehicle Storage		1945	1890	N	Medium
Ward	CNR	Parks	Residence	Ward Charcoal Ovens	0	0	N	Medium

CITY	DEPT	DIVISION	NAME	ADDRESS	YR	AREA (sq ft)	CRITICAL	Earthquake Risk
Tonopah	CNR	Parks	Flammable storage		1972	480	N	Medium
Tonopah	CNR	Parks	Main shop/storage		1972	6000	N	Medium
Tonopah	CNR	Parks	Mobile home, Van Dyke #1		1980	980	N	Medium
Tonopah	CNR	Parks	Mobile home, Van Dyke #2		1971	980	N	Medium
Tonopah	CNR	Parks	Residence #3		1992	1400	N	Medium
Tonopah	CNR	Parks	Residence #4		1992	1400	N	Medium
Tonopah	CNR	Parks	Shop bldg, new		1995	192	N	Medium
Tonopah	CNR	Parks	Storage (Old Water treatment plant)		1964	323	N	Medium
Warm Springs	Trans	Comm	Prefab Building		0	96	N	Medium
Warm Springs	CNR	Parks	Ranger Residence		1979	1820	N	Medium
Wendover	Trans	Maint	Maintenance station		1988	9600	N	Medium
Winnemucca	Trans	Maint	Vehicle Storage E	725 W. 4th St.	1957	9900	N	Medium
	CNR	Forestry	Conservation Camp Storage		2002	1500	N	
Blue Jay	CA	Museum	Gift Shop/ History Center	600 Yucca Street	2001	300	N	
Eagle Peak	Trans	Comm	Prefab Building		0	100	N	
Pilot Peak	Trans	Comm	Prefab Building		1996	200	N	
Sobre Peak	CNR	Parks	Pumphouse		1992	104	N	
Sobre Peak	CNR	Parks	Residence, Lower		1937	1127	N	
Sobre Peak	CNR	Parks	Residence, upper		1937	439	N	
Sobre Peak	CNR	Parks	Shop		1937	912	N	
Spring Valley	CNR	Parks	Barn, lean-to, calving shed Chicken co		1940	4451	N	
Steptoe Valley	CNR	Wildlife	Bunk House CCC Office /Dugout /Office	Steptoe WMA	1970	7030	N	
Washoe Valley	CNR	Forestry	Headquarters		1980	11534	N	
Carson City	SIIS	SIIS	SIIS North		0	14190	U	High
Carson City	SIIS	SIIS	SIIS South	515 E. Musser St.	1959	42550	U	High
Las Vegas	DETR	ESD	Las Vegas Industrial	1001 North "A" Street	1975	2400	U	Medium

Table 3-17
State Owned Critical Facilities and Flood and Dam Failure Vulnerability and Loss Estimate

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
3 Mile Hill	Modular Building		0	120	C	C		
Alamo	Fuel Depot		1976	215	C	C		
Alamo	Maintenance Station		1976	7222	C	C		
Anderson	Fire station		1940	0	C			
Anderson Acres	Fire Station		0	0	C	X		
Austin	Maintenance station		1987	6660	C			
Austin	Office		0	0	C			
Battle Mountain	Fuel Depot/Maint. Station	350 E. 4th	1955	210	C	AH	$ 12,600	
Beatty	Generator house		1980	64	C	D		
Beatty	Pump House		1970	42	C	D		
Beatty	Maintenance Station		1960	4940	C	X		
Belmont	Courthouse		1900	6288	C	X		
Big Smokey	Fuel Depot/Maint Station		1973	9000	C	X		
Blue Jay	Fuel Depot/Maint Station		1962	9000	C	X		
Boulder City	Cemetery Administration Building	1900 Buchanan Blvd.	1990	8589	C	X		
Boulder City	Office / Solar Research Facility	1500 Buchanan Blvd.	1977	4078	C	X		
Boulder City	Administration/ cottages / shop /gym		1968	30258	C			
Boulder City	Boulder City Campus	Boulder City Campus	0	20780	C			
Caliente	Classrooms, Administration, Dorms, Mai		1994	136671	C	C		
Carlin	Administration	101 Susie Creek Road	1988	2400	C	X		
Carlin	Honor Camp	Susie Creek Road	0	48	C	X		
Carlin	Maint station main shop/Vehicle Storag	Emigrant exit I-80	1958	5720	C			
Carson City	DMV Computer Facility/Warehouse/Office	555 Wright Way	1998	108255	C	AH	$ 6,495,300	
Carson City	V&T Interpretive Center	2180 S. Carson St.	1988	53536	C	AH	$ 3,212,160	
Carson City	Administration/Cottages/Garage	711 E. 5th St.	0	28578	C	B		$ 571,560

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Carson City	Blasdel	209 E. Musser St.	1956	41679	C	B		
Carson City	Brisltecone Main Bldg and Additions, C	2201 W. College Parkway	0	232229	C	B		$ 4,644,580
Carson City	Buildings & Grounds	406 E. Second St.	0	0	C	B		$ -
Carson City	Capitol	101 N. Carson	1870	54778	C	B		$ 1,095,560
Carson City	Computer Facility	575 E. Third St.	1970	12336	C	B		$ 246,720
Carson City	Director's Office Building	708 N. Curry Street	1910	1500	C	B		$ 30,000
Carson City	Education (Old Fremont School)	700 East 5th Street	0	0	C	B		$ -
Carson City	Governor's Mansion	600 Mountain St.	1907	19361	C	B		$ 387,220
Carson City	Kinkead	505 East King Street	1974	84966	C	B		$ 1,699,320
Carson City	Legislative Council Bureau Office		0	29207	C	B		$ 584,140
Carson City	Legislature Building	401 S. Carson St.	0	183836	C	B		$ 3,676,720
Carson City	Main Gate House, Corrections Facility	1721 Snyder Ave.	1973	279200	C	B		$ 5,584,000
Carson City	Motor Pool	750 E. King St.	1988	3987	C	B		$ 79,740
Carson City	Nevada State Museum	600 N. Carson St.	1871	43099	C	B		$ 861,980
Carson City	Octagon, Capitol Annex	101 N. Carson	1906	9864	C	B		$ 197,280
Carson City	Old Carson City Courthouse	198 N. Carson Street	1920	14680	C	B		$ 293,600
Carson City	Old Supreme Court	100 N. Carson St.	0	0	C	B		$ -
Carson City	Old Supreme Court & Library (Hero's Me	198 S. Carson St.	1935	26299	C	B		$ 525,980
Carson City	Parking Garage	S. Stewart St.	1990	144452	C	B		$ 2,889,040
Carson City	Paul Laxalt State Building (Tourism)	401 N. Carson St.	1891	19076	C	B		$ 381,520
Carson City	Printing Office	301 S. Stewart St.	1963	24869	C	B		$ 497,380

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Carson City	Printing Office (old)	402 E. Second St.	0	0	C	B		$ -
Carson City	Regional Medical Facility (Unit 8)	1750 Snyder	1993	61138	C	B		$ 1,222,760
Carson City	State Administrative Office	500 E. Third St.	1960	30924	C	B		$ 618,480
Carson City	State Library	100 S. Stewart St.	1993	250507	C	B		$ 5,010,140
Carson City	State Mail Bldg Remodel	Third Street	1996	0	C	B		$ -
Carson City	Supreme Court	201 S. Carson St.	1991	118900	C	B		$ 2,378,000
Carson City	Visitor's Center II, M-13		1974	4768	C	B		$ 95,360
Carson City	Washoe Forestry HQ	123 W. Nye Ln.	1979	0	C	B		$ -
Carson City	Yard office, M-20		0	196	C	B		$ 3,920
Carson City	150th Maintenance/State Admin. Buildin	2551 S. Carson Street	1959	11000	C	C		
Carson City	80 bed pre-fab housing	PO BOX 7000	1980	6104	C	C		
Carson City	Admin & Housing/Gatehouse/Education	3301 E. 5th St.	0	100442	C	C		
Carson City	Carson City Ammo	East 5th Street	1973	600	C	C		
Carson City	Carson City OMS/CSMS/Haz Mat Waste Sto	2444 Fairview	1992	39699	C	C		
Carson City	Clear Creek Youth Center		1960	67872	C	C		
Carson City	Corrections Facility	3301 East 5th St. PO Box 607	1925	195322	C	C		
Carson City	Emergency Management	2478 Fairview Drive	2004	0	C	C		
Carson City	GSA Fleet Building/Storage	2601 S. Carson Street	1983	36550	C	C		
Carson City	Headquarters Building	5151 S. Carson St.	1965	155060	C	C		
Carson City	HQ STARC Armory	2361 S. Carson St.	1962	10400	C	C		
Carson City	OTAG Annex	2461 S. Carson St.	1959	3978	C	C		
Carson City	OTAG Building	2478 Fairview Drive	2004	31500	C	C		
Carson City	Regional Medical Facility		1993	63000	C	C		
Carson City	Training Facility	2101 Snyder Ave.	1985	11000	C	C		
Carson City	Work Shops		1950	3877	C	C		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Carson City	Indian Hills Museum Warehouse	2061 Topsy Lane	1980	15440	C	X		
Carson City	Annex Building		1977	8415	C			
Carson City	Conservation Camp Warehouse		1986	1152	C			
Carson City	Conservation Camp, Main office		1983	1296	C			
Carson City	Genoa Station		1900	0	C			
Carson City	Honor Camp		0	0	C			
Carson City	Lawrence E. Jacobsen Ctr (aka Area Com	2460 Fairview Drive	2002	79738	C			
Carson City	Museum Warehouse/Textile Center	2351 Arrowhead Dr.	1960	6000	C			
Carson City	Sewage Ejection Pumphouse		0	0	C			
Cold Springs	Fuel Depot/ Maint. Station		1969	11084	C	C		
Contact	Fuel Depot/Maint. Station		1941	4044	C	C		
Currie	Office/Shop	825 Hwy 50 East	1995	500	C	AE	$ 30,000	
Deeth	Garage/Firestation		0	1800	C	A	$ 108,000	
Elko	Armory	1375 13th St.	1961	12404	C	AE	$ 744,240	
Elko	Elko Local Office	172 6th St.	1985	4000	C	AE	$ 240,000	
Elko	Regional Office	1375 Mt. City Hwy.	1973	2047	C	AE	$ 122,820	
Elko	Administration		1962	3847	C	C		
Elko	Garage/radio shop 619		1983	3840	C	C		
Elko	Garage/radio shop 620		1980	1800	C	C		
Elko	Shop		1960	3840	C	C		
Elko	Administration, District office	1951 Idaho St	1954	80465	C	X		
Elko	Agriculture office (Boies Bldg)	1351 Elm St.	1974	3315	C	X		
Elko	College Campus	1500 College Parkway	1996	213960	C	X		
Elko	Fire station 621		0	0	C	X		
Elko	Fire Station No 1 office/residence		1972	0	C	X		
Elko	Fire Station No 2 (622)		1971	720	C	X		
Elko	Fire Station No 2 residence		1971	0	C	X		
Elko	Fire Station Office/Shop		1980	2400	C	X		
Elko	High Tech Center	1290 Burns Road	2001	34542	C	X		
Elko	Interagency Dispatch Center	725 Aspen Way	2000	6800	C	X		
Elko	State Agencies Bldg.	850 Elm St.	1979	20000	C	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Ely	Armory	125 Mill St.	1959	9877	C	AO	$ 592,620	
Ely	Fuel Depot	1401 Ave. F	1968	10456	C	C		
Ely	Admin/Housing		1984	22968	C	D		
Ely	Bldg #14, Gatehouse/ Corrections Facil	4569 N. State Route 490	1987	395350	C	D		
Ely	Fire House/Shed		1987	1495	C	D		
Ely	Forestry office		1987	1220	C	D		
Ely	Regional Administrative Office		1955	1440	C	X		
Ely	Wildlife Field Office		2000	1719	C	X		
Ely	Goeringer Center	2115 Bobcat Drive	1996	12000	C			
Emigrant Pass	Fuel Depot/Garage/Maint.	I-80	1953	11160	C	C		
Eureka	Maintenance Station		1955	2720	C			
Eureka	Office		0	0	C			
Fallon	Fuel Depot		1963	10000	C	C		
Fallon	Armory	895 E. Richards	1962	10404	C	X		
Fallon	Campus #2 bldg		1988	7680	C	X		
Fallon	Community College, classrooms		1980	10800	C	X		
Fallon	Fallon Local Office	121 Industrial Way	1978	2264	C	X		
Fallon	Portable bldg		1983	0	C	X		
Fallon	Regional Office	380 W. "B" St.	1981	3120	C	X		
Fernley	Fuel Depot		1969	195	C	AE	$ 11,700	
Fernley	Maintenance Station		1969	3741	C	AE	$ 224,460	
Fernley	Pump House		1969	100	C	AE	$ 6,000	
Galena	Fuel Depot		1996	48	C	X		
Galena Creek	Fire Station		1970	0	C	A	$ -	
Galena Creek	Garage		0	0	C	A	$ -	
Gardnerville	Maintenance Station		1989	6720	C	X		
Glendale	Maintenance Station		1947	2850	C	X		
Goldfield	Fuel Depot		1978	144	C	D		
Goldfield	Maintenance station		1978	6220	C	D		
Hawthorne	Armory	9th & Sunset	1961	10404	C	AO	$ 624,240	
Hawthorne	Fuel Depot		1957	192	C	X		
Hawthorne	Maintenance Station		1957	2265	C	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Henderson	Armory	151 E. Horizon	1971	22690	C	X		
Henderson	I.A. & Fire Marshal	2398 S. Boulder Hwy	0	0	C	X		
Henderson	Henderson Campus	Henderson Campus	0	167000	C			
Incline	Fuel Depot/Maint.		1962	10204	C	X		
Incline Village	Incline Village Local Office	894 Southwood Blvd.	1979	2400	C	X		
IndependenceValley	Fuel Depot/Maint./Vech. Storage		1960	11195	C			
Indian Springs	Administration A correction Facility	Cold Creek Road	1980	353895	C	D		
Indian Springs	Correction Facility		2000	300300	C	X		
Indian Springs	House 2		0	930	C	X		
Indian Springs	NDF Office/Shops/storage		1988	8050	C	X		
Jack's Valley	Fire Station		1988	0	C	X		
Jean	Administration/visitor's	No. 1 Prison Row	1978	185950	C	X		
Jean	Control Office Building B/Housing/Util		2000	30215	C	X		
Kyle Canyon	Maintenance/Storage Bldg/Admin office		1980	2750	C			
Lake Mead	Sewer pump station	Cave Rock	1977	80	C	A	$ 4,800	
Lake Mead	Sewer Plant		1996	0	C	D		
Las Vegas	DMV & PS - W/H	8250 W. Flamingo	0	40723	C	A	$ 2,443,380	
Las Vegas	Southern Nevada Science Center	755 E. Flamingo Rd.	1991	44280	C	AE	$ 2,656,800	
Las Vegas	Sawyer Office Building	555 E. Washington Ave.	1995	224000	C	shaded X		$ 4,480,000
Las Vegas	#17 Desert Willow Treatment Center	6161 West Charleston Blvd.	1998	198000	C	X		
Las Vegas	Agriculture	2300 McLeod St.	1974	5722	C	X		
Las Vegas	Belrose Bldg	620 Belrose St.	1973	41075	C	X		
Las Vegas	Bradley Building	2501 E. Sahara Ave.	1974	27864	C	X		
Las Vegas	Campos	215 East Bonanza	1954	33000	C	X		
Las Vegas	CDL, Express (DMV)	4110 Donovan Way	1971	29000	C	X		
Las Vegas	Central Kitchen/commissary	1391 S. Jones Blvd.	1976	0	C	X		
Las Vegas	Clinical & Orthogenic Center, Bldg #7	6171 W. Charleston Blvd.	1974	20500	C	X		
Las Vegas	Desert Development Center	1391 S. Jones Blvd.	1976	54656	C	X		
Las Vegas	DMV Registration/Vehicle Inspection Ce	2701 E. Sahara Ave.	1976	50282	C	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Las Vegas	Maintenance Bldg/NHP Garage	2621 E. Sahara Ave.	1989	9895	C	X		
Las Vegas	Motor Pool	5085 Rent-A-Car Road	1981	1410	C	X		
Las Vegas	NDI - Investigation Division	2855 S. Jones Blvd.	1967	2630	C	X		
Las Vegas	Office	1700 W. Charleston Ave.	1983	72000	C	X		
Las Vegas	OfficeWarehouse/shop	4747 Vegas Drive	2000	28600	C	X		
Las Vegas	University of Las Vegas		1982	683704	C	X		
Las Vegas	Admin/Day Care/O P Unit, Bldg #1		1970	0	C			
Las Vegas	Adult/Child Inpatient, Bldg #3		1970	0	C			
Las Vegas	Campus	Charleston Campus	0	385000	C			
Las Vegas	Central kitchen facility		1976	0	C			
Las Vegas	Computer Building		1981	2500	C			
Las Vegas	Construction Office		1958	3311	C			
Las Vegas	Crew Building		1986	12000	C			
Las Vegas	Emotionally Disturbed Children		1974	0	C			
Las Vegas	Fire Station		0	0	C			
Las Vegas	Fuel Depot		1985	1800	C			
Las Vegas	Industrial Therapy bldg #2		1976	9000	C			
Las Vegas	Lab		1958	2996	C			
Las Vegas	Main Office		1941	11262	C			
Las Vegas	Maintenance		1989	0	C			
Las Vegas	Maintenance Station		1988	44700	C			
Las Vegas	Metal Tire St		1985	400	C			
Las Vegas	Office Bldg		1974	33090	C			
Las Vegas	Palo Verde High Tech Center	Summerlin	1998	33000	C			
Las Vegas	Rehabilitation Center Bldg #1		1976	96830	C			
Las Vegas	Restitution Center		0	0	C			
Las Vegas	Right-of-Way Office		1958	3284	C			
Las Vegas	Storage		1974	0	C			
Las Vegas	Warehouse/shop		1982	0	C			
Las Vegas	Wellness Center	Sahara West Campus	1986	7500	C			

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Las Vegas	Western High Tech Center	Western	1998	33000	C			
Lee Canyon	Fire Station		1979	1900	C	X		
Lovelock	Correction Facility	1200 Prison Road	1993	402700	C	C		
Lovelock	Fuel Depot		1958	4500	C			
Mina	Fuel Depot/ Maint.		1953	7800	C	D		
Minden	Douglas County Branch	1680 Bently Parkway S.	1997	15000	C	X		
Minden	Hanger/Dispatch Center	2311 Firebrand Road	1990	6400	C	X		
Montezuma Mtn	Prefab Building		0	120	C	Esmeralda Co		
Montgomery Pass	Pump house		1977	160	C	shaded X		$ 3,200
Mount Charleston	Fuel Depot/Maint. Station		1967	7238	C	X		
Mount Rose	Maintenance Station		1954	1848	C	X		
Nixon	Maintenance Station		1966	2440	C	D		
North Fork	Fuel Depot/Maint. Station	Mtn City Hwy	1955	3640	C	A	$ 218,400	
North Las Vegas	College Campus	Cheyenne Campus	1988	278762	C	shaded X		$ 5,575,240
North Las Vegas	Clark County Armory	6400 Range Road	1997	14262	C	X		
North Las Vegas	Commercial License office		1995	5486	C	X		
North Las Vegas	Southern Nevada Veteran's Home	Nellis AFB	2000	115500	C			
Orovada	Fuel Depot /Maint. /Houses		1955	9703	C	X		
Panaca	Maintenance Station		1986	6660	C	D		
Peavine Mtn.	Fire Station		1961	0	C	X		
Pequop	Fuel Depot		1953	5767	C	D		
Pioche	Conservation Camp Forestry Office		1987	2400	C	D		
Pioche	Main Housing Unit Correctional Facilit		1995	28037	C			
Quinn River	Fuel Depot	State Route 140	1955	224	C	X		
Quinn River	Maintenance Station	State Route 140	1955	2055	C	X		
Reno	Culinary / Dishwashing / Maint./Genera	2595 E. Second St.	0	27064	C	AE	$ 1,623,840	
Reno	Regional Headquarters / Radio Garage	357 Hammill Lane	1994	19763	C	shaded X		$ 395,260
Reno	Collage Campus	7000 Dandini Blvd.	1996	462467	C	X		
Reno	DMV - Reg, DL /Inspection Station	305 Galletti Way	1975	30567	C	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Reno	DRI Northern Science Center and Additi	7010 Dandini Blvd.	0	167238	C	X		
Reno	Plumb Lane Armory	685 E. Plumb Lane	1995	15457	C	X		
Reno	Reno Local Office	70 W. Taylor St.	1964	14373	C	X		
Reno	Special Children's Clinic	2667 Enterprise Rd.	1980	12705	C	X		
Reno	University of Nevada, Reno		1960	10839	C	X		
Reno	Addition		1996	3420	C			
Reno	Administration Bldg C at UNR		1977	13792	C			
Reno	District Office		1965	11100	C			
Reno	Fuel Depot 1		1963	120	C			
Reno	Fuel Depot 2		1988	75	C			
Reno	Housing Unit A at UNR		1977	0	C			
Reno	Housing Unit B at UNR		1977	0	C			
Reno	Maintenance Station		1963	29726	C			
Reno	Radio Shop/Warehouse		1969	1152	C			
Ruby Lake	Fuel Depot / Maint.		1958	608	C	D		
Ruby Lake	Maintenance station		1958	2700	C	D		
Searchlight	Maintenance Station		1945	1140	C	X		
Shoshone	Prefab Building		0	100	C			
Silver Springs	Base camp for seasonal employees		1976	588	C	A	$ 35,280	
Silver Springs	Administration Bldg. at Honor Camp		1991	2400	C	C		
Silver Springs	Correctional Facility		1991	18967	C	C		
Silver Springs	Culinary/Dining		1991	4150	C	C		
Silver Springs	Garage at Honor Camp		0	1200	C	C		
Silver Springs	Hazardous Materials Shed at Honor Camp		1991	96	C	C		
Sobre Peak	Office Complex		1994	3464	C	D		
Sobre Peak	Prefab Building		0	150	C			
Sparks	Administration Bldg #1 Human Resources	480 Galletti Way	0	215374	C	X		
Sparks	Administration Bldg. 605 Storage Shed		1988	720	C	X		
Sparks	Administration Bldg. 605 Storage Shed		1985	576	C	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Sparks	Lakes Crossing Security Unit, Bldg#130	500 Galletti Way	0	23994	C	X		
Sparks	Reno/Sparks Industrial Office	420 Galletti Way	0	3900	C	X		
Sparks	SLA Duplex, Bldg #14, (leased to SRC)	605 S. 21st St.	1951	1524	C	X		
Sparks	SRC Administration, Bldg #605	605 S. 21st St.	1979	7117	C	X		
Sparks	SRC Bldg #604, ICF/MR 2 6-bed homes	604 S. 21st St.	1981	4829	C	X		
Sparks	SRC ICF/MR 2 6-Bed Home Bldg #606	606 S. 21st Street.	1981	4829	C	X		
Sparks	SRC ICF/MR Dual Diagnosis Bldg #345	345 S. 21st St.	1990	2428	C	X		
Sparks	SRC ICF/MR Dual Diagnosis, Bldg #325	325 S. 21st St.	1990	2428	C	X		
Sparks	SRC ICF/MR Dual Diagnosis, Bldg #335	335 S. 21st St.	1990	2428	C	X		
Sparks	SRC ICF/MR, Bldg #602, 2 6-bed homes	602 S. 21st St.	1979	6725	C	X		
Sparks	SRC ICF/MR, Bldg #603, 6-bed home	603 S. 21st St.	1979	3444	C	X		
Sparks	SRC Training & Admin, Bldg #600-601	600 S. 21st St.	1970	13386	C	X		
Sparks	Warehouse / Eqpt Yard	295 Galletti Way	1960	1300	C	X		
Sparks	Weights & Measures	2150 Frazer St.	1971	4100	C			
Spooner	Fuel Depot		1993	4562	C	C		
SpoonerSummit	Fire Station		1972	2714	C	D		
Stead	Armory	20000 Army Aviation Dr.	1984	93592	C			
Stead	Bldg #1, Admin, Roberts/ College Campu		1965	136500	C			
Stead	College Campus Rooms		1959	176820	C			
Stead	Operations and Maintenance Shop #5	19960 Army Aviation Dr.	1994	5800	C			
Stead	Washoe County Training Center	19980 Army Aviation Dr.	1997	55766	C			
Stewart	Administration/housing/.corrections	5500 Snyder Ave.	1968	14632	C	C		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
	fa							
Stewart	Building #012, POST	107 Jacobsen Way	1941	14572	C			
Stewart	Building #107, OTS/ONCA/SERC/NHP	107 Jacobsen Way	1963	47832	C			
Tonopah	Administration Building	Hwy 376	1990	2452	C	X		
Tonopah	Culinary/Housing Units/multi - Purp. r	Hwy 376	1990	25948	C	X		
Tonopah	Fuel depot / Maint Office /Material St		1954	38942	C			
Verdi	Auxiliary fire station		1987	0	C	X		
Verdi	Fire Station		1980	0	C	X		
Verdi	Fire Station residence		0	0	C	X		
Virginia City	Fuel Depot		1960	100	C	C		
Virginia City	Maintenance Station		1960	1396	C	C		
Warm Springs	Blue Jay Maintenance Station Gas Depot		1962	3951	C	X		
Warm Springs	Maintenance Office/Pump House	4855 Eastlake Blvd.	1978	400	C	X		
Warm Springs	Office/Pumphouse/Residence	3870 Lakeshore Dr.	1996	1600	C	X		
Warm Springs	Service bldg/shop/office		1979	1920	C	X		
Wellington	Fuel Depot / Maint. Station / Pump Hou		1950	4220	C	C		
Wells	Administration		1985	2400	C	A	$ 144,000	
Wells	Cook Shed	Carlin Conservation Camp	0	144	C	A	$ 8,640	
Wells	Fuel Pump House		1988	98	C	A	$ 5,880	
Wells	Garage saw shop		1986	960	C	A	$ 57,600	
Wells	Housing Unit/Culinary/Admin./ Multi Pu		1984	21120	C	A	$ 1,267,200	
Wells	Fuel Depot	541 Wells Avenue	1953	8260	C	X		
Wildhorse	Main office/shop complex/Residences		1982	4929	C	D		
Winnemucca	ABE/ESL Trailer	5490 Kluncy Canyon Road	1994	720	C	X		
Winnemucca	Administration		1986	1800	C	X		
Winnemucca	Administration/Housing / Cafeteria / G		1986	26834	C	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Winnemucca	Armory	735 W. 4th St.	1959	16277	C	X		
Winnemucca	Equipment Repair Shop/Fuel Depot. Main	725 W. 4th St.	1979	26156	C	X		
Winnemucca	Fuel Island Bldg / Shops /Office	Humboldt Conservation Camp	0	3047	C	X		
Winnemucca	Office	1141 W. Winnemucca Blvd	1957	6528	C	X		
Winnemucca	Winnemucca Center	5490 Kluncy Canyon Road	1995	12400	C	X		
Yerington	Armory	14 Joe Parr Way	1959	16169	C	B		$ 323,380
Alamo	Pump House		0	240	N	X		
Baker	Hatchery	Spring Creek Rearing Station	0	0	N			
Beatty	Shop converted to residence		0	600	N	D		
Beatty	Storage trailer		1953	0	N	D		
Belmont	Well House		1977	213	N	C		
Berlin	Adobe house		1900	544	N	X		
Berlin	Assay Office		1900	576	N	X		
Berlin	Ball mill (main Berlin mill)		1900	9945	N	X		
Berlin	Camp's cabin		1900	458	N	X		
Berlin	Camp's shed		1900	560	N	X		
Berlin	Fossil House		1970	4300	N	X		
Berlin	Fossil Out Building		1970	280	N	X		
Berlin	Foster's Blacksmith Shop		1900	483	N	X		
Berlin	Generator Plant House		1900	480	N	X		
Berlin	Goat house		1900	462	N	X		
Berlin	Hoist shack		1900	336	N	X		
Berlin	House Trailer		0	0	N	X		
Berlin	Italian house		1900	0	N	X		
Berlin	Machine shop		1900	2150	N	X		
Berlin	Mill		1900	0	N	X		
Berlin	Office (Mine Superintendents Office)		1900	880	N	X		
Berlin	Phillips house		1900	483	N	X		
Berlin	Ranger residence (Mine Forman's		1900	750	N	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
	House)							
Berlin	Telegraph bldg		1900	0	N	X		
Berlin	Terry trailer		1966	400	N	X		
Berlin	Tiffel's cabin / stagecoach stop		1900	693	N	X		
Berlin	Warehouse		1800	464	N	X		
Blue Jay	Gift Shop/ History Center	600 Yucca Street	2001	300	N			
Boulder City	Welcome Center		1989	1764	N			
Carlin	Carlin Conservation Camp	Carlin Conservation Camp	0	1700	N	X		
Carson City	Washoe Valley Nursery		1979	0	N	X		
Carson City	DOT Quonset, storage, training trailer		0	27400	N			
Carson City	Farm, Barns Etc..	Dairy Farm, 1721 Snyder Ave.	1998	1200	N			
Carson City	Hanger (at Carson Airport)		1978	4320	N			
Cathedral Gorge	Maint. Office and Ranger Station		0	8000	N	D		
Currie	Maint. Station		1958	4128	N	D		
Deeth	Storage		0	0	N	A	$ -	
Eagle Peak	Prefab Building		0	100	N	C		
Echo Canyon	Fish Cleaning Station/Office/Res.		1990	2293	N	D		
Elko	Adventurer cottage Super. House Classr		1966	3990	N	C		
Elko	Asst. Superintendent House		0	102190	N	C		
Elko	Storage/garage		1975	1728	N	X		
Ely	Railroad Museum Ely Freight Barn	100 Ave. A.	0	20865	N	C		
Eureka	Vehicle Storage		1969	2040	N			
Fallon	Annex		1954	0	N	X		
Fallon	Boat Storage Facility		1993	2250	N	X		
Fernley	Vehicle Storage		1969	1776	N	AE	$ 106,560	
Fernley	Cemetery Administration Bldg.	14 Veterans' Way	1990	2576	N	X		
Floyd Lamb	Buckland Station Historic Building		1870	4056	N	A	$ 243,360	
Floyd Lamb	Mobile Home		1978	0	N	A	$ -	
Floyd Lamb	Museum/Visitor Center		1935	1300	N	A	$ 78,000	

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Floyd Lamb	Pumphouse, Ghiglia Ranch		1965	100	N	A	$ 6,000	
Floyd Lamb	Ranger residence - Van Dyke trailer		1972	952	N	A	$ 57,120	
Floyd Lamb	Residence #1, Depaoli Ranch		1983	1600	N	A	$ 96,000	
Floyd Lamb	Residence #2, Depaoli Ranch		1983	2166	N	A	$ 129,960	
Floyd Lamb	Residence #3, Depaoli Ranch		1983	2128	N	A	$ 127,680	
Floyd Lamb	Residence #5	Hwy 95	1950	1026	N	A	$ 61,560	
Floyd Lamb	Shop/Office		1992	1200	N	A	$ 72,000	
Floyd Lamb	Storage bldg		1935	0	N	A	$ -	
Floyd Lamb	Adobe Hut		1940	0	N	X		
Floyd Lamb	Caretaker's house		1940	1204	N	X		
Floyd Lamb	Dairy barn		1940	0	N	X		
Floyd Lamb	Duplex		0	0	N	X		
Floyd Lamb	Floyd Lamb Nursery	9600 Tule Springs Road	1975	28832	N	X		
Floyd Lamb	Foreman's house		1940	1780	N	X		
Floyd Lamb	Generator bldg		0	0	N	X		
Floyd Lamb	Guest house		0	1854	N	X		
Floyd Lamb	Gun Club - Club House		1955	5000	N	X		
Floyd Lamb	Hay barn		0	0	N	X		
Floyd Lamb	Machine Shop		1940	4440	N	X		
Floyd Lamb	Manager / Visitor Center		1940	1755	N	X		
Floyd Lamb	Power house		1940	0	N	X		
Floyd Lamb	Pump house 174		1940	40	N	X		
Floyd Lamb	Pump house 176		0	420	N	X		
Floyd Lamb	Pump house, well #171		0	630	N	X		
Floyd Lamb	Ranger Residence		1978	750	N	X		
Floyd Lamb	Residence FLSP		0	0	N	X		
Floyd Lamb	Spring house & well		1940	280	N	X		
Floyd Lamb	Stables		1940	3320	N	X		
Floyd Lamb	Water tower		1940	370	N	X		
Galena	Vehicle Storage		1996	5088	N	X		
Glendale	Vehicle Storage		1947	5244	N	X		
Hawthorne	Vehicle Storage		1957	2127	N	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Henderson	Henderson Office	1399 American Pacific	1997	19305	N	X		
Indian Springs	House 1		1956	1300	N	X		
Indian Springs	Maintenance Station		1956	3600	N	X		
Indian Springs	Storage Trailer		0	8240	N	X		
Key Pittman	Incubator, chicken coop/residence	PO Box 31, Hiko, NV	0	0	N			
Key Pittman	Pumphouse/Residence/Bunkhouse	PO Box 89	0	4555	N			
Kyle Canyon	Fire Station		1963	2800	N	X		
Kyle Canyon	District Headquarters		1930	860	N			
Kyle Canyon	Employee Residence #1		1981	1056	N			
Kyle Canyon	Residence #2		1981	1056	N			
Kyle Canyon	Residence #3		1923	890	N			
Kyle Canyon	Trailer		1978	0	N			
Kyle Canyon	Well House		1960	0	N			
Lake Mead	Fee Station	Cave Rock	1991	102	N	A	$ 6,120	
Lake Mead	Pump House		1977	24	N	D		
Lake Mead	Well House		1977	1000	N	D		
Lake Mead	Hatchery		0	0	N			
Las Vegas	Nev. State Museum & Hist. Society	700 Twin Lakes Dr.	1982	32824	N	X		
Las Vegas	Vehicle Storage A		1985	4000	N			
Las Vegas	Vehicle Storage B		1985	5000	N			
Lund	Hatchery		1990	45855	N	A	$ 2,751,300	
Lund	Maintenance Station		1978	2507	N	D		
Mesquite	Pump House		1970	120	N	Esmeralda Co		
Mesquite	Welcome Center		1989	1767	N	X		
Montgomery Pass	Maint. Station	Hwy 6	1957	8400	N	D		
Montgomery Pass	Museum		1937	450	N	shaded X		$ 9,000
Mount Rose	Sand Storage		1987	1729	N	X		
Mountain Springs	Garage /Maint. Station and Houses		1957	5932	N	X		
North Fork	Houses	Hwy 225	1955	1872	N	A	$ 112,320	
North Fork	Trailer 1		1982	1000	N	A	$ 60,000	
North Fork	Trailer 2		1990	1000	N	A	$ 60,000	

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Overton	Lost City Buildings	721 S. Moapa Valley Blvd.	1981	23000	N	X		
Overton	Employee Storage /Granary /Main Office		1940	8089	N			
Pahrump	High Tech Learning Center	551 E. Calvada Blvd.	2001	32004	N	AO	$ 1,920,240	
Peavine	Prefab Building		0	100	N			
Pilot Peak	Prefab Building		1996	200	N	D		
Pine Grove	Prefab Building		0	100	N			
Quinn River	House 1		1955	1560	N	X		
Quinn River	House 2		1955	1560	N	X		
Quinn River	House 3	State Route 140	1970	1014	N	X		
Quinn River	House 4	State Route 140	1970	1014	N	X		
Quinn River	Vehicle storage	State Route 140	1955	2592	N	X		
Reno	Historical Society Bldg	1650 N. Virginia St.	1968	22300	N	X		
Reno	Regional Office/annex	1100 Valley Rd.	1963	8643	N	X		
Reno	Warehouse	2250 Barnett Way	1960	29128	N	X		
Reno	1-bay garage		0	5663	N			
Reno	Boat storage facility		1993	2400	N			
Reno	Building B		1963	20000	N			
Reno	Building C		1963	5120	N			
Reno	Building D		1988	10502	N			
Reno	Hunter Education Addition		1990	4882	N			
Reno	Regional Office Addition		1972	1195	N			
Reno	Vehicle Storage		1978	26835	N			
Ruby Lake	House 1		1958	1000	N	D		
Ruby Lake	House 2		1958	1000	N	D		
Ruby Lake	House 3		1958	1000	N	D		
Ruby Lake	Vehicle Storage		1958	2440	N	D		
Ruby Lake	Gallager Hatchery		1966	24110	N			
Ruby Lake	Office, shop		1978	1080	N			
Ruby Lake	Well House		1980	0	N			
Searchlight	House 1		1945	1250	N	X		
Searchlight	Vehicle Storage		1945	1890	N	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Silver Springs	Mechanical bldg at beach 7		1978	480	N	A	$ 28,800	
Silver Springs	Residence #1, Marlette mobile		1971	940	N	A	$ 56,400	
Silver Springs	Residence #2, Broadmoor mobile		1972	980	N	A	$ 58,800	
Silver Springs	Residence #3, Century modular		1981	900	N	A	$ 54,000	
Silver Springs	Shop		1980	1200	N	A	$ 72,000	
Sobre Peak	Pumphouse		1992	104	N	D		
Sobre Peak	Residence, Lower		1937	1127	N	D		
Sobre Peak	Residence, upper		1937	439	N	D		
Sobre Peak	Shop		1937	912	N	D		
Sparks	Residence #4, Buckland Residence		0	0	N			
Spooner Summit	Group shelter C-14 /Rangers Office / V		1983	2592	N			
Spring Valley	Barn, lean-to, calving shed Chicken co		1940	4451	N	D		
Steptoe Valley	Bunk House CCC Office /Dugout /Office	Steptoe WMA	1970	7030	N			
Stewart	Stewart Indian Cultural Ctr.		1923	188602	N	C		
Stewart	Garage /Res. /Office/Visitor Center	2005 Hwy 28	1970	8563	N	X		
Tonopah	Flammable storage		1972	480	N			
Tonopah	Main shop/storage		1972	6000	N			
Tonopah	Mobile home, Van Dyke #1		1980	980	N			
Tonopah	Mobile home, Van Dyke #2		1971	980	N			
Tonopah	Residence #3		1992	1400	N			
Tonopah	Residence #4		1992	1400	N			
Tonopah	Shop bldg, new		1995	192	N			
Tonopah	Storage (Old Water treatment plant)		1964	323	N			
Virginia City	South "C: Street	South "C" Street	1950	300	N	C		
Virginia City	Vehicle Storage		1960	1176	N	C		
Ward	Residence	Ward Charcoal Ovens	0	0	N			
Warm Springs	Prefab Building		0	96	N	X		
Warm Springs	Ranger Residence		1979	1820	N	X		
Washoe Valley	Headquarters		1980	11534	N	X		

CITY	NAME	ADDRESS	YR	AREA	CRITICAL	FLOOD ZONE	100Yr @30%	500 Yr @ 10%
Wendover	Maintenance station		1988	9600	N	AO	$ 576,000	
Winnemucca	Vehicle Storage E	725 W. 4th St.	1957	9900	N	X		
	Conservation Camp Storage		2002	1500	N			
Carson City	SIIS South	515 E. Musser St.	1959	42550	U	B		$ 851,000
Carson City	SIIS North		0	14190	U			
Las Vegas	Las Vegas Industrial	1001 North "A" Street	1975	2400	U	X		
							$ 20,889,960	$ 44,352,080
							$ 6,734,220	$ 860,000
							$ 27,624,180	
								$ 45,212,080

Table 3-18
State Owned Critical Facilities and Fire Vulnerability and Loss Estimate

CITY	DIVISION	NAME & ADDRESS		YR	AREA (sq ft)	CRITICAL	Fire Loss in $
3 Mile Hill	Comm	Modular Building		0	120	C	$36,000
Alamo	Maint	Fuel Depot		1976	215	C	$64,500
Alamo	Maint	Maintenance Station		1976	7222	C	$2,166,600
Anderson	Wildlife	Fire station		1940	0	C	$0
Anderson Acres	Forestry	Fire Station		0	0	C	$0
Austin	Wildlife	Office		0	0	C	$0
Austin	Maint	Maintenance station		1987	6660	C	$1,998,000
Battle Mountain	Maint	Fuel Depot/Maint. Station	350 E. 4th	1955	210	C	$63,000
Beatty	Parks	Generator house		1980	64	C	$19,200
Beatty	Parks	Pump House		1970	42	C	$12,600
Beatty	Maint	Maintenance Station		1960	4940	C	$1,482,000
Belmont	Parks	Courthouse		1900	6288	C	$1,886,400
Big Smokey	Maint	Fuel Depot/Maint Station		1973	9000	C	$2,700,000
Blue Jay	Maint	Fuel Depot/Maint Station		1962	9000	C	$2,700,000
Boulder City	SNCH	Administration/ cottages / shop /gym		1968	30258	C	$9,077,400
Boulder City	CCSN	Boulder City Campus	Boulder City Campus	0	20780	C	$6,234,000
Boulder City	DRI	Office / Solar Research Facility	1500 Buchanan Blvd.	1977	4078	C	$1,223,400
Boulder City	Veterans	Cemetery Administration Building	1900 Buchanan Blvd.	1990	8589	C	$2,576,700
Caliente	NGTC	Classrooms, Administration, Dorms, Mai		1994	136671	C	$41,001,300
Carlin	Forestry	Administration	101 Susie Creek Road	1988	2400	C	$720,000
Carlin	HonCamp	Honor Camp	Susie Creek Road	0	48	C	$14,400
Carlin	Maint	Maint station main shop/Vehicle Storag	Emigrant exit I-80	1958	5720	C	$1,716,000
Carson City	B & G	Blasdel	209 E. Musser St.	1956	41679	C	$12,503,700
Carson City	B & G	Buildings & Grounds	406 E. Second St.	0	0	C	$0

Carson City	B & G	Capitol	101 N. Carson	1870	54778	C	$16,433,400
Carson City	B & G	Education (Old Fremont School)	700 East 5th Street	0	0	C	$0
Carson City	B & G	Governor's Mansion	600 Mountain St.	1907	19361	C	$5,808,300
Carson City	B & G	Kinkead	505 East King Street	1974	84966	C	$25,489,800
Carson City	B & G	Octagon, Capitol Annex	101 N. Carson	1906	9864	C	$2,959,200
Carson City	B & G	Old Carson City Courthouse	198 N. Carson Street	1920	14680	C	$4,404,000
Carson City	B & G	Old Supreme Court	100 N. Carson St.	0	0	C	$0
Carson City	B & G	Old Supreme Court & Library (Hero's Me	198 S. Carson St.	1935	26299	C	$7,889,700
Carson City	B & G	Paul Laxalt State Building (Tourism)	401 N. Carson St.	1891	19076	C	$5,722,800
Carson City	B & G	Supreme Court	201 S. Carson St.	1991	118900	C	$35,670,000
Carson City	CCYC	Clear Creek Youth Center		1960	67872	C	$20,361,600
Carson City	Mail	Printing Office (old)	402 E. Second St.	0	0	C	$0
Carson City	Mail	State Mail Bldg Remodel	Third Street	1996	0	C	$0
Carson City	MtrPool	Motor Pool	750 E. King St.	1988	3987	C	$1,196,100
Carson City	Print	Printing Office	301 S. Stewart St.	1963	24869	C	$7,460,700
Carson City	Indian	Indian Hills Museum Warehouse	2061 Topsy Lane	1980	15440	C	$4,632,000
Carson City	Library	State Library	100 S. Stewart St.	1993	250507	C	$75,152,100
Carson City	Mus&Hist	Director's Office Building	708 N. Curry Street	1910	1500	C	$450,000
Carson City	Mus&Hist	Nevada State Museum	600 N. Carson St.	1871	43099	C	$12,929,700
Carson City	Museum	Museum Warehouse/Textile Center	2351 Arrowhead Dr.	1960	6000	C	$1,800,000
Carson City	NSRM	V&T Interpretive Center	2180 S. Carson St.	1988	53536	C	$16,060,800
Carson City	Forestry	Genoa Station		1900	0	C	$0
Carson City	Forestry	Washoe Forestry HQ	123 W. Nye Ln.	1979	0	C	$0
Carson City	HonCamp	Honor Camp		0	0	C	$0
Carson City	NNCC	Main Gate House, Corrections Facility	1721 Snyder Ave.	1973	279200	C	$83,760,000
Carson City	NNCC	Regional Medical Facility (Unit 8)	1750 Snyder	1993	61138	C	$18,341,400
Carson City	NNCC	Visitor's Center II, M-13		1974	4768	C	$1,430,400
Carson City	NNCC	Yard office, M-20		0	196	C	$58,800
Carson City	NNHC/OLD	Conservation Camp Warehouse		1986	1152	C	$345,600

Carson City	NNHC/OLD	Conservation Camp, Main office		1983	1296	C	$388,800
Carson City	NNHC/OLD	Sewage Ejection Pumphouse		0	0	C	$0
Carson City	NSP	Corrections Facility	3301 East 5th St. PO Box 607	1925	195322	C	$58,596,600
Carson City	NSP	Work Shops		1950	3877	C	$1,163,100
Carson City	RMF	Regional Medical Facility		1993	63000	C	$18,900,000
Carson City	WSCC	80 bed pre-fab housing	PO BOX 7000	1980	6104	C	$1,831,200
Carson City	WSCC	Admin & Housing/Gatehouse/Education	3301 E. 5th St.	0	100442	C	$30,132,600
Carson City	ESD	State Administrive Office	500 E. Third St.	1960	30924	C	$9,277,200
Carson City	FacMgmt	Computer Facility	575 E. Third St.	1970	12336	C	$3,700,800
Carson City	NNCH	Administration/Cottages/Garage	711 E. 5th St.	0	28578	C	$8,573,400
Carson City	Legis	Legislative Council Bureau Office		0	29207	C	$8,762,100
Carson City	Legis	Legislature Building	401 S. Carson St.	0	183836	C	$55,150,800
Carson City	Legis	Parking Garage	S. Stewart St.	1990	144452	C	$43,335,600
Carson City	NNG	Carson City Ammo	East 5th Street	1973	600	C	$180,000
Carson City	NNG	Carson City OMS/CSMS/Haz Mat Waste Sto	2444 Fairview	1992	39699	C	$11,909,700
Carson City	NNG	Lawrence E. Jacobsen Ctr (aka Area Com	2460 Fairview Drive	2002	79738	C	$23,921,400
Carson City	NNG	OTAG Annex	2478 Fairview Drive	2004	3978	C	$1,193,400
Carson City	NNG	OTAG Building	2478 Fairview Drive	2004	31500	C	$9,450,000
Carson City	DMV	DMV Computer Facility/Warehouse/Office	555 Wright Way	1998	108255	C	$32,476,500
Carson City	PS	Emergency Management	2478 Fairview Drive	2006	0	C	$0
Carson City	PS	Training Facility	2101 Snyder Ave.	1985	11000	C	$3,300,000
Carson City	HQ	Annex Building		1977	8415	C	$2,524,500
Carson City	HQ	Headquarters Building	5151 S. Carson St.	1965	155060	C	$46,518,000
Carson City	WNCC	Brisltecone Main Bldg and Additions, C	2201 W. College Parkway	0	232229	C	$69,668,700
Cold Springs	Maint	Fuel Depot/ Maint. Station		1969	11084	C	$3,325,200
Contact	Maint	Fuel Depot/Maint. Station		1941	4044	C	$1,213,200
Currie	Parks	Office/Shop	825 Hwy 50 East	1995	500	C	$150,000
Deeth	Forestry	Garage/Firestation		0	1800	C	$540,000
Elko	Agri	Agriculture office (Boies Bldg)	1351 Elm St.	1974	3315	C	$994,500

Elko	CNR	Garage/radio shop 619		1983	3840	C	$1,152,000
Elko	CNR	Garage/radio shop 620		1980	1800	C	$540,000
Elko	Forestry	Fire station 621		0	0	C	$0
Elko	Forestry	Fire Station No 1 office/residence		1972	0	C	$0
Elko	Forestry	Fire Station No 2 (622)		1971	720	C	$216,000
Elko	Forestry	Fire Station No 2 residence		1971	0	C	$0
Elko	Forestry	Fire Station Office/Shop		1980	2400	C	$720,000
Elko	Forestry	Interagency Dispatch Center	725 Aspen Way	2000	6800	C	$2,040,000
Elko	Forestry	Shop		1960	3840	C	$1,152,000
Elko	Wildlife	Regional Office	1375 Mt. City Hwy.	1973	2047	C	$614,100
Elko	ESD	Elko Local Office	172 6th St.	1985	4000	C	$1,200,000
Elko	NYTC	Administration		1962	3847	C	$1,154,100
Elko	NNG	Armory	1375 13th St.	1961	12404	C	$3,721,200
Elko	Misc	State Agencies Bldg.	850 Elm St.	1979	20000	C	$6,000,000
Elko	Admin	Administration, District office	1951 Idaho St	1954	80465	C	$24,139,500
Elko	GBC	College Campus	1500 College Parkway	1996	213960	C	$64,188,000
Elko	GBC	High Tech Center	1290 Burns Road	2001	34542	C	$10,362,600
Ely	Forestry	Fire House/Shed		1987	1495	C	$448,500
Ely	Forestry	Forestry office		1987	1220	C	$366,000
Ely	Wildlife	Regional Administrative Office		1955	1440	C	$432,000
Ely	Wildlife	Wildlife Field Office		2000	1719	C	$515,700
Ely	ESP	Bldg #14, Gatehouse/ Corrections Facil	4569 N. State Route 490	1987	395350	C	$118,605,000
Ely	HonCamp	Admin/Housing		1984	22968	C	$6,890,400
Ely	NNG	Armory	125 Mill St.	1959	9877	C	$2,963,100
Ely	Maint	Fuel Depot	1401 Ave. F	1968	10456	C	$3,136,800
Ely	GBC	Goeringer Center	2115 Bobcat Drive	1996	12000	C	$3,600,000
Emigrant Pass	Maint	Fuel Depot/Garage/Maint.	I-80	1953	11160	C	$3,348,000
Eureka	Wildlife	Office		0	0	C	$0
Eureka	Maint	Maintenance Station		1955	2720	C	$816,000
Fallon	Wildlife	Regional Office	380 W. "B" St.	1981	3120	C	$936,000
Fallon	ESD	Fallon Local Office	121 Industrial Way	1978	2264	C	$679,200
Fallon	NNG	Armory	895 E. Richards	1962	10404	C	$3,121,200

Fallon	Maint	Fuel Depot		1963	10000	C	$3,000,000
Fallon	WNCC	Campus #2 bldg		1988	7680	C	$2,304,000
Fallon	WNCC	Community College, classrooms		1980	10800	C	$3,240,000
Fallon	WNCC	Portable bldg		1983	0	C	$0
Fernley	Maint	Fuel Depot		1969	195	C	$58,500
Fernley	Maint	Maintenance Station		1969	3741	C	$1,122,300
Fernley	Maint	Pump House		1969	100	C	$30,000
Galena	Maint	Fuel Depot		1996	48	C	$14,400
Galena Creek	Forestry	Fire Station		1970	0	C	$0
Galena Creek	Forestry	Garage		0	0	C	$0
Gardnerville	Maint	Maintenance Station		1989	6720	C	$2,016,000
Glendale	Maint	Maintenance Station		1947	2850	C	$855,000
Goldfield	Maint	Fuel Depot		1978	144	C	$43,200
Goldfield	Maint	Maintenance station		1978	6220	C	$1,866,000
Hawthorne	NNG	Armory	9th & Sunset	1961	10404	C	$3,121,200
Hawthorne	Maint	Fuel Depot		1957	192	C	$57,600
Hawthorne	Maint	Maintenance Station		1957	2265	C	$679,500
Henderson	NNG	Armory	151 E. Horizon	1971	22690	C	$6,807,000
Henderson	PS	I.A. & Fire Marshal	2398 S. Boulder Hwy	0	0	C	$0
Henderson	CCSN	Henderson Campus	Henderson Campus	0	167000	C	$50,100,000
Incline	Maint	Fuel Depot/Maint.		1962	10204	C	$3,061,200
Incline Village	ESD	Incline Village Local Office	894 Southwood Blvd.	1979	2400	C	$720,000
IndependenceValley	Maint	Fuel Depot/Maint./Vech. Storage		1960	11195	C	$3,358,500
Indian Springs	Forestry	NDF Office/Shops/storage		1988	8050	C	$2,415,000
Indian Springs	HDSP	Correction Facility		2000	300300	C	$90,090,000
Indian Springs	SDCC	Administration A correction Facility	Cold Creek Road	1980	353895	C	$106,168,500
Indian Springs	Maint	House 2		0	930	C	$279,000
Jack's Valley	Forestry	Fire Station		1988	0	C	$0
Jean	HonCamp	Control Office Building B/Housing/Util		2000	30215	C	$9,064,500
Jean	SNCC	Administration/visitor's	No. 1 Prison Row	1978	185950	C	$55,785,000
Kyle Canyon	Parks	Maintenance/Storage Bldg/Admin office		1980	2750	C	$825,000

Lake Mead	Parks	Sewer pump station	Cave Rock	1977	80	C	$24,000
Lake Mead	Parks	Sewer Plant		1996	0	C	$0
Las Vegas	B & G	Belrose Bldg	620 Belrose St.	1973	41075	C	$12,322,500
Las Vegas	B & G	Bradley Building	2501 E. Sahara Ave.	1974	27864	C	$8,359,200
Las Vegas	B & G	Campos	215 East Bonanza	1954	33000	C	$9,900,000
Las Vegas	B & G	CDL, Express (DMV)	4110 Donovan Way	1971	29000	C	$8,700,000
Las Vegas	B & G	Maintenance Bldg/NHP Garage	2621 E. Sahara Ave.	1989	9895	C	$2,968,500
Las Vegas	B & G	Sawyer Office Building	555 E. Washington Ave.	1995	224000	C	$67,200,000
Las Vegas	Maint	Maintenance		1989	0	C	$0
Las Vegas	MtrPool	Motor Pool	5085 Rent-A-Car Road	1981	1410	C	$423,000
Las Vegas	Agri	Agriculture	2300 McLeod St.	1974	5722	C	$1,716,600
Las Vegas	Forestry	Fire Station		0	0	C	$0
Las Vegas	Forestry	OfficeWarehouse/shop	4747 Vegas Drive	2000	28600	C	$8,580,000
Las Vegas	HonCamp	Restitution Center		0	0	C	$0
Las Vegas	HumRes	Office Bldg		1974	33090	C	$9,927,000
Las Vegas	LVMHC	Admin/Day Care/O P Unit, Bldg #1		1970	0	C	$0
Las Vegas	LVMHC	Adult/Child Inpatient, Bldg #3		1970	0	C	$0
Las Vegas	LVMHC	Central kitchen facility		1976	0	C	$0
Las Vegas	LVMHC	Central Kitchen/commissary	1391 S. Jones Blvd.	1976	0	C	$0
Las Vegas	LVMHC	Storage		1974	0	C	$0
Las Vegas	LVMHC	Warehouse/shop		1982	0	C	$0
Las Vegas	MHMR	Emotionally Disturbed Children		1974	0	C	$0
Las Vegas	SNAMHS	#17 Desert Willow Treatment Center	6161 West Charleston Blvd.	1998	198000	C	$59,400,000
Las Vegas	SNCAS	Clinical & Orthogenic Center, Bldg #7	6171 W. Charleston Blvd.	1974	20500	C	$6,150,000
Las Vegas	SNMRS	Desert Development Center	1391 S. Jones Blvd.	1976	54656	C	$16,396,800
Las Vegas	DMV	DMV & PS - W/H	8250 W. Flamingo	0	40723	C	$12,216,900
Las Vegas	DMV	DMV Registration/Vehicle Inspection Ce	2701 E. Sahara Ave.	1976	50282	C	$15,084,600
Las Vegas	PS	NDI - Investigation Division	2855 S. Jones Blvd.	1967	2630	C	$789,000

Las Vegas	SIIS	Industrial Therapy bldg #2		1976	9000	C	$2,700,000
Las Vegas	SIIS	Office	1700 W. Charleston Ave.	1983	72000	C	$21,600,000
Las Vegas	SIIS	Rehabilitation Center Bldg #1		1976	96830	C	$29,049,000
Las Vegas	Maint	Computer Building		1981	2500	C	$750,000
Las Vegas	Maint	Construction Office		1958	3311	C	$993,300
Las Vegas	Maint	Crew Building		1986	12000	C	$3,600,000
Las Vegas	Maint	Fuel Depot		1985	1800	C	$540,000
Las Vegas	Maint	Lab		1958	2996	C	$898,800
Las Vegas	Maint	Main Office		1941	11262	C	$3,378,600
Las Vegas	Maint	Maintenance Station		1988	44700	C	$13,410,000
Las Vegas	Maint	Metal Tire St		1985	400	C	$120,000
Las Vegas	Maint	Right-of-Way Office		1958	3284	C	$985,200
Las Vegas	CCSN	Campus	Charleston Campus	0	385000	C	$115,500,000
Las Vegas	CCSN	Palo Verde High Tech Center	Summerlin	1998	33000	C	$9,900,000
Las Vegas	CCSN	Wellness Center	Sahara West Campus	1986	7500	C	$2,250,000
Las Vegas	CCSN	Western High Tech Center	Western	1998	33000	C	$9,900,000
Las Vegas	DRI	Southern Nevada Science Center	755 E. Flamingo Rd.	1991	44280	C	$13,284,000
Las Vegas	UNLV	University of Las Vegas		1982	3683704	C	$1,105,111,200
Lee Canyon	Forestry	Fire Station		1979	1900	C	$570,000
Lovelock	LCC	Correction Facility	1200 Prison Road	1993	402700	C	$120,810,000
Lovelock	Maint	Fuel Depot		1958	4500	C	$1,350,000
Mina	Maint	Fuel Depot/ Maint.		1953	7800	C	$2,340,000
Minden	Forestry	Hanger/Dispatch Center	2311 Firebrand Road	1990	6400	C	$1,920,000
Minden	WNCC	Douglas County Branch	1680 Bently Parkway S.	1997	15000	C	$4,500,000
Montezuma Mtn	Comm	Prefab Building		0	120	C	$36,000
Montgomery Pass	Parks	Pump house		1977	160	C	$48,000
Mount Charleston	Maint	Fuel Depot/Maint. Station		1967	7238	C	$2,171,400
Mount Rose	Maint	Maintenance Station		1954	1848	C	$554,400
Nixon	Maint	Maintenance Station		1966	2440	C	$732,000

North Fork	Maint	Fuel Depot/Maint. Station	Mtn City Hwy	1955	3640	C	$1,092,000
North Las Vegas	NNG	Clark County Armory	6400 Range Road	1997	14262	C	$4,278,600
North Las Vegas	DMV	Commercial License office		1995	5486	C	$1,645,800
North Las Vegas	CCSN	College Campus	Cheyenne Campus	1988	278762	C	$83,628,600
North Las Vegas	Veterans	Southern Nevada Veteran's Home	Nellis AFB	2000	115500	C	$34,650,000
Orovada	Maint	Fuel Depot /Maint. /Houses		1955	9703	C	$2,910,900
Panaca	Maint	Maintenance Station		1986	6660	C	$1,998,000
Peavine Mtn.	Forestry	Fire Station		1961	0	C	$0
Pequop	Maint	Fuel Depot		1953	5767	C	$1,730,100
Pioche	Forestry	Conservation Camp Forestry Office		1987	2400	C	$720,000
Pioche	HonCamp	Main Housing Unit Correctional Facilit		1995	28037	C	$8,411,100
Quinn River	Maint	Fuel Depot	State Route 140	1955	224	C	$67,200
Quinn River	Maint	Maintenance Station	State Route 140	1955	2055	C	$616,500
Reno	B & G	Special Children's Clinic	2667 Enterprise Rd.	1980	12705	C	$3,811,500
Reno	Wildlife	Radio Shop/Warehouse		1969	1152	C	$345,600
Reno	NNRC	Culinary / Dishwashing / Maint./Genera	2595 E. Second St.	0	27064	C	$8,119,200
Reno	ESD	Reno Local Office	70 W. Taylor St.	1964	14373	C	$4,311,900
Reno	NNCAS	Addition		1996	3420	C	$1,026,000
Reno	NNCAS	Administration Bldg C at UNR		1977	13792	C	$4,137,600
Reno	NNCAS	Housing Unit A at UNR		1977	0	C	$0
Reno	NNCAS	Housing Unit B at UNR		1977	0	C	$0
Reno	NNG	Plumb Lane Armory	685 E. Plumb Lane	1995	15457	C	$4,637,100
Reno	DMV	DMV - Reg, DL /Inspection Station	305 Galletti Way	1975	30567	C	$9,170,100
Reno	PS	Regional Headquarters / Radio Garage	357 Hammill Lane	1994	19763	C	$5,928,900
Reno	Maint	District Office		1965	11100	C	$3,330,000
Reno	Maint	Fuel Depot 1		1963	120	C	$36,000
Reno	Maint	Fuel Depot 2		1988	75	C	$22,500
Reno	Maint	Maintenance Station		1963	29726	C	$8,917,800
Reno	DRI	DRI Northern Science Center and Additi	7010 Dandini Blvd.	0	167238	C	$50,171,400
Reno	TMCC	Collage Campus	7000 Dandini Blvd.	1996	462467	C	$138,740,100
Reno	UNR	University of Nevada, Reno		1960	4010839	C	$1,203,251,700

Ruby Lake	Maint	Fuel Depot / Maint.		1958	608	C	$182,400
Ruby Lake	Maint	Maintenance station		1958	2700	C	$810,000
Searchlight	Maint	Maintenance Station		1945	1140	C	$342,000
Shoshone	Comm	Prefab Building		0	100	C	$30,000
Silver Springs	Forestry	Administration Bldg. at Honor Camp		1991	2400	C	$720,000
Silver Springs	Forestry	Garage at Honor Camp		0	1200	C	$360,000
Silver Springs	Forestry	Hazardous Materials Shed at Honor Camp		1991	96	C	$28,800
Silver Springs	Parks	Base camp for seasonal employees		1976	588	C	$176,400
Silver Springs	SSCC	Culinary/Dining		1991	4150	C	$1,245,000
Silver Springs	SSCC	Correctional Facility		1991	18967	C	$5,690,100
Sobre Peak	Parks	Office Complex		1994	3464	C	$1,039,200
Sobre Peak	Comm	Prefab Building		0	150	C	$45,000
Sparks	Agri	Warehouse / Eqpt Yard	295 Galletti Way	1960	1300	C	$390,000
Sparks	Agri	Weights & Measures	2150 Frazer St.	1971	4100	C	$1,230,000
Sparks	ESD	Reno/Sparks Industrial Office	420 Galletti Way	0	3900	C	$1,170,000
Sparks	MHMRD	Lakes Crossing Security Unit, Bldg#130	500 Galletti Way	0	23994	C	$7,198,200
Sparks	NMHI	Administration Bldg #1 Human Resources	480 Galletti Way	0	215374	C	$64,612,200
Sparks	NMHI	SLA Duplex, Bldg #14, (leased to SRC)	605 S. 21st St.	1951	1524	C	$457,200
Sparks	SRC	Administration Bldg. 605 Storage Shed		1988	720	C	$216,000
Sparks	SRC	Administration Bldg. 605 Storage Shed		1985	576	C	$172,800
Sparks	SRC	SRC Administration, Bldg #605	605 S. 21st St.	1979	7117	C	$2,135,100
Sparks	SRC	SRC Bldg #604, ICF/MR 2 6-bed homes	604 S. 21st St.	1981	4829	C	$1,448,700
Sparks	SRC	SRC ICF/MR 2 6-Bed Home Bldg #606	606 S. 21st Street.	1981	4829	C	$1,448,700
Sparks	SRC	SRC ICF/MR Dual Diagnosis Bldg #345	345 S. 21st St.	1990	2428	C	$728,400
Sparks	SRC	SRC ICF/MR Dual Diagnosis, Bldg #325	325 S. 21st St.	1990	2428	C	$728,400
Sparks	SRC	SRC ICF/MR Dual Diagnosis, Bldg #335	335 S. 21st St.	1990	2428	C	$728,400
Sparks	SRC	SRC ICF/MR, Bldg #602, 2 6-bed	602 S. 21st St.	1979	6725	C	$2,017,500

		homes					
Sparks	SRC	SRC ICF/MR, Bldg #603, 6-bed home	603 S. 21st St.	1979	3444	C	$1,033,200
Sparks	SRC	SRC Training & Admin, Bldg #600-601	600 S. 21st St.	1970	13386	C	$4,015,800
Spooner	Maint	Fuel Depot		1993	4562	C	$1,368,600
SpoonerSummit	Forestry	Fire Station		1972	2714	C	$814,200
Stead	NNG	Armory	20000 Army Aviation Dr.	1984	93592	C	$28,077,600
Stead	NNG	Operations and Maintenance Shop #5	19960 Army Aviation Dr.	1994	5800	C	$1,740,000
Stead	NNG	Washoe County Training Center	19980 Army Aviation Dr.	1997	55766	C	$16,729,800
Stead	JobCorp	Bldg #1, Admin, Roberts/ College Campu		1965	136500	C	$40,950,000
Stead	Stead	College Campus Rooms		1959	176820	C	$53,046,000
Stewart	GovCom	Building #012, POST	107 Jacobsen Way	1941	14572	C	$4,371,600
Stewart	NNHC/OLD	Administration/housing/.corrections fa	5500 Snyder Ave.	1968	14632	C	$4,389,600
Stewart	PS	Building #107, OTS/ONCA/SERC/NHP	107 Jacobsen Way	1963	47832	C	$14,349,600
Tonopah	Forestry	Administration Building	Hwy 376	1990	2452	C	$735,600
Tonopah	HonCamp	Culinary/Housing Units/multi - Purp. r	Hwy 376	1990	25948	C	$7,784,400
Tonopah	Maint	Fuel depot / Maint Office /Material St		1954	38942	C	$11,682,600
Verdi	Forestry	Auxiliary fire station		1987	0	C	$0
Verdi	Forestry	Fire Station		1980	0	C	$0
Verdi	Forestry	Fire Station residence		0	0	C	$0
Virginia City	Maint	Fuel Depot		1960	100	C	$30,000
Virginia City	Maint	Maintenance Station		1960	1396	C	$418,800
Warm Springs	Parks	Maintenance Office/Pump House	4855 Eastlake Blvd.	1978	400	C	$120,000
Warm Springs	Parks	Office/Pumphouse/Residence	3870 Lakeshore Dr.	1996	1600	C	$480,000
Warm Springs	Parks	Service bldg/shop/office		1979	1920	C	$576,000
Warm Springs	Maint	Blue Jay Maintenance Station Gas Depot		1962	3951	C	$1,185,300
Wellington	Maint	Fuel Depot / Maint. Station / Pump Hou		1950	4220	C	$1,266,000
Wells	Forestry	Administration		1985	2400	C	$720,000
Wells	Forestry	Cook Shed	Carlin Conservation Camp	0	144	C	$43,200

Wells	Forestry	Fuel Pump House		1988	98	C	$29,400
Wells	Forestry	Garage saw shop		1986	960	C	$288,000
Wells	HonCamp	Housing Unit/Culinary/Admin./ Multi Pu		1984	21120	C	$6,336,000
Wells	Maint	Fuel Depot	541 Wells Avenue	1953	8260	C	$2,478,000
Wildhorse	Parks	Main office/shop complex/Residences		1982	4929	C	$1,478,700
Winnemucca	Forestry	Administration		1986	1800	C	$540,000
Winnemucca	Forestry	Fuel Island Bldg / Shops /Office	Humboldt Conservation Camp	0	3047	C	$914,100
Winnemucca	HonCamp	Administration/Housing / Cafeteria / G		1986	26834	C	$8,050,200
Winnemucca	NNG	Armory	735 W. 4th St.	1959	16277	C	$4,883,100
Winnemucca	Maint	Equipment Repair Shop/Fuel Depot. Main	725 W. 4th St.	1979	26156	C	$7,846,800
Winnemucca	Maint	Office	1141 W. Winnemucca Blvd	1957	6528	C	$1,958,400
Winnemucca	GBC	ABE/ESL Trailer	5490 Kluncy Canyon Road	1994	720	C	$216,000
Winnemucca	GBC	Winnemucca Center	5490 Kluncy Canyon Road	1995	12400	C	$3,720,000
Yerington	NNG	Armory	14 Joe Parr Way	1959	16169	C	$4,850,700
		SUB TOTAL CRITICAL FACILITY LOSS ESTIMATION					**$5,143,418,700**
		Non-Critical Facility Loss Estimation					
Alamo	RestArea	Pump House		0	240	N	$72,000
Baker	Wildlife	Hatchery	Spring Creek Rearing Station	0	0	N	$0
Beatty	Parks	Shop converted to residence		0	600	N	$180,000
Beatty	Parks	Storage trailer		1953	0	N	$0
Belmont	RestArea	Well House		1977	213	N	$63,900
Berlin	Parks	Adobe house		1900	544	N	$163,200
Berlin	Parks	Assay Office		1900	576	N	$172,800
Berlin	Parks	Ball mill (main Berlin mill)		1900	9945	N	$2,983,500
Berlin	Parks	Camp's cabin		1900	458	N	$137,400
Berlin	Parks	Camp's shed		1900	560	N	$168,000

Berlin	Parks	Fossil House		1970	4300	N	$1,290,000
Berlin	Parks	Fossil Out Building		1970	280	N	$84,000
Berlin	Parks	Foster's Blacksmith Shop		1900	483	N	$144,900
Berlin	Parks	Generator Plant House		1900	480	N	$144,000
Berlin	Parks	Goat house		1900	462	N	$138,600
Berlin	Parks	Hoist shack		1900	336	N	$100,800
Berlin	Parks	House Trailer		0	0	N	$0
Berlin	Parks	Italian house		1900	0	N	$0
Berlin	Parks	Machine shop		1900	2150	N	$645,000
Berlin	Parks	Mill		1900	0	N	$0
Berlin	Parks	Office (Mine Superintendents Office)		1900	880	N	$264,000
Berlin	Parks	Phillips house		1900	483	N	$144,900
Berlin	Parks	Ranger residence (Mine Forman's House)		1900	750	N	$225,000
Berlin	Parks	Telegraph bldg		1900	0	N	$0
Berlin	Parks	Terry trailer		1966	400	N	$120,000
Berlin	Parks	Tiffel's cabin / stagecoach stop		1900	693	N	$207,900
Berlin	Parks	Warehouse		1800	464	N	$139,200
Blue Jay	Museum	Gift Shop/ History Center	600 Yucca Street	2001	300	N	$90,000
Boulder City	RestArea	Welcome Center		1989	1764	N	$529,200
Carlin	Forestry	Carlin Conservation Camp	Carlin Conservation Camp	0	1700	N	$510,000
Carson City	Forestry	Washoe Valley Nursery		1979	0	N	$0
Carson City	Farm	Farm, Barns Etc..	Dairy Farm, 1721 Snyder Ave.	1998	1200	N	$360,000
Carson City	HQ	Hanger (at Carson Airport)		1978	4320	N	$1,296,000
Carson City	Maint	DOT Quonset, storage, training trailer		0	27400	N	$8,220,000
Cathedral Gorge	Parks	Maint. Office and Ranger Station		0	8000	N	$2,400,000
Currie	Maint	Maint. Station		1958	4128	N	$1,238,400
Deeth	Forestry	Storage		0	0	N	$0
Eagle Peak	Comm	Prefab Building		0	100	N	$30,000
Echo Canyon	Parks	Fish Cleaning Station/Office/Res.		1990	2293	N	$687,900
Elko	Wildlife	Storage/garage		1975	1728	N	$518,400
Elko	NYTC	Adventurer cottage Super. House Classr		1966	3990	N	$1,197,000
Elko	NYTC	Asst. Superintendent House		0	102190	N	$30,657,000

Ely	Museum	Railroad Museum Ely Freight Barn	100 Ave. A.	0	20865	N	$6,259,500
Eureka	Maint	Vehicle Storage		1969	2040	N	$612,000
Fallon	Wildlife	Annex		1954	0	N	$0
Fallon	Wildlife	Boat Storage Facility		1993	2250	N	$675,000
Fernley	Maint	Vehicle Storage		1969	1776	N	$532,800
Fernley	Veterans	Cemetery Administration Bldg.	14 Veterans' Way	1990	2576	N	$772,800
Floyd Lamb	Forestry	Floyd Lamb Nursery	9600 Tule Springs Road	1975	28832	N	$8,649,600
Floyd Lamb	Parks	Adobe Hut		1940	0	N	$0
Floyd Lamb	Parks	Caretaker's house		1940	1204	N	$361,200
Floyd Lamb	Parks	Dairy barn		1940	0	N	$0
Floyd Lamb	Parks	Duplex		0	0	N	$0
Floyd Lamb	Parks	Foreman's house		1940	1780	N	$534,000
Floyd Lamb	Parks	Generator bldg		0	0	N	$0
Floyd Lamb	Parks	Guest house		0	1854	N	$556,200
Floyd Lamb	Parks	Gun Club - Club House		1955	5000	N	$1,500,000
Floyd Lamb	Parks	Hay barn		0	0	N	$0
Floyd Lamb	Parks	Machine Shop		1940	4440	N	$1,332,000
Floyd Lamb	Parks	Manager / Visitor Center		1940	1755	N	$526,500
Floyd Lamb	Parks	Power house		1940	0	N	$0
Floyd Lamb	Parks	Pump house 174		1940	40	N	$12,000
Floyd Lamb	Parks	Pump house 176		0	420	N	$126,000
Floyd Lamb	Parks	Pump house, well #171		0	630	N	$189,000
Floyd Lamb	Parks	Ranger Residence		1978	750	N	$225,000
Floyd Lamb	Parks	Residence FLSP		0	0	N	$0
Floyd Lamb	Parks	Spring house & well		1940	280	N	$84,000
Floyd Lamb	Parks	Stables		1940	3320	N	$996,000
Floyd Lamb	Parks	Water tower		1940	370	N	$111,000
Floyd Lamb	Parks	Buckland Station Historic Building		1870	4056	N	$1,216,800
Floyd Lamb	Parks	Mobile Home		1978	0	N	$0
Floyd Lamb	Parks	Museum/Visitor Center		1935	1300	N	$390,000
Floyd Lamb	Parks	Pumphouse, Ghiglia Ranch		1965	100	N	$30,000
Floyd Lamb	Parks	Ranger residence - Van Dyke trailer		1972	952	N	$285,600
Floyd Lamb	Parks	Residence #1, Depaoli Ranch		1983	1600	N	$480,000

Floyd Lamb	Parks	Residence #2, Depaoli Ranch		1983	2166	N	$649,800
Floyd Lamb	Parks	Residence #3, Depaoli Ranch		1983	2128	N	$638,400
Floyd Lamb	Parks	Residence #5	Hwy 95	1950	1026	N	$307,800
Floyd Lamb	Parks	Shop/Office		1992	1200	N	$360,000
Floyd Lamb	Parks	Storage bldg		1935	0	N	$0
Galena	Maint	Vehicle Storage		1996	5088	N	$1,526,400
Glendale	Maint	Vehicle Storage		1947	5244	N	$1,573,200
Hawthorne	Maint	Vehicle Storage		1957	2127	N	$638,100
Henderson	DMV	Henderson Office	1399 American Pacific	1997	19305	N	$5,791,500
Indian Springs	Forestry	Storage Trailer		0	8240	N	$2,472,000
Indian Springs	Maint	House 1		1956	1300	N	$390,000
Indian Springs	Maint	Maintenance Station		1956	3600	N	$1,080,000
Key Pittman	Wildlife	Incubator, chicken coop/residence	PO Box 31, Hiko, NV	0	0	N	$0
Key Pittman	Wildlife	Pumphouse/Residence/Bunkhouse	PO Box 89	0	4555	N	$1,366,500
Kyle Canyon	Forestry	Fire Station		1963	2800	N	$840,000
Kyle Canyon	Parks	District Headquarters		1930	860	N	$258,000
Kyle Canyon	Parks	Employee Residence #1		1981	1056	N	$316,800
Kyle Canyon	Parks	Residence #2		1981	1056	N	$316,800
Kyle Canyon	Parks	Residence #3		1923	890	N	$267,000
Kyle Canyon	Parks	Trailer		1978	0	N	$0
Kyle Canyon	Parks	Well House		1960	0	N	$0
Lake Mead	Wildlife	Hatchery		0	0	N	$0
Lake Mead	Parks	Fee Station	Cave Rock	1991	102	N	$30,600
Lake Mead	Parks	Pump House		1977	24	N	$7,200
Lake Mead	Parks	Well House		1977	1000	N	$300,000
Las Vegas	SoNev	Nev. State Museum & Hist. Society	700 Twin Lakes Dr.	1982	32824	N	$9,847,200
Las Vegas	Maint	Vehicle Storage A		1985	4000	N	$1,200,000
Las Vegas	Maint	Vehicle Storage B		1985	5000	N	$1,500,000
Lund	Wildlife	Hatchery		1990	45855	N	$13,756,500
Lund	Maint	Maintenance Station		1978	2507	N	$752,100
Mesquite	RestArea	Welcome Center		1989	1767	N	$530,100
Mesquite	RestArea	Pump House		1970	120	N	$36,000

Montgomery Pass	Parks	Museum		1937	450	N	$135,000
Montgomery Pass	Maint	Maint. Station	Hwy 6	1957	8400	N	$2,520,000
Mount Rose	Maint	Sand Storage		1987	1729	N	$518,700
Mountain Springs	Maint	Garage /Maint. Station and Houses		1957	5932	N	$1,779,600
North Fork	Maint	Houses	Hwy 225	1955	1872	N	$561,600
North Fork	Maint	Trailer 1		1982	1000	N	$300,000
North Fork	Maint	Trailer 2		1990	1000	N	$300,000
Overton	LostCity	Lost City Buildings	721 S. Moapa Valley Blvd.	1981	23000	N	$6,900,000
Overton	Wildlife	Employee Storage /Granary /Main Office		1940	8089	N	$2,426,700
Pahrump	CCSN	High Tech Learning Center	551 E. Calvada Blvd.	2001	32004	N	$9,601,200
Peavine	Comm	Prefab Building		0	100	N	$30,000
Pilot Peak	Comm	Prefab Building		1996	200	N	$60,000
Pine Grove	Comm	Prefab Building		0	100	N	$30,000
Quinn River	Maint	House 1		1955	1560	N	$468,000
Quinn River	Maint	House 2		1955	1560	N	$468,000
Quinn River	Maint	House 3	State Route 140	1970	1014	N	$304,200
Quinn River	Maint	House 4	State Route 140	1970	1014	N	$304,200
Quinn River	Maint	Vehicle storage	State Route 140	1955	2592	N	$777,600
Reno	B & G	Warehouse	2250 Barnett Way	1960	29128	N	$8,738,400
Reno	HistSoc	Historical Society Bldg	1650 N. Virginia St.	1968	22300	N	$6,690,000
Reno	Forestry	1-bay garage		0	5663	N	$1,698,900
Reno	Wildlife	Boat storage facility		1993	2400	N	$720,000
Reno	Wildlife	Hunter Education Addition		1990	4882	N	$1,464,600
Reno	Wildlife	Regional Office Addition		1972	1195	N	$358,500
Reno	Wildlife	Regional Office/annex	1100 Valley Rd.	1963	8643	N	$2,592,900
Reno	Maint	Building B		1963	20000	N	$6,000,000
Reno	Maint	Building C		1963	5120	N	$1,536,000
Reno	Maint	Building D		1988	10502	N	$3,150,600
Reno	Maint	Vehicle Storage		1978	26835	N	$8,050,500
Ruby Lake	Wildlife	Gallager Hatchery		1966	24110	N	$7,233,000
Ruby Lake	Parks	Office, shop		1978	1080	N	$324,000
Ruby Lake	Parks	Well House		1980	0	N	$0

Ruby Lake	Maint	House 1		1958	1000	N	$300,000
Ruby Lake	Maint	House 2		1958	1000	N	$300,000
Ruby Lake	Maint	House 3		1958	1000	N	$300,000
Ruby Lake	Maint	Vehicle Storage		1958	2440	N	$732,000
Searchlight	Maint	House 1		1945	1250	N	$375,000
Searchlight	Maint	Vehicle Storage		1945	1890	N	$567,000
Silver Springs	Parks	Mechanical bldg at beach 7		1978	480	N	$144,000
Silver Springs	Parks	Residence #1, Marlette mobile		1971	940	N	$282,000
Silver Springs	Parks	Residence #2, Broadmoor mobile		1972	980	N	$294,000
Silver Springs	Parks	Residence #3, Century modular		1981	900	N	$270,000
Silver Springs	Parks	Shop		1980	1200	N	$360,000
Sobre Peak	Parks	Pumphouse		1992	104	N	$31,200
Sobre Peak	Parks	Residence, Lower		1937	1127	N	$338,100
Sobre Peak	Parks	Residence, upper		1937	439	N	$131,700
Sobre Peak	Parks	Shop		1937	912	N	$273,600
Sparks	Parks	Residence #4, Buckland Residence		0	0	N	$0
Spooner Summit	Parks	Group shelter C-14 /Rangers Office / V		1983	2592	N	$777,600
Spring Valley	Parks	Barn, lean-to, calving shed Chicken co		1940	4451	N	$1,335,300
Steptoe Valley	Wildlife	Bunk House CCC Office /Dugout /Office	Steptoe WMA	1970	7030	N	$2,109,000
Stewart	B & G	Stewart Indian Cultural Ctr.		1923	188602	N	$56,580,600
Stewart	Parks	Garage /Res. /Office/Visitor Center	2005 Hwy 28	1970	8563	N	$2,568,900
Tonopah	Parks	Flammable storage		1972	480	N	$144,000
Tonopah	Parks	Main shop/storage		1972	6000	N	$1,800,000
Tonopah	Parks	Mobile home, Van Dyke #1		1980	980	N	$294,000
Tonopah	Parks	Mobile home, Van Dyke #2		1971	980	N	$294,000
Tonopah	Parks	Residence #3		1992	1400	N	$420,000
Tonopah	Parks	Residence #4		1992	1400	N	$420,000
Tonopah	Parks	Shop bldg, new		1995	192	N	$57,600
Tonopah	Parks	Storage (Old Water treatment plant)		1964	323	N	$96,900
Virginia City	Comstock	South "C: Street	South "C" Street	1950	300	N	$90,000
Virginia City	Maint	Vehicle Storage		1960	1176	N	$352,800
Ward	Parks	Residence	Ward Charcoal Ovens	0	0	N	$0

Warm Springs	Parks	Ranger Residence		1979	1820	N	$546,000
Warm Springs	Comm	Prefab Building		0	96	N	$28,800
Washoe Valley	Forestry	Headquarters		1980	11534	N	$3,460,200
Wendover	Maint	Maintenance station		1988	9600	N	$2,880,000
Winnemucca	Maint	Vehicle Storage E	725 W. 4th St.	1957	9900	N	$2,970,000
	Forestry	Conservation Camp Storage		2002	1500	N	$450,000
Carson City	SIIS	SIIS North		0	14190	U	$4,257,000
Carson City	SIIS	SIIS South	515 E. Musser St.	1959	42550	U	$12,765,000
Las Vegas	ESD	Las Vegas Industrial	1001 North "A" Street	1975	2400	U	$720,000
Carson City		**Sub total Non-Critical Facility Loss Estimation**					$304,690,500
		TOTAL STATE FACILITY LOSS ESTIMATION FOR WILDFIRE					**$5,448,109,200**