



# CLARK COUNTY NATURAL & MAN-MADE HAZARDS REPORT

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**Clark County**  
**Department of Comprehensive Planning**  
500 South Grand Central Parkway, Suite 3012  
PO Box 551741 Las Vegas, NV 89155-1741  
(702) 455-4314 Fax: (702) 385-8940  
<http://www.accessclarkcounty.com>

# ACKNOWLEDGMENTS

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## **County Commissioners:**

Rory Reid, Chair  
Susan Brager, Vice-Chair  
Lawrence L. Brown, III  
Tom Collins  
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Steve Sisolak  
Lawrence Weekly

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George Stevens, Chief Financial Officer  
Don Burnette, Chief Administrative Officer

## **Department of Comprehensive Planning:**

Nancy Lipski, Director  
Bruce Sillitoe, Planning Manager  
Jon Wardlaw, Assistant Planning Manager

## **Element Team:**

Daniel Sinagra, Senior Planner, Lead  
Garrett TerBerg, Principal Planner  
Daniel Kezar, Senior Planner

## **Technical Team:**

Allen Wheeler, System Coordinator  
Ann Bachir, Management Analyst II  
Darci Mayer, Planner  
Ed Zagalo, Strategic Service Manager, CCFD  
Jim O' Brien, Manager, Administrative Services Emergency Management  
Judy Currier, Management Analyst, SNWA  
Kathy Perkins, Crime Prevention Specialist, LVMPD  
Lorna Phegley, Management Analyst II  
Michael Houghtaling, Senior, Engineer, Development Services  
Mindy Meacham, Health Educator II, HDSN  
Nikki Marshall, Financial Analyst II, Finance  
Sharon Krisko, Administrative Secretary

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# BACKGROUND

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Over the past three decades, Clark County has been one of the fastest growing counties in the United States. By the year 2035, combined resident and average daily visitor population of Clark County is projected to approach 4 million (Clark County, 2009).

A number of natural and man-made hazards with the potential to cause loss of life, injuries and substantial property damage exist within Clark County.

## Defining the Framework

For planning purposes this report divides “Hazard” into three parts: the situation, the problem, and the solution. The Natural and Man-Made Hazards Element is a high level strategic plan intended to identify hazardous situations in Clark County. Many of these situations can be avoided or addressed through actions, policies and programs such as the Land Use Plans, Unified Development Code, Fire Code, and the International Building Code. Specific problems and solutions are addressed in a variety of ways as outlined by the Clark County Multi-Jurisdictional Hazard Mitigation Plan (Clark County, 2005) and related documents.

## Hazardous Situations

Natural and man-made hazards occur with the interaction of three broad systems: the natural environment, built environment, and social system. Most risks come from anticipated but unpredictable events that impact people or property. Some hazardous situations and precursors can be identified by their settings or locations. Hazardous situations are divided into the following three categories:

- a) Natural Hazards** are divided in land subcategories: earthquake, landslides, subsidence and fissures, urban fire and wildfire; and in the weather subcategories: floods, drought, extreme heat and wind.
- b) Man-Made Hazards** are classified with the following subcategories: mining, construction, transportation, hazardous material transport, manufacturing and utility corridors.
- c) Others** including air quality, communicable diseases and crime.

## Natural Hazards: Land and Weather

### Land: Earthquakes, Landslides, Subsidence and Fissures, Urban Fire and Wildfire

#### Earthquakes

Seismic activity in the Las Vegas Valley is related to both natural and man-made causes. Natural causes related to seismic activity are due to shifts of the earth’s crust. Tectonic faulting is found throughout Clark County. Understanding the risk from these faults will help to avoid exposure to these hazards and minimize potential damages (Clark County, 2010). Man-made seismic activity has been caused in the past by explosions related to underground nuclear testing.

## **Landslides**

Natural physical processes such as heavy rainfall, slope erosion, snowmelt, and earthquakes can trigger landslides. They can also be caused by man-made activities such as earthwork, blasting, or water leakage from utilities.

## **Subsidence**

Subsidence occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as fine grained sediments. The rock compacts because water is partly responsible for holding the ground up. When the water is withdrawn, the rock falls on itself. Subsidence was first documented in the Las Vegas Valley in 1935 and over time has led to as much as 2 meter subsidence (Bell 84). While a broad regional subsidence bowl occupies the central portion of the Las Vegas Valley, three localized subsidence bowls are superimposed on this area, and are located in the central (downtown), southern (Las Vegas Strip) and the northwestern part of the valley.

## **Fissures**

Fissures have been observed in the Las Vegas Valley since 1925, and form small tension cracks in the sediment above the water table, and are thought to enlarge due to mechanical piping. Eight principal zones of fissuring exist in the Las Vegas Valley and are closely coincident with known or inferred geologic faults." These faults are also the preferred sites for fissuring, which has affected several existing residential developments and poses a potential threat to numerous other potential development sites in the valley (Bell 84).

## **Urban Fire**

An urban fire is simply a significant fire that occurs in the built environment. Urban fires can threaten health and safety and cause property damage by destroying homes, schools, commercial buildings, and vehicles. In the urban environment, these fires also can pose a threat to adjacent properties.

## **Wildfire**

Wildfires are rapidly spreading fires with devastating impacts in an area of wilderness. Wild land fires are a continuing hazard to natural resources and development located near natural areas (Clark County, 2008).

## **Weather: Flood, Drought, Extreme Heat, and Wind**

### **Flood**

In general, the valleys in Clark County are located in basins with a single drainage outlet. Rainfall in the surrounding mountain ranges can cause flooding as water flows off the mountains onto the valley floor. In areas of urban development, flood impacts increase for residents located near flood-prone areas.

### **Drought**

Clark County lies mainly within the Mojave Desert and has a naturally dry climate with average rainfall of less than five inches per year.

## **Extreme Heat**

During the summertime, heat waves can bring unusually high temperatures (10 degrees or more above the average high temperature of 106 degrees) that last for days or weeks (Nevada State, 2009). Extreme heat conditions combined with humidity can have severe effects on the human body. Extreme heat can result in heat-related illnesses including heat exhaustion and heat stroke. In addition, asphalt and concrete surfaces store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect." 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.

## **Wind**

Wind hazards for Clark County are generally produced by dust devils, weather systems, thunder storms, and very rarely, tornadoes. These winds can cause injuries, deaths, business interruption, and property damage. Winds exceeding 25 mph are considered hazards and a wind advisory is required. Wind advisories, watches, and warnings for Clark County, Nevada are issued by the National Weather Service.

## **Man-Made Hazards: Mining, Construction, Transportation, Hazardous Material Transport, Manufacturing, and Utility Corridors.**

### **Mining**

Over time, abandoned mine features become unstable from exposure to the elements and decay of support timbers. Mine features include shafts and structures. It is estimated that 200,000 to 300,000 mining related features exist in the state. The State of Nevada Commission of Mineral Resources monitors mine related hazards. In Clark County 2,045 hazards were discovered, and 1,379 were secured to avoid potential hazards (Nevada State Commission on Mineral Resources, 2009).

### **Construction**

Construction sites (building and infrastructure) present a setting for many potential hazards that can cause personal injuries, liabilities, and property damage. According to the Occupational Safety and Hazards Administration (OSHA), main construction related hazards are: falls from height or vehicles, electrical hazards, chemical exposure, excavation hazards and improper handling of construction equipment.

## **Transportation: Ground, Air, and Rail**

### **Ground**

Hazards arise in this category from the interactions of vehicles and their surroundings, (e.g. accidents). Vehicles typically found on roadways include: cars, trucks, buses, motorcycles and bikes.

### **Air**

There are a number of private, public, military airports/airfields and heliports in Clark County. Flight operations at these facilities range from few to hundreds per day. The largest of these facilities are McCarran International Airport and Nellis Air Force Base.

## **Rail**

The major rail system in Clark County is operated by the Union Pacific Railroad for freight transport. Passenger travel is no longer available in this area. The greatest risks associated with freight trains are spills of hazardous materials, crashes, run-away rail cars, and accidents at grade crossings. The 2008 Rail Hazardous Commodity Flow Report and Comparative Analysis for Clark County, Nevada includes information on materials transported through Clark County.

## **Hazardous Material Transport**

Clark County experiences significant exposure to the transportation of man-made hazardous material. The County is concerned with the transfer and disposal of nuclear waste, chemical materials, and other hazardous materials along roadways and the Union Pacific Railroad System. One of Clark County's concerns is the ongoing effort by the Federal Government to designate Yucca Mountain as the central repository to store high level radioactive nuclear waste from nuclear power generation facilities across the country. The proposed facility presents challenges, including health risks to the general population residing along transportation corridors. Information on highway accidents and hazardous commodities that are transported by truck through Clark County can be found in the 2008 Truck Hazardous Commodity Flow Report and Comparative Analysis for Clark County, Nevada.

## **Manufacturing**

Hazardous material spills associated with the processing of manufactured goods, and the use of explosive and volatile substances in the fabrication of industrial goods can have a significant impact on the environment, economy, and residents of Clark County. A release of hazardous substances can occur in fixed facilities or during transportation of materials. Hazardous substances that are released to surface waters, sewer systems, drinking water supplies, or that impact groundwater require specialized equipment and expertise.

## **Utility Corridors**

Several corridors have been established in Clark County for the infrastructure to transport water, wastewater, electric, fuel, natural gas, etc. These facilities may present a potential physical and environmental hazard for the rural and urban areas within Clark County.

## **Others: Air Quality, Communicable Diseases and Crime**

### **Air Quality**

Due to population's growth, suburban sprawl and vehicular uses, air pollutants have increasingly become an environmental hazard in Clark County. Pollens, particulates, PM10, PM2.5, Ozone, greenhouse gases and other air pollutants present a serious environmental concern. These pollutants can cause allergic reactions and serious cardio respiratory diseases.

The Clark County Department of Air Quality Management under federal government guidelines is responsible for monitoring our air, developing proper control measures, and educating the citizens of Clark County on issues related to air quality.

### **Communicable Diseases**

Communicable (contagious) diseases can be transmitted from one person or animal to another. Physical interactions between people, environmental exposure and contact with infested animal

and pathogens can increase the spread of communicable diseases. Depending on the severity quarantine may be required to prevent the spread of these communicable diseases.

## **Crime**

A crime is a wrong doing classified as an offense against the public law. For the purpose of this report crime is further defined as a violation of law that has the potential of harming an individual, the public, or property.

# ANALYSIS

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In defining the framework for this Element, identified Natural and Man-Made Hazards were divided into three parts: situation, problem, and solution. In order to achieve effective strategic planning, the next important step in the process for the Natural and Man-Made Hazards Element was to perform an adequacy analysis. The analysis matches solutions by Clark County and partner agencies to the identified hazardous situations and problems.

After coordinating the research and analysis, the Department of Comprehensive Planning has found that the County and partner agencies use a variety of mechanisms to address hazards. The mechanisms include but are not limited to plans, laws, contracts, agreements, and implementation and action programs. The analysis demonstrates that the following subjects have been sufficiently addressed:

Air Quality	Hazardous Material Transport.
Communicable Diseases	Landslides
Construction	Manufacturing
Crime	Mining
Drought	Subsidence & Fissures
Earthquakes	Urban Fire
Extreme Heat	Utility Corridors
Flood	Transportation
	Wildfire

## Conclusions

- The system that Clark County uses to address natural and man-made hazards has been found sufficient for planning purposes.
- The system that Clark County uses to address natural and man-made hazards recognizes the strengths of specialized departments and agencies.
- Since the location of virtually all situational hazards and hazardous human activities are known, plans can be made to minimize and avoid the risks associated with these hazards.
- Additional support for County land use plans can be provided by improving and coordinating existing environmental and hazards maps and data. With this, the land use plans can reference standardized information from the primary source.

# RECOMMENDATIONS

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## **Policies**

The following policies are recommended for inclusion in the Clark County Comprehensive Plan.

- 1 Minimize public exposure to natural and man-made hazards.
- 2 Ensure that land use plans and development regulations consider natural and man-made hazards and mitigation programs.
- 3 Provide public facilities and services to protect against natural and man-made hazards.
- 4 Support educational programs to inform the community about natural and man-made hazards.
- 5 Coordinate with local, regional, state and federal governments and the private sector to provide protection against natural and man-made hazards.

## **Work Program**

1. Use the data sources identified in this report to refine and update information used in the land use planning process.
2. Implement the Clark County Multi-Jurisdictional Hazards Mitigation Plan and Recovery Program by including Emergency Management staff in the land use planning process.
3. Develop a communication/education program to increase awareness of the actions taken to protect the public from natural and man-made hazards.

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