City of Reno Jurisdiction-Specific Annex – Washoe County Regional Hazard Mitigation Plan

2020 Plan Update

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1. INTRODUCTION

1.1 City of Reno Hazard Mitigation Program

The City of Reno has a fully integrated approach to hazard mitigation planning and program implementation. Throughout the 2019 update process, the following Hazard Mitigation Plan (HMP) participation roles were recorded:

Name	Position	Role in Hazard Mitigation
Bob Leighton	Emergency Manager	Mitigation Program Lead
Arlo Stockham	Community Development Director	Subject Matter Expert and program implementation
Bryan Heller	Assistant Director of Public Works	
Chris Pingree	Building and Safety Manager	
Frank Avera	Facilities Manager – Public Works	
Gary Zaepfel	Senior Business Analyst	
Joe Coudriet	Associate Civil Engineer	
Marcus Voss	Combination Inspector – Community Development-Building	
Phil Tousignant	Environmental Services Supervisor – Public Works	
Rebecca Knapp	Police Dispatcher	
Sean Garlock	Lieutenant	
Sergio Gutierrez	Senior Environmental Engineer – Public Works	
Theresa Jones	Environmental Engineer – Public Works	
Travis Trutill	Streets Maintenance Manager	
Tray Palmer	Fire Marshal	

1.2 What's New in the 2020 Update?

With the 2020 HMP update, Washoe County and its regional partners have recognized changes in planning priorities by placing an added emphasis on incorporating actionable strategies in the mitigation implementation plan and moving away from including ongoing coordination activities. Recent disasters and emerging hazards have also influenced the planning priorities and development of mitigation actions for the 2020 HMP update.

In 2017, the County and its partners responded to major winter floods, including closed-basin flooding that affected communities in the North Valleys area. An engineering team was employed during the planning process to evaluate and continue to develop mitigation strategies for closed-basin flooding that have been developed since 2017. These strategies are discussed in detail in Appendix B. This is the first time that closed-basin flooding hazards have been addressed in the regional HMP.

In the years since the release of the 2015 HMP, the City has undergone near constant change. With a growing population, some vulnerabilities have increased, while others have been effectively mitigated to an acceptable level.

The 2020 update of the Washoe County Regional HMP includes the following major revisions to the 2015 plan:

- Incorporation of additional hazards and more comprehensive risk assessments (see Chapter 3);
- Expanded capability assessment (see Chapter 4);
- Integration of hazard mitigation planning into existing mechanisms (see Section 4.5); and
- Comprehensive and focused mitigation strategy with prioritized mitigation actions (see Chapter 5).

See Appendix C of the Basic Plan for the completed Federal Emergency Management Agency (FEMA) Local Plan Mitigation Review Tool for the Washoe County Regional HMP.

1.3 Plan Adoption

44 CFR §201.6(c)(5) requires that the HMP be formally adopted by elected officials from each participating jurisdiction. City Council formally adopted the 2020 update of the Washoe County Regional HMP on [Date].

This HMP was approved by FEMA Region IX on [Date]. A copy of the City of Reno's adoption resolution is included in Appendix H of the Basic Plan.

2. COMMUNITY PROFILE

2.1 Governance

Now known as "The Biggest Little City in the World," the city of Reno started as a crossing point of the Truckee River for travelers moving westward during the California Gold Rush. It was officially founded in 1868 with the establishment of a railroad station, and later incorporated in 1903. Reno became the Washoe County seat in 1871. Host to a democratic municipal government, the City of Reno has a seven-member city council as the core of its governance structure, which includes the mayor, a representative "At-Large," and five members representing each of the five districts—or wards—of Reno. The mayor and council members serve a four-year term. The council sets priorities and approves budgets and empowers City Departments to advance these priorities. The City of Reno website identifies the following Tier 1 and 2 priorities as of 2019.

Tier 1:

- Identify new revenues
- Property tax restructuring
- Increase affordable housing
- Make progress on homelessness
- Implement the sewer plan

Tier 2:

- Implement the zoning code update
- Streamline the planning and building process
- Make progress on the Downtown Action Plan
- Improve efficiency of Council meetings
- Demonstrate commitment to the river

The City is organized into the following departments and offices, which oversee a variety of divisions and programs:

- City Attorney
- City Clerk
- City Manager's Office
- Civil Service Commission
- Community Development Department
- Department of Information Technology
- Economic Development/ Redevelopment Agency
- Finance
- Fire Department
- Human Resources
- Parks, Recreation & Community Services
- Police
- Public Safety Dispatch
- Public Works

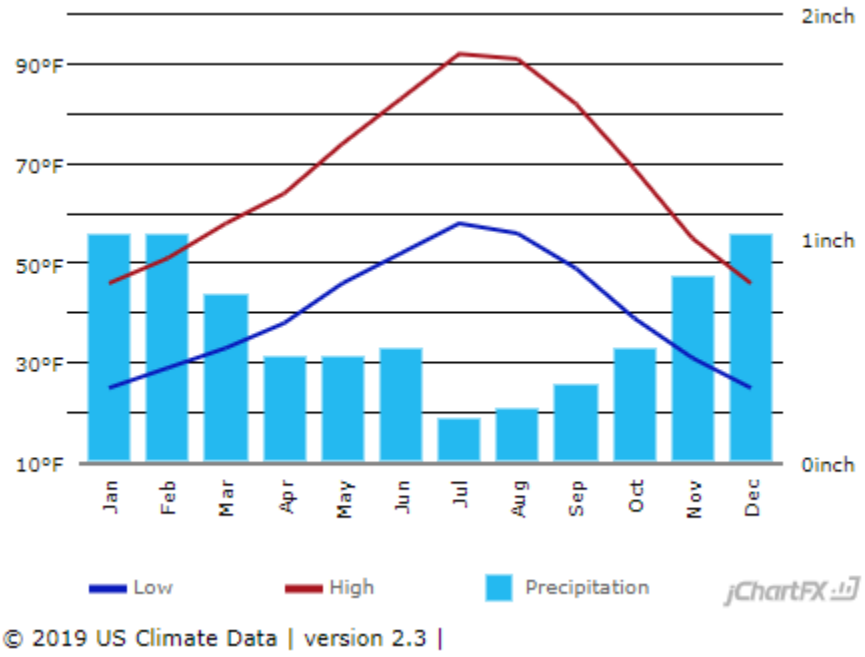
2.2 Geography and Climate

Reno is located in northwestern Nevada on the eastern slope of the Sierra Nevada range in the Truckee Meadows basin, one of a series of north-south trending basins on the western edge of the Great Basin. The city is located approximately 22 miles northeast of Lake Tahoe and makes up 103 square miles per 2010 Census data.

The Truckee River, one of the few terminal rivers in the United States, flows from Lake Tahoe, California, through downtown Reno to Pyramid Lake, Nevada. The city of Reno developed along the banks of the Truckee River.

Reno has a steppe climate, like Jaipur, India or Murcia, Spain, which means it is in the range between desert and humid climates. According to National Oceanic and Atmospheric Administration weather data, Reno's annual average precipitation is 7.4 inches. Most rainfall and snow occur in winter and spring, with the possibility of summer thunderstorms between April and October. Extreme highs have reached 104–108 degrees Fahrenheit, and lows -16 to -17. The city averages 300 days of sunshine per year. Figure 2-1 shows city of Reno average temperatures and precipitation based on data from 1981–2010 normals. According to a 2016 report by Climate Central and the Weather Channel, Reno is among the fastest warming cities in the U.S.

Figure 2-1 City of Reno Averages



2.3 Population and Demographics

According to U.S. Census data V2018 estimates, Reno is home to 250,998 individuals, an 11.4% increase from 2010 Census data. The City's Master Plan states that it expects to grow by more than 62,000 residents over the next 20 years. The American Community Survey (ACS) 2017 1-year Census data is provided in Table 2-1.

Table 2-1 American Community Survey 2017 1-year Census Data

	City of Reno	Nevada
Population by Age		
Under 10 years	13%	13%
10–19 years	12%	12%
20–59 years	55%	54%
60 years and older	20%	21%
Women	50%	50%
Race/Ethnicity		
White	59%	49%
Black	3%	9%
American Indian, Alaskan Native	1%	1%
Asian, Native Hawaiian, other Pacific Islander	9%	9%
Hispanic or Latino, any race	26%	29%

Source: U.S. Census Bureau **Census data:** ACS 2017 1-year

ACS 2017 1-year provides the following additional data:

Economics:

- $32,248 per capital income with a $57,125 median household income
- 43% of the population earns under $50K and 5% earn over $200K
- 12.7% of persons live below the poverty line; 14% of children under 18 and 8% of those 65 and older

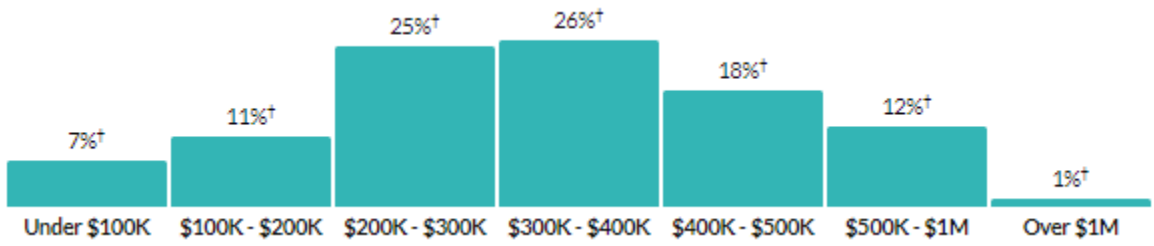
Families:

- 100,794 households with an average 2.4 persons per household
- 44% of individuals 15 years and older are married, and married couples make up 52% of all households

Housing:

- 108,877 housing units; 7% vacancy rate; 51% renter occupied
- By percentage of total population, 42% of the population has moved into Reno since 2005
- 55% of structures are single-unit, followed by 41% multi-unit
- Over 50% of owner-occupied housing units are valued between $200,000 and $400,000 (see Figure 2-2)

Figure 2-2 Value of Owner-occupied Housing Units



Source: U.S. Census Bureau Census data: ACS 2017 1-year

Social:

- 89.7% high school graduate or higher
- 10% no degree and 13% post-grad degrees
- The home language of 28% of children 5–17 is Spanish
- 16% of the population is foreign-born
- 7.5% of the population has a veteran status

2.4 Economy

Industry Characteristics: The trade and service sectors make up the largest portion of Reno's economy, with approximately 65% of the work force employed in these sectors. Recreational activities (especially skiing and golfing) in the nearby area and legalized gambling make the city a major resort. While gaming and other recreational activities continue to make up a significant portion of the economy, the city's business base is diversifying through expansion of distribution, warehousing, and manufacturing facilities. Approximately 25% of the city's work force is employed in construction, manufacturing, transportation, communications, public utilities, or financial services (City of Reno n.d.).

Table 2-2 Businesses in the City of Reno

All firms	21,577
Men-owned firms	10,717
Women-owned firms	6,898
Minority-owned firms	3,616
Veteran-owned firms	2,222

Source: U.S. Census Bureau 2012

Population Growth: 42% of the population has moved into Reno since 2005, clearly illustrating its growth patterns. Table 2-3 shows the percent change since 2000.

Table 2-3 City of Reno Change in Population

2000 Population	2010 Population	2017 American Community Survey Estimate	Estimated Percent Change 2000–2017
180,480	225,221	248,860	37.9

Source: U.S. Census Bureau n.d.a; n.d.b; 2017

Economic Growth: During the recovery from the 2008 recession, Reno has seen increased economic diversification, job growth, and commercial development. Between 2014 and 2018, the trade, transportation and utilities; professional and business services; manufacturing; construction; and education sectors in Reno saw the most growth in terms of the number of jobs (Hidalgo 2019).

In 2016 the Truckee Meadows region (Reno, Sparks, and unincorporated Washoe County) supported approximately 263,000 jobs. The Consensus Forecast estimates that employment in the region will continue to grow, increasing to 347,000 jobs by 2036.

Businesses relocating to or expanding to the City have access to various programs and incentives through the State of Nevada, including the Catalyst Fund, tax abatements and hiring incentives, and various other grant and incentive programs.

BUSINESS HIGHLIGHT – Top Employers per Reno's 2016 Comprehensive Annual Financial Report

Peppermill Reno

International Game Technology

Washoe County School District

WASHOE COUNTY, NEVADA 1861

University of Nevada, Reno

Atlantis Casino Resort

Renown Regional Medical Center


Saint Mary's Regional Medical Center

Circus & Eldorado Joint Venture – photo credit Ken Lund

2.5 Land Use and Ownership Trends

History. Reno is located between the Carson Range on the west and the Virginia Range on the east in a broad valley called the Truckee Meadows. Early development in Reno was located near the Truckee river, with heavy industrial uses growing along the river, including metal works, a refuse transfer station, and open storage. Public spaces are also located along the river.

As the city and adjoining areas have grown, development has pushed outward from the valley floor onto the mountain's alluvial fan or directly onto its hillside. Much of the current development in the north-west and southwest areas, and properties in between Reno and the Reno Stead Airport to the north are located in areas where slopes range from 10–30% (City of Reno 2008).

Land Use Planning

The growing city currently measures 103 square miles, which includes some Bureau of Land Manage-ment land in the Cold Springs area. The city abuts large swaths of U.S. Forest Service lands in the Sierra Nevada mountains.

The 2012 Truckee Meadows Regional Plan, calls for an aggressive infill policy and projects that the city will increase in population to 339,500 by 2030, with an average minimum density of four people per acre. The final **2019 Regional Plan Update** is yet to be released. Median housing prices are increasing in Reno and the surrounding region, making it likely that development of new housing in and around the city will increase if the national economy continues to be strong. The Truckee Meadows Housing Study (2016) calls for a wider variety of housing types to meet anticipated demographic shifts and affordable housing needs; it recommends infill in the metropolitan area to add additional "missing middle housing"—smaller, more affordable housing types—to support a situation where costs of ownership of single-family detached housing in the area has gone up by more than 60% over the last two decades while household incomes have increased by only 17%.

The City of Reno Master Plan is an evolving plan that provides a vision for the built environment of the city and guides land use decisions. Its current iteration, adopted in 2017, is ReImagine Reno. It covers all of the city of Reno and its sphere of influence and has a time frame to the year 2036.

Transportation: Numerous initiatives are underway to improve public transportation in Reno. In 2019 the Regional Transportation Commission received $40.4 million from the Federal Transit Administration to advance the Virginia Street Bus RAPID Transit Extension Project in Midtown, which includes elements for new sidewalks, lighting, landscaping, improving safety, and the addition of five bus stations and two electric buses to operate on the RAPID Virginia Line to create connectivity from Meadowood Mall to Midtown Reno and the University of Nevada, Reno.

Per its sustainability report, the city achieved credits for Green Vehicle Infrastructure, with 41 alternative fuel stations including 33 electric vehicle charging stations.

Public Parkland. According to its sustainability report, 100% of households in Reno are within 3 miles of an off-road trail. The City of Reno Parks, Recreation, and Community Services manages 88 parks and over 3.80 acres of public parkland. ReImagine Reno has set goals for preservation and enhancement of interconnection between the parks network and to support non-motorized transportation within the city.

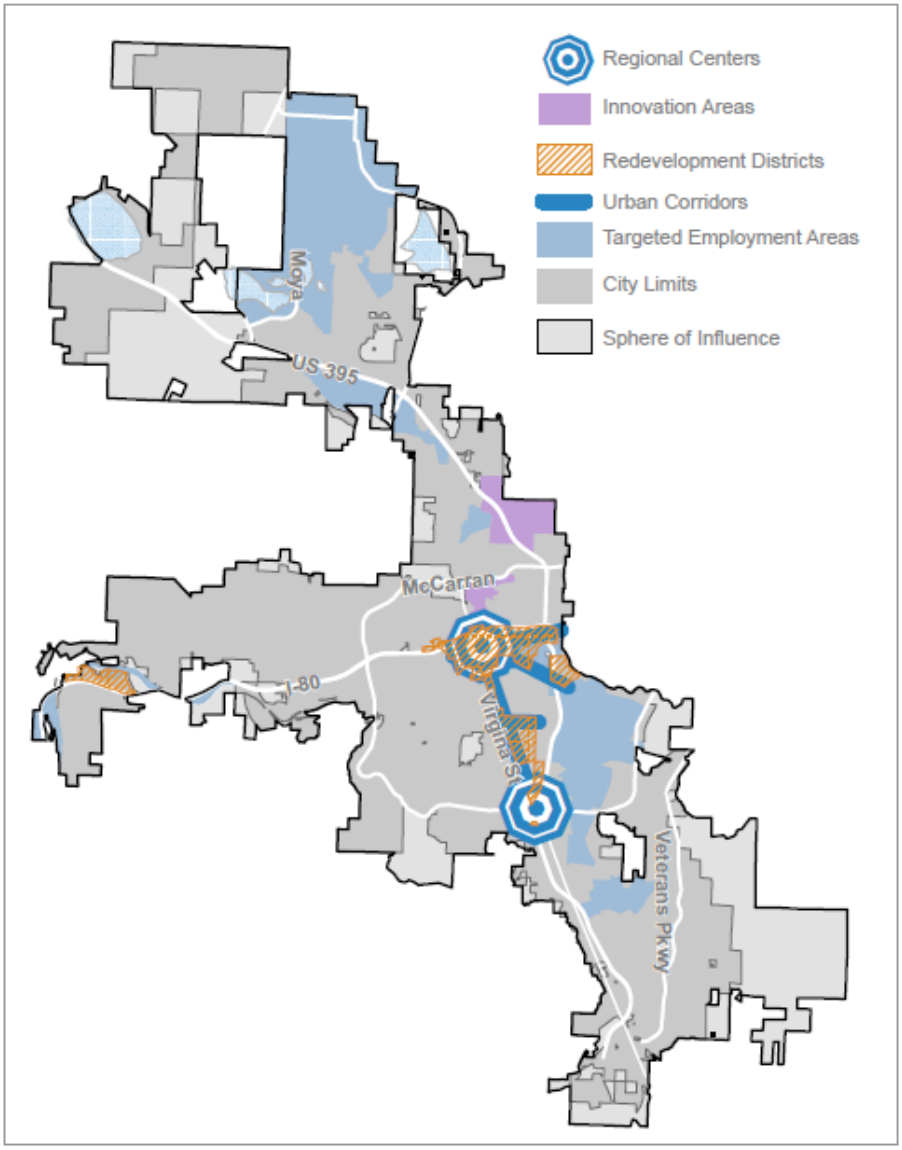
Sustainability, Resiliency, and RenoResilience. Reno is a 3-STAR Community under the STAR Communities Rating System, which helps communities track and gain points in goal areas of built environment, climate and energy, economy and jobs, education, arts and community, equity and empowerment, health and safety, natural systems, and innovation and process. Per its first and only sustainability report in 2017, the city of Reno was ranked the number 31 greenest city in America by WalletHub.

Reno launched ReEnergize Reno—to promote investment in energy efficiency and waste reduction, including improving the efficiency of commercial, industrial, and multifamily buildings 20% by 2025. The program is part of the U.S. Department of Energy's Better Buildings Challenge. The City supports participants with technical assistance on benchmarking, education, financing options information, and recognition.

New development:

- ReImagine Reno identifies infill and redevelopment priority areas as the Downtown and Convention Center Regional Centers, Innovation Areas, Redevelopment Districts, and Urban Corridors as outlined in Figure 2-3 below.
- The **Stonegate planned community** in North Reno calls for over 4,000 homes, as well as commercial properties, restaurants, schools and parks to occupy over 1,700 acres below the northeastern slopes of Peavine Mountain in Cold Spring Valley. The community will be developed within the Wildland Urban Interface (WUI) and is currently outside the response time of existing fire stations, which means a new fire station will be required.

Figure 2-3 City of Reno Growth Tiers



2.6 Natural Resources

Major natural systems present in the Truckee Meadows basin include:

- **Geology:** The city of Reno is located on the western edge of the Basin and Range geological province. The Basin and Range Province is characterized by high desert punctuated by rows of mountain ridges that run roughly north to south. As these mountain ridges push up through the Earth's crust, they can cause earthquakes, making this region one of the most earthquake prone in the U.S. These ridges also create a closed basin, meaning water that falls within the basin stays there until it evaporates or is removed through human activity (Earth Observatory n.d.). Area geology is also affected by tectonic forces outside the Basin and Range, such as deformation along the San Andreas Fault system in California. The 500-mile-long Walker Lane zone of faulting passes approximately 30 miles to the northeast of the Reno area. Nearly 100 faults have been mapped in the Truckee Meadows; though, all of them, except for a few, have remained inactive for at least 1 million years (City of Reno 2008).
- **Watersheds:** Reno lies within the Truckee River watershed. The Truckee River flows 140 miles from Lake Tahoe to Pyramid Lake, north of Sparks. The river drains an area of 3,120 square miles in western Nevada and eastern California. The basin includes 11 major streams that drain into the river. Most of the river flow is allocated to users through a system of user rights set out in the Truckee River Operating Agreement (2015).
- **Wildlife:** Species that are native to lower montane woodlands and sagebrush habitats in the Truckee Meadows region include raptors like the ferruginous hawk and bald eagles, bats, sparrows, burrowing owls, lizards, small mammals such as the dark kangaroo mouse and kit fox, mule deer, pronghorn antelope, and sage grouse. Natural communities and open spaces contribute to the region's scenic character and provide recreational opportunities for residents (Washoe County 2008). The Truckee River supports the federally listed threatened Lahontan cutthroat trout and federally listed endangered cui-ui, as well as brown, brook and rainbow trout and mountain whitefish.

2.7 Cultural Resources and Values

Cultural resources can be defined as the "physical evidence or place of past human activity: site, object, landscape, structure; or a site, structure, landscape, object or natural feature of significance to a group of people traditionally associated with it" (National Park Service 2015). Evidence of long-term human inhabitation of the Truckee Meadow region still exists in archaeological sites, including rock art, seasonal camps, and residential communities, and the artefacts that may be found at these sites. Both the Washoe and Paiute people inhabited territory within the Truckee Meadows. The Washoe were a hunter gatherer society. The southwest Truckee Meadows alluvial fan has significant archeologic sensitivity from long-term habitation, with resources, including hunting sites, game fences, quarries, and winter villages (City of Reno 2008).

Paiute and Washoe people in the last 1800's and early 1900's were know to live on land currently occupied by Idlewild Park, University of Nevada, Reno campus, Vaughn Mill, near Manogue High School, in the hills north of Truckee Meadows, and along the river (City of Reno 2008).

Historic Resources

In 2012, the City Council adopted the Historic Plan as a component of the City of Reno Master Plan, with a visions statement as follows:

> Identify, recognize, and encourage the preservation of Reno's historic resources that include historic buildings, structures, objects, neighborhoods, emigrant trails and highways, archeological sites, and landscapes in an effort to foster civic and neighborhood pride so that future generations will have the opportunity to appreciate and understand Reno's unique cultural heritage.

The plan demonstrated the city's value for preservation of historic resources. The City of Reno Register of Historic Place was established in 1993.

In ReImagineReno, the most recent City of Reno Master Plan, the plan calls attention to sustainable development principles to be adhered to for all development within Reno's centers, corridors, and neighborhoods, including encouraging the retention and incorporation of historic and cultural resources. The same concept is applied to any alterations of public lands at the urban/rural interface. The plan also encourages integration of cultural and historic resources at the neighborhood design level. Adaptive reuse is encouraged.

3. HAZARD PROFILES AND VULNERABILITY ASSESSMENTS

Chapter 3 contains hazard profiles and vulnerability assessments to determine the potential impact of hazard to the people, economy, and built and natural environments of the City of Reno. They have been streamlined to increase the effectiveness and usability of the HMP. Additional details are provided in Appendix F of the Basic Plan.

FEMA	**B1.** Does the Plan include a description of the type, location, and extent of all natural hazards that can affect [the City of Reno]? (Requirement §201.6(c)(2)(i)) **B2.** Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for [the City of Reno]? (Requirement §201.6(c)(2)(i)) **B3.** Does the plan include a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement 44 Code of Federal Regulations § 201.6(c)(2)(ii))

3.1 General

Washoe County has experienced several major disaster declarations that may have affected the city of Reno. In total, the County has experienced 32 federal disaster or fire management assistance declarations since 1953. Table 3-1 identifies the declarations since 2010 that may have affected the city of Reno.

Table 3-1 Washoe County FEMA Disaster Declarations

Disaster ID	Date of Declaration	Disaster Name/Type	Incident Period
FM-2973	18-Nov-11	Caughlin Fire	18-Nov-11 – 21-Nov-11
FM-2974	19-Jan-12	Washoe Fire	19-Jan-12 – 21-Jan-12
FM-5156	14-Oct-16	Little Valley Fire	14-Oct-16 – 31-Oct-16
FM-5138	29-Jul-16	Rock Fire	29-Jul-16 – 31-Jul-16
FM-5141	31-Jul-16	Virginia Mountains Complex Fire	29-Jul-16 – 7-Aug-16
FM-5190	14-Jul-17	Cold Springs Fire	14-Jul-17 – 15-Jul-17
DR-4303	17-Feb-17	Severe winter storms, flooding, and mudslides	5-Jan-17 – 14-Jan-17
DR-4307	27-Mar-17	Severe winter storms, flooding, and mudslides	5-Feb-17 – 22-Feb-17
FM-5283	13-Jul-19	Jasper Fire	13-Jul-19 – 16-Jul-19

Source: FEMA 2019

The hazard profiles and vulnerability assessments contained in this chapter represent a considerable amount of work performed by the Mitigation Planning Team (MPT). Planning Team members ranked hazards using several key considerations, followed up by activities to validate hazard analysis results and identify specific areas of risk. Table 3-2 displays the high-priority hazards that City of Reno representatives to the MPT selected for further assessment.

Table 3-2 Hazards Addressed in the Plan

Hazard Type	Hazard Name
Natural Hazards	Flooding Wildland Fire Earthquake Severe Storms (Winter Storm)
Human-Caused Hazards	Criminal Acts and Terrorism Hazardous Materials Incident
Technological Hazards	Energy Emergency

3.2 Hazard Ranking Methodology

The hazards identified in the HMP were initially ranked based on MPT feedback during MPT Meeting #1.

Following the individual hazard ranking activity, the results were added up and aggregated to show an average score for all city of Reno MPT members (see Table 3-3).

3.3 Hazard-Specific Profiles and Risk Assessments

The following sections profile and assess the risks associated with hazards that are high planning priorities for the City of Reno, which are hazards that were scored an average of 3.00 or higher during the hazard ranking activity. No natural hazards that have the potential to affect the city were omitted from the initial hazard assessment and ranking activity. The hazard profiles and risk assessments align with EMAP standards by focusing on hazards with a high magnitude or high probability. Each risk assessment considers the following attributes:

- **Location:** An indication of geographic areas that are most likely to experience the hazard.
- **Past Occurrences/History:** Similar to location, a chronological highlight of recent occurrences of the hazard accompanied by an extent or damage cost, if available.
- **Extent/Probability:** A description of the potential magnitude of the hazard, accompanied by the likelihood of the hazard occurring (or a timeframe of recurrence, if available).
- **Vulnerability:** A description of the potential magnitude of losses associated with the hazard. Vulnerability may be expressed in quantitative or qualitative values depending upon available data. Identifies development trends impact on the City's vulnerability to each hazard since the 2012 plan development (increased, decreased, or unchanged).

Note: Hazard Descriptions, Potential Impacts from Future Climate Conditions, and Cascading Impacts can be found in Chapter 4 of the HMP Basic Plan, as these are not place-specific.

Table 3-3 City of Reno Hazard Rankings

Jurisdiction: City of Reno - Hazards									
	Probability (1= lowest, 5= highest)	*Magnitude (1= lowest, 5= highest)*	*Frequency (1= lowest, 5=highest)*	*Onset (1= slowest, 5= fastest)*	*Duration (1= shortest, 5=longest)*	*Change in Risk (↑, ↓, ↔ since 2015)*		*Average*	*Rank*
Energy Emergency	4.00	1.67	4.33	5.00	2.00	0.00		3.75	1
Flooding	4.00	3.33	2.67	3.00	2.67	1.00		3.25	2
Wildland Fire	3.67	3.00	3.00	3.33	2.00	1.00		3.25	2
Earthquake	2.33	3.33	2.33	5.00	1.67	0.00		3.25	2
Criminal Acts and Terrorism	2.67	3.67	2.00	4.67	1.33	1.00		3.25	2
Hazardous Materials Incident	3.33	1.67	3.00	5.00	2.00	0.00		3.25	2
Severe Storms (Winter Storm)	4.00	1.67	4.00	3.00	2.33	-0.50		3.17	7
Infectious Disease	2.00	4.00	1.67	3.67	3.00	0.50		2.83	8
Severe Storms (Windstorm)	3.67	1.33	2.67	3.33	2.00	0.00		2.75	9
Drought	3.00	1.67	3.33	2.33	4.67	0.00		2.58	10
Avalanche and Landslide (Landslide)	1.33	2.67	1.33	3.33	1.33	0.50		2.17	11

Note: Radiological waste transport and volcano hazards were not initially ranked by the MPT. In subsequent meetings, these hazards were identified as low probability but potentially high magnitude hazards. Risk assessments for both hazards are included in Section 4.5 of the Basic Plan. Avalanche and Landslide (Avalanche) and Transportation Incident (Aircraft Crash) were not identified as hazards for Reno.

3.3.1 Energy Emergency

Energy Emergency

Probability	Magnitude	Frequency	Onset	Duration	Average	Rank
4.00	1.67	4.33	5.00	2.00	3.75	1

Location

Any area of the city may potentially be impacted by a power outage or other energy emergency. Reno is the metropolitan center of the region, and sufficient redundancy in electrical infrastructure exists in most areas to prevent widespread power outages as a result of localized damage to the power system.

Past Occurrences/History

Historically, power outages have been caused by natural events and human-caused accidents, but have not been recorded in a way that is publicly accessible. Numerous power outages occur every year, with outage times ranging from a few minutes to over two days. Data from NV Energy's Reno substation accounts for 44 outages in 2018. A power outage in July 2019 affected more than 2,000 customers in Reno.

Interruptions in energy services may also be planned—for example, to allow for system repairs or maintenance. In 2019, NV Energy began implementing extensive public safety outage management programs in areas with extreme fire risks. To prevent downed power lines and damaged equipment from causing fires, NV Energy may de-energize parts of the electrical grid during weather conditions conducive to wildland fires (e.g., high temperatures, low humidity, high winds, lightning storms) or based on field observations or information from first responders (NV Energy 2019). Planned outages by NV Energy or Pacific Gas and Electric Company (PG&E) in California have the potential to affect fuel availability for the City. Outages affecting PG&E's system would cut power to the equipment that controls operation of the fuel pipeline serving the region.

Extent and Probability

It is difficult to predict the impacts of future energy emergencies, but they have the potential to impact all government and business operations and cause extensive economic losses among other impacts. Due to the sporadic nature of outages, it is also difficult to estimate how frequently such failures will occur or their duration. The city's electric provider, NV Energy, generally deals with power outages multiple times per year with many of them only lasting a matter of hours. Every several years, more significant power outages are experienced.

Future Probability Trend – Based on potential increases in heat waves and increasing regional development resulting in greater demand, the city may be impacted by an increase in the probability of future energy emergencies.

Vulnerability

NV Energy has provided electric power to northern Nevada for over 150 years. Customers in the Reno-Sparks area are served by multiple power generation facilities and a transmission system with built-in redundancy, which decreases the risk for widespread and longer-duration power outages. However, power outages have the potential to disrupt government and business operations over time

Energy Emergency

periods ranging from several hours to several days. Electric customers in areas on the fringes of the electric system may be the some of the last to have service restored as repairs to urban areas with more customers are prioritized.

Recent Development Trends

- **Economic:** NV Energy is actively diversifying its energy generation facilities by adding renewable energy facilities to its system. NV Energy handles planning, expansion, and maintenance of its electric facilities in accordance with Nevada Public Utility Commission regulations. (Decreased Vulnerability)
- **Land Use:** The city's upward trend in development increases the overall demand on utilities. (Increased Vulnerability)
- **Future Land Use:** The city's upward trend in development increases the overall demand on utilities. (Increased Vulnerability)

3.3.2 Flooding

Flooding

Probability	Magnitude	Frequency	Onset	Duration
4.00	3.33	2.67	3.00	2.67

Average	Rank
3.25	2

Location

The geographic location of flooding is concentrated in the floodway and floodplain of the Truckee River and its tributaries, including Steamboat Creek and Dry Creek in eastern Reno. The Truckee River headwaters are comprised of the Lake Tahoe Basin. The river drains part of the high Sierra Nevada and empties into Pyramid Lake. It is the sole outlet of Lake Tahoe.

The Truckee River runs directly through the city of Reno, which makes it important for residents adjacent to the river to be prepared in the event of a flood. Reno Ward 3 has significant components with a FEMA Critical Flood Zone 1 along Steamboat Creek and Veterans Parkway and encompassing the residential communities along Mira Loma Drive and adjacent to Mira Loma Park. The communities in Ward 3 along Dry Creek are also within Critical Flood Zone 1.

Flash flooding is usually associated with development and urbanization as well as inadequate storm drainage systems. Results of the concentrated development were heavily felt during the 2005 flood events. Reno is less susceptible to alluvial fan flooding and flash flooding, which is experience more in Hidden Valley, Jumbo Grade, Stormy Canyon, Virginia Foothills, Whites Creek and Galena Creek.

Past Occurrences/History

In January 2017, northern Nevada experience significant flooding from a storm that dropped 3-6.5 inches of rain in the region, and snow in the mountains. The combination of heavy rain and mountain snow led to flood conditions in the valleys of the Reno-Sparks area. There was also localized flooding in places near irrigation ditches, designed to carry water from the Truckee River to agricultural areas south of Reno. Several ditches in Reno failed and residents were evacuated to local high schools.

Flooding

The most significant flooding occurred along the Truckee River in downtown Reno and in the industrial areas of Sparks near the river. Washoe County Manager John Slaughter was quoted as saying, "Flooding was widespread and roads were closed. We faced things like Mount Rose Highway washing out and ditches have been a challenge. There were things that we couldn't predict ahead of time."

Several bridges were closed in downtown Reno. Area school districts and universities were closed due to the event. Washoe County estimated more than 400 homes and nine commercial structures were evacuated. Among the evacuations were approximately 35 dwellings in the Autumn Hills area near Huffaker Park due to health hazards created by the failure of a sewer lift station.

Many roads were closed due to flooding, overwhelmed and blocked culverts, and debris flows in the Reno-Sparks, Carson City, and Minden areas on the 8th. A damage estimate from Washoe County Emergency Management for the entire county in January was over $15M, with much of the damage between the 7th and 9th.

Additional incidents of flooding, include:

- March 22, 2018 – Lemmon Drive closed from Deodar Way to Arkansas Drive and not reopened until April 9 due to key water level triggers being reached.
- February 10, 2017, Swan Lake overflowing from heavy rain and snow – 13 homes threatened
- January 8-9, 2017 as described above
- December 24, 2005 to January 3, 2006 – Truckee River/tributary flooding
- December 16, 1996 to January 6, 1997 – Truckee River and tributary flooding resulting in regional damage of $700,000,000. A foot of water covered Terminal Way at the Reno/Tahoe International Airport, resulting in closure of the facility and stranding 1,000 travelers.
- February 11 to February 20, 1986

Reno has also experienced episodes of flash flooding, including, but not limited to:

- 2014, flash flood resulted in rapid rise in water and several vehicles stalling near Meadowood Mall
- 2005, flash flooding in Double Diamond area of South Reno and near the Reno-Tahoe International Airport, which covered Terminal Way in a foot of water.

See Appendix F of the Basic Plan for more details.

Extent and Probability

Severe flooding may result in serious injuries and deaths as well as damage to public facilities and private property. Extent of flooding can be determined by the height of river flows in comparison to flood stages determined by U.S. Geological Survey (USGS) stream gauges located throughout the area. It can also be measured by past damages of flooding.

Reno may experience limited, localized flooding on an annual basis. Major riverine floods have occurred approximately once a decade, and major alluvial fan floods have occurred approximately once every 20 years.

Flooding

Future Probability Trend – Based on a potential increase in high-intensity precipitation events and increased probability of wildland fires, Reno may be impacted by an **increase** in the probability of future floods and flash flooding.

Vulnerability

Riverine or flash flooding in the county often results in the washout or flooding of roadways and infrastructure in waterways, such as bridges or culverts. Due to the concentration of urban development along the Truckee River, many critical facilities in the county are located within the 100-year or 500-year mapped floodplains and are vulnerable to riverine flooding. Flash flooding can affect smaller creeks and streams and areas near burn scars, and critical facilities outside of mapped floodplains may be affected.

Major flooding can impact the community by displacing residents and business owners, damaging and disrupting infrastructure including roads and bridges, water treatment facilities, and wastewater treatment facilities, and causing health risks due to contaminated public water supplies and private wells.

The city of Reno has the following located within or partially within a 100-year-floodplain:

- 6 dams, 5 schools, 3 fire stations, and 2 wastewater treatment plants.

The following are located at least partially within a 500-year floodplain:

- 7 hospitals, 16 schools, 4 fire stations, 3 police stations, the Reno/Tahoe International Airport

Dams: The Washoe Lake Dam experienced a breach in June 2018 that resulted in increased water levels in Steamboat Creek by 6 inches. While the impact is predominantly upon the Pleasant Valley community and those along Steamboat Creek, it demonstrates potential vulnerabilities of communities near damns and the creeks or irrigation ditches they feed.

Reno's West Wash Reservoir, for example, is immediately adjacent to a residential neighborhood in the northwest part of the city, as are the majority of the dams within the City limits. Six are in 100-year-flood zones, presenting greater concern.

The Watershed Rehabilitation Program, administered by the USDA-NRCS, assists project sponsors—like government agencies—with the rehabilitation of aging dams to, for example, upgrade spillway capacity to meet 100-year flood requirements and raising the top of dams to meet structure and stability standards. While the final scoping report for the Wet Wash Dam was completed in 2015, as of a National Watershed Rehabilitation status report in March 2018, the project was still in the planning phase.

Mitigation: The Public Works Department prioritizes projects that have a co-benefit of addressing flooding or reducing stormwater runoff. This means that projects that connect irrigation ditches to the stormwater system—allowing overflow in the system to go into the irrigation system—will be prioritized.

Flooding

Recent Development Trends

- **Economic:** New residential and commercial development within the closed basins of Lemon Valley and Cold Springs Valley that are near lakes (like Swan Lake) that are fed from snowpack and do not have rivers to drain into will put surrounding communities at an increased risk. (Increased Vulnerability)
- **Land Use:** Infill development within the city may increase the vulnerability of downtown areas that are in high demand for commercial and residential development but also are located within the 100- and 500-year floodplains.
- **Future Land Use:** Given Reno's growing populations and economy, there will be more exposure to vulnerability from flooding. (Increased Vulnerability)

See Appendix F1 of the Basic Plan for a full Risk Exposure Table and Appendix F2 of the Basic Plan for maps.

3.3.3 Wildland Fire

Wildland Fire

Probability	Magnitude	Frequency	Onset	Duration	Average	Rank
3.67	3.00	3.00	3.33	2.00	3.25	2

Location

As the city and adjoining areas have grown, development has pushed outward from the valley floor onto the mountain's alluvial fan or directly onto its hillside – areas that fall within a higher fire risk rating. On its website, the City of Reno notes that "living among the foothills in Reno is known as living in the Wildland Urban Interface or WUI." Reno weather often brings high winds, low humidity, and hot temperatures during summer months however recent years have shown that fire danger can exist all year round.

Washoe County maintains a geographic information system (GIS) Fire Risk Rating System from Low to Moderate to High to Extreme. Most of Reno's urban center and along Interstate 80 (I-80) and U.S. Route 395 (US 395) is Low Risk. However, nearing the foothills the rating progressively increases to High. The Cold Springs area and the western reaches of the city are in this high-risk area.

In its Master Plan, the City expresses its intention to reduce wildland fire risk by working "collaboratively with Washoe County, the Bureau of Land Management, the U.S. Forest Service, and other partners to develop and implement management plans for lands surrounding the city to mini-mize fire hazards and risks that could be worsened due to more intense drought cycles, a decline in forest health, and other impacts of climate change."

Fire protection is provided by the Reno Fire Department (combined with the Truckee Meadows Fire Protection District), 5 Sparks Fire Department, and Sierra Fire Protection District. The City of Reno Fire Department operates 14 fire stations, 17 fire companies, and has 21 front-line structure engines, 4 ladder trucks, and 8 brush trucks designed to respond to wildland fires.

Wildland Fire

Past Occurrences/History

While there have not been wildland fires within the city of Reno boundaries listed in the Washoe Regional Mapping System since 2015, there have been instances of wildland fires just outside jurisdictional boundaries that underscore the threat, particularly to the growing communities in the foothills.

Recent past wildland fires nearby the city are listed below from 2015-2018. Based on these recent events as well as recorded historic occurrences of wildland fires, there is an estimated 35% to 45% chance of a fire occurring in within city boundaries each year.

- August 2017 Whites Fire – Natural caused, 30 acres, south of Reno
- August 2017 Prater Fire – Undetermined cause, 2,816 acres in Sparks
- August 2017 I-80 Fire – Undetermined cause, 514 acres in Sparks
- July 2017 Cold Springs Fire – Undetermined cause, 1,523 acres
- August 2016 Hawken Fire – Human-caused, 278 acres, just outside of Coughlin Ranch.
- July 2016 S Fire – Undetermined cause, 2,554 acres in Sparks

See *Appendix F of the Basic Plan for the wildland fire hazard rating map.*

Extent and Probability

As economic growth continues to increase demand for residential and commercial growth outside of the urban center, more development will take place in the foothills and in the WUI, increasing the likelihood that the city will be impacted by a wildland fire. While lightning strikes account for many wildland fires in the region, most fires are caused by people. On its website, the City recommends various ways humans can help reduce risk by creating defensible space (for example, reducing vegetation in the yard), properly disposing of cigarette butts, and following the law as related to fireworks and target shooting to name a few.

In Washoe County, wildland fires are frequent and inevitable. The majority of fires burn between June and October, and fires occur nearly every year. City of Reno representatives to the MPT rated wildland fires as one of the most frequent hazards likely to impact the city.

Future Probability Trend – Based on projected changes in the timing and quantity of snowmelt and increases in the frequency and magnitude of drought and extreme heat, the city may be impacted by an **increase** in the probability of future wildland fires.

Vulnerability

According to USDA Forest Service Data on wildland fire potential, much of the northern reaches of the city of Reno is in a high-risk zone, as well as Northwest Reno, extending toward Verdi and the California border. Likewise, the Hidden Valley area in the southeast is a high risk, along with the Coughlin Ranch area. These are all areas at the outer reaches of City boundaries, where development is creeping toward the mountains.

As development continues to increase in medium and high-risk areas, the risk of wildland fire damage to homes and other structures will increase. New development is taking place in City outskirts and foothills resulting in increased development in an eight-minute response time zone. Some new planned development, in the Cold Springs Valley for example, is outside the response time of existing fire stations making any new development in this area especially vulnerable to wildland fires until a new fire station is acquired. Until a permanent fire station can be established, the Master Plan limits development to no more than 1,700 single-family units.

Wildland Fire

Property

- Several critical infrastructure facilities are within medium risk of wildland fire potential. Galena High School—established in 1992—is rated 3 on a scale of 1-6 of increasing wildland fire risk. Two fire stations at lower medium risk (2 on a scale of 1-6) include Sierra Fire Protection District Station 331 Peavine near Peavine mountain in northwest Reno and Station 39 in the wooded foothills of southwest Reno.

Recent Development Trends

- **Economic:** The city of Reno currently supports over 263,000 jobs and is expected to grow by more than 62,000 residents over the next 20 years. The Consensus Forecast estimates that employment in the region will continue to grow, increasing to 347,000 jobs by 2036. The Master Plan calls for infill and redevelopment in urban corridors for commercial use, which encourages commercial resources to be located in the lower-risk areas of the City as related to wildland fire. However, additional commercial assets will be paired with expanding residential development in the city outskirts. (Increased Vulnerability)
- **Land Use:** Current land use patterns that include development in outer reaches of Reno result in increased vulnerability.
- **Future Land Use:** Increased development in the foothills presents increasing vulnerability for the outskirts of the city of Reno. The ReImagine Reno Master Plan Land Use Plan, for example, calls for expansion of single family neighborhoods in the Cold Springs Valley, the northwest reaches of the City in the foothills, and increasingly into the foothills at. (Increased Vulnerability)

See Appendix F1 of the Basic Plan for a full Risk Exposure Table and Appendix F-2 of the Basic Plan for maps.

3.3.4 Earthquake

Earthquake

Probability	Magnitude	Frequency	Onset	Duration
2.33	3.33	2.33	5.00	1.67

Average	Rank
3.25	2

Location

The State of Nevada is the third most seismically active state in the U.S. Washoe County is located in one the most seismically active areas in Nevada. Most occurrences of earthquakes are small enough to be nearly undetectable by people, but larger magnitude earthquakes can cause significant damage to homes and infrastructure.

In an interview with News 4, Nevada Seismological Laboratory scientist Graham Kent said Reno has experienced a magnitude 6 earthquake on average every 12.5 years for 100 years, but has been quiet since 1948, which means Reno is overdue.

There are at least two faults running into the city limits that may be capable of a large, damaging earthquake of magnitude 7 or more—larger than the Northridge earthquake in January 1994. There

Earthquake

are many more smaller faults. Graham Kent says the geography is further complicated by the fact that Reno is in a basin: "The minute you punch energy into a basin it goes back and forth and back and forth, and that can cause a lot of problems" (Hendry, 2016). An earthquake frequency map produced in Reno Folio indicates that earthquakes seem to cluster around major water bodies, as opposed to the specific fault traces (City of Reno 2008).

- The area of Reno encompassing White Lake, the Granite Hills, Silver Lake, the Sierra Sage Golf Course, sections of the US 395, and that is adjacent the Reno Stead Airport is in an area of seismic ground motion hazard of a 2% probability in 50 years of a 64+ range earthquake, which causes violent or extreme shaking and heavy to very heavy damage.
- Southern Reno, expanding outward from the US 395 and encompassing the Reno Tahoe International Airport and south toward Steamboat Hills has the same hazard probability.
- The sections of Reno along I-80 and extending westward to Verdi are in the 48–64 range.

Past Occurrences/History

Information on previous major earthquakes with magnitudes greater than 5 on the Modified Mercalli Intensity Scale in Washoe County is included in Section 4.5.4 of the Basic Plan. Shaking from these earthquakes would have been felt in Reno and may have caused structural damage.

Recent earthquakes in the area within the past year include a set of earthquakes in Sun Valley in June 19 at 1.7, 1.8, and 1.5 magnitude.

Extent and Probability

A major earthquake has the potential to cause widespread and significant damage to structures in the city of Reno, injuries, and deaths. Because of their potential to cause damage to structures, roads, and utilities, earthquakes may disrupt government operations and the local economy for a period of days to weeks and may require evacuations or create increased demand for emergency medical services. Response to and recovery from an earthquake may require federal support.

Future Probability Trend – A total of 17 earthquakes with a magnitude greater than 5 on the Modified Mercalli Intensity Scale have occurred in Washoe County in the last 150 years. The probability of future occurrences can be estimated at 10%; this means that there is roughly a 10% chance of an earthquake with magnitude >5 to occur every year. Climate, economic, and land use trends do not affect the probability of an earthquake; however, economic trends and land use patterns can affect the amount of damage caused by an earthquake. This **increases** the probability that future earthquakes will result in damage to structures, roads, utilities, and new development.

Vulnerability

Earthquakes have the potential to cause significant, widespread structural damage throughout the region. Critical facilities in Reno are located in areas that may experience relatively high seismic ground motion hazards. Most of these facilities may experience peak ground acceleration with a **2% probability of exceedance in 50 years** of between 48 and 64% gravity, which would be experienced as severe shaking capable of causing moderate to heavy damage. However, some of Reno's infrastructure is in the 64+ range, which causes violent or extreme shaking and heavy to very heavy damage. The infrastructure in this latter category includes:

- 6 power plants, 14 hospitals, 62 schools, 1 transfer station, 1 airport, 20 dams, 23 fire stations, and 4 police stations

Earthquake

For most critical facilities in the city, smaller earthquakes (resulting in peak ground acceleration with a **10% probability of exceedance in 50 years**) could produce ground motion ranging from 32 to 48% gravity. These levels of peak ground acceleration would be experienced as very strong to severe shaking with the potential to cause moderate to heavy damage. Two hundred and five assets are in this range, including fire stations, police stations, schools, hospitals, dams, wastewater treatment systems, and transfer stations. One hundred fifty-three assets are in the 48–64% gravity range.

Several critical facilities with highest risk (2% probably in 50 years of violent or extreme shaking and 10% in 50 year probability of moderate to severe shaking) are partnered with high landslide susceptibility, further increasing risk to the facilities. These include Pleasant Valley Volunteer Fire Department 227; Sierra Fire Protection District Stations 38, 381, and 382 in Galena; and Sierra Fire Protection District Station 39 in Southwest Reno.

Recent Development Trends

- **Economic:** FEMA reports that annual earthquake loss (AEL) in Nevada is $50-100 million annually. AEL increased by 28% from 2002 to 2014. Given Reno's upward economic development trends, it is likely that a greater amount of infrastructure will be at risk. (Increased Vulnerability)
- **Land Use:** Current land use patterns put communities at higher risk. A USGS map of earthquakes in the region from 2005 to 2019 shows the majority are centered in Northwest Reno, including a 5.1 magnitude earthquake in April 2008. This is an area with increased single-family neighborhood development. (Increased Vulnerability)
- **Future Land Use:** The trend of increased residential and commercial development in the foothills of the mountains and on steeper grades may make structures more vulnerable to earthquake damage and subsequent landslides. (Increased Vulnerability)

See Appendix F1 of the Basic Plan for a full Risk Exposure Tables and Appendix F2 of the Basic Plan for maps.

3.3.5 Criminal Acts and Terrorism

Criminal Acts and Terrorism

Probability	Magnitude	Frequency	Onset	Duration	Average	Rank
2.67	3.67	2.00	4.67	1.33	3.25	2

Location

Any populated area can be impacted by acts of violence. These areas include, but are not limited to, shopping centers, business centers, financial districts, clinics/hospitals, schools, and government offices and buildings. The University of Nevada, Reno and Peppermill Resort Spa Casino are examples of highly populated areas where an act of violence may occur.

Criminal Acts and Terrorism

Past Occurrences/History

- November 28, 2017: A 30-year-old male gunman rained gunfire down onto Sierra Street from the 8th floor of the Montage condominiums in downtown Reno and barricaded himself and a hostage inside of an apartment. The suspect died after being taken into custody after the Reno Police Department and the Washoe County Sheriff's Office SWAT team breached the room. The hostage was uninjured but a passerby reported one minor injury.
- October 29, 2015: A Reno Walmart employee shot and wounded three Walmart employees.
- December 17, 2013: A gunman entered the Center for Advanced Medicine and accessed Urology Nevada. He shot two doctors and a patient. One of the doctors later died of their injuries.
- October 21, 2013: A 12-year-old student opened fire with a semi-automatic handgun at Sparks Middle School, injuring two students and killing a teacher.
- September 6, 2011: A gunman opened fire at an International House of Pancakes Restaurant, killing four people and wounding seven others.

Extent and Probability

It is difficult to estimate the extent or probability of acts of violence. Nonetheless, it can be deduced that an active threat could affect all populated areas in Washoe County; government facilities and schools may be most likely targeted for acts of violence and acts of terrorism.

Future Probability Trend – Future weather conditions have no direct connections to acts of violence and terrorism. However, increased development and urbanization have the potential to **increase** the probability of a future active threat.

Vulnerability

County, schools, government buildings, or other public gathering places or public events would likely be top targets for acts of terrorism. Many acts of violence also occur in public gathering places. Acts of violence could have an impact on the community in the following ways: loss of human life; damage to buildings and structures; temporary displacement during the threat and/or investigation; stress on medical, emergency response, and security services; decrease in economic activity and hospitality business after the event; psychological and emotional trauma; and an increased need for emergency services and funding.

Weapons of Mass Destruction training is provided to emergency response agencies through Homeland Security.

The Reno Police Department has increased its staff since 2015.

Recent Development Trends

- **Economic:** Criminal acts pose no new risk to economic interests. Regional employers and governments, including Reno-Tahoe International Airport; University of Nevada, Reno; and the Reno-Sparks Indian Colony have held training workshops to enable employees to respond to active assailant incidents. (Decreased Vulnerability)
- **Land Use:** Criminal acts pose no new risk to land use. (Unchanged Vulnerability)
- **Future Land Use:** Because criminal acts tend to target areas of higher population, as Reno grows, its vulnerability will increase. (Increased Vulnerability).

3.3.6 Hazardous Materials Incident

Hazardous Materials Incident

Probability	Magnitude	Frequency	Onset	Duration		Average	Rank
3.33	1.67	3.00	5.00	2.00		3.25	2

Location

The potential for contact with hazardous materials is present throughout all areas of Washoe County due to three main factors:

- The widespread distribution of hazardous materials storage locations (fixed facility);
- The transport of hazardous materials via motor transportation and rail (transportation); and
- The transport of hazardous materials via pipeline (pipeline).

The U.S. Environmental Protection Agency's Environmental Justice Screening tool indicates that communities just east of Silver Lake and including the Sierra Sage Golf Course and Mayors Park are in the 80-90th percentile for proximity to hazardous waste. Facilities in this area include:

- Sierra Packaging & Converting LLC
- Axalta Coating Systems
- LSC communications

The areas surrounding Reno-Sparks Indian Colony and surrounding the Reno-Tahoe Airport are also in the 80-90th percentile. Hazardous waste facilities include:

- Renown Regional Medical Center
- Hamilton Company

The area surrounding Huffaler Hills Open Space is also in the 80-90th percentile for exposure. Fixed facilities include:

- Charles River Preclinical Services Nevada
- Ryder Integrated Logistics Eastman Kodak Company

Highway Transportation

Major transportation routes through Reno include US 395/Interstate 580 (I-580) and I-80. US 395 is also a major north-south route through the city. According to a 2013 Washoe County Hazard Mitigation Report, I-80 experiences an average annual daily traffic amount of 30,000 vehicles (based on the location .9 mile east of Vista Boulevard Interchange). I-580 experiences 93,000 average daily traffic counts.

Class 1-9 hazards travel via highway and have historically been cited along these routes. The predominant classes are Class 3 – Flammable Liquids, Class 2 – Compressed Gasses, Class 8 – Corrosives, and Class 5 – Oxidizers and Organic Peroxides.

Rail Transport

Nevada is served by the Union Pacific Railroad, which runs through Reno. It maintains a main line track that travels east and west along the Truckee River Corridor starting at Truckee, California and

Hazardous Materials Incident

continuing east to Fernley, Nevada. The railroad route is within 100 yards of the Truckee River at many locations and crosses waterways at several additional locations.

Hazardous material loads can and will be mixed with other freight being transported by the train on any given day. The amount of hazardous materials is dependent upon product demand and can vary based on season.

The following table is from the Washoe County Hazard Mitigation Report.

Table 3-4 Union Pacific Hazardous Materials Commodity Flow Data (2012)

UN/NA Number	HazMat Class Number	Shipping Name	Total Loads
UN1987	3	Alcohols, not otherwise specified (n.o.s.)	1491
UN2212	9	Blue Asbestos	544
UN1267	3	Petroleum Crude Oil	119
UN3065	3	Alcoholic Beverages	79
UN1075	2.1	Petroleum Gases, Liquefied	65
UN1203	3	Gasoline	65
UN3257	9	Elevated Temperature Liquid, n.o.s.	50
UN1580	6.1	Chloropicrin	33
UN3268	9	Air Bag Modules	27
UN1814	8	Potassium Hydroxide, Solution	19
UN1219	3	Isopropanol	19
UN3077	9	Waste Environmentally Hazardous Substance, Solid, n.o.s.	16
99	MIX	Freight All Kinds (FAK)-Hazardous Materials	16
UN1062	2.3	Methyl Bromide	16
UN1402	4.3	Calcium Carbide	15
UN1993	3	Flammable Liquids, n.o.s.	11
UN2924	3	Flammable Liquids, Corrosive, n.o.s.	11
UN3432	9	Polychlorinated Biphenyls, Solid	10

Source: Ecology and Environment, Inc. 2013

Pipeline

The Kinder Morgan SFPP North pipeline parallels I-80 through the Reno/Sparks metropolitan area and carries petroleum products (gasoline, diesel, and jet fuel).

Hazardous Materials Incident

Air

Hazardous materials may be transported through the city of Reno via air carriers, the highest risk being during the loading and unloading processes at Reno-Tahoe International Airport. Generally, the quantities of hazardous materials shipped by air are much smaller than other transportation modes.

Transport of hazardous materials by air is regulated by the Federal Aviation Administration's Office of Hazardous Materials Safety and by the International Air Transport Association and the International Civil Aviation Organization. Hazardous materials sent using air transportation must minimally comply with federal hazardous materials regulations (49 Code of Federal Regulations Parts 171–179).

The Federal Aviation Administration also employs special agents who conduct inspections and investigations of those who:

- Offer hazardous materials for air transportation (shippers); and
- Accept and transport the hazardous materials (air carriers).

Past Occurrences/History

According to the federal Pipeline and Hazardous Materials Safety Administration (PHMSA), which releases annual hazardous materials incident reports, from 2015 to August 2019, there were 51 reported incidents, none of which resulted in injury. One incident occurred by rail, three by air, and the rest by highway.

According to PHMSA, within Washoe County, there was a single reported spill of Jet A/Turbine Fuel in October 2007 along the Kinder Morgan SFPP North pipeline at the Reno-Spark border. The incident resulted in the release of 851 barrels (35,742 gallons) due to an equipment failure.

Extent and Probability

The vulnerability to hazardous materials disasters at fixed facilities includes either the potential for an explosive release or insidious leaking of materials into the ground or groundwater. The impact of an accident and spill during roadway or rail transport depends largely on the spill location relative to population centers and waterways. According to the U.S. Bureau of Transportation Statistics, the number of hazardous materials incidents along traffic corridors increases in summer months (June through August). Any release from the pipeline could have severe consequences to the population and the environment. The proximity of an existing pipeline to the Truckee River, its inlets and outlets, signifies a potential threat to the Reno water system, as Reno citizens draw water from the river. Cascading effects of a pipeline accident, particularly the potential for causing wildland fires, is an additional concern.

More typical hazardous material incidents are handled at the city or county level, disrupt services for up to two weeks, and have countywide economic impacts. Considering a worst-case scenario, a hazardous materials release could require federal support, impact critical facilities and disrupt services for more than 20 days, and have national economic impacts.

Future Probability Trend –As volume of hazardous materials transport, handling or production increases, the expected frequency of accidents involving uncontained release increases correspondingly. An increase in hazardous materials regulation is likely to decrease potential for hazmat release events. Probability of a hazardous materials release via roadway, rail, or fixed facility accident is marginally higher than probability of pipeline accidents, due to increased potential for

Hazardous Materials Incident

human error or mechanical failure. Indicators for probability for pipeline accidents are linked to probability for other identified hazards including terrorism, earthquake, and, to a lesser extent, wildland fire.

Vulnerability

Hazardous materials incidents can be caused by a number of factors, including technological failures, natural hazards, such as earthquakes or flooding, or human factors. The County and local governments maintain records of hazardous materials storage sites in the Regional Hazardous Materials Response Plan and maintain communications with the Nevada Highway Patrol regarding shipments of hazardous materials on all transportation routes throughout the county.

Hazardous materials incidents can be caused by a number of factors. The region's most pressing vulnerability is presented by a transportation incident occurring on I-80 and/or I-580. Many of the critical facilities and valuable assets are in close proximity to I-80 and I-580, particularly in the Reno/Sparks corridor.

Recent Development Trends

- **Economic:** New economic development is poised for infill within the urban center of the city of Reno, not far from the rail line. (Increased Vulnerability)
- **Land Use:** Areas of development near Silver lake are exposed to greater hazardous materials threats from fixed facilities. (Increased Vulnerability)

Future Land Use: The increasing population and economic activity in Reno suggests that there will be an increased amount of traffic on major highways, increasing the likelihood of a hazardous materials incident via highways. (Increased Vulnerability)

3.3.7 Severe Storms (Winter Storm)

Severe Storms (Winter Storm)

	Probability	Magnitude	Frequency	Onset	Duration	Average	Rank
Winter Storm	4.00	1.67	4.00	3.00	2.33	3.17	7

Location

High elevations of the western portion of Washoe County experience the effects of winter storms, oftentimes snow storms, with greater frequency. City of Reno locations often affected by snow storms include Mt. Peavine and I-80 near the County's border with California. 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. A large winter storm event can also cause exceptionally high rainfall that persists for days, resulting in heavy flooding. Extreme cold temperatures often accompany severe winter storms in Washoe County.

Severe Storms (Winter Storm)

Past Occurrences/History

Winter Storm

Reno's annual average snowfall is 22 inches, with snowfalls generally occurring in November through March according to data from 1981–2010 climate normal (U.S. Climate Data, n.d.). The majority of snowfall occurs from December through February. The City of Reno Public Works Department notes Reno experiences 13 storms annually.

The 2018 State of Nevada Enhanced HMP lists the following severe winter storms occurring in Washoe County over the past 15 years:

- **December 29, 2004 – January 10, 2005**: Severe winter storm in Northern Nevada, prompting FEMA to designate 16 counties for federal funding to alleviate the cost for emergency protective measures.
- **February 25, 2011**: Winter storm with up 18 inches of snow and 50 miles per hour winds, causing multiple auto accidents, two injuries, and roughly $250,000 in damages.
- **January 13–14, 2013**: Prolonged winter temperatures led to Governor Sandoval declaring a state of emergency, and subzero temperatures were responsible for deaths across the state, including in Reno, Nevada.
- **November 9–10, 2015**: Severe winter storm resulted in downed power lines due to heavy, wet snow, and over 35,000 customers were without power in Washoe County.
- **January 30–31, 2016**: Snow totals of 4 to 8 inches around Reno/Sparks area, and areas in and near the foothills west of Reno received between 8 to 10 inches of snow. Whiteout conditions occurred due to heavy lake-effect snow off Pyramid Lake.

Extent and Probability

Typical severe storm events are handled at the city or county level, can disrupt service for a period of days to weeks, and can have economic impacts on a statewide scale. Considering a worst-case scenario, a severe storm event could require federal level support, could impact critical facilities and disrupt services for more than 20 days, and could have nationwide economic impacts.

Future Probability Trend – The future probability of severe storms is **high**, and the potential impact from future climate conditions could increase the risk of severe storm events. However, since severe storms occur each year, Reno has a number of mechanisms in place to promote safety.

On its website, the City of Reno provides mapped Snow and Ice Control Routes (revised 2018) for 19 segments of the City, along with a list of priority snow plow streets and an affiliated Winter Snow and Ice Control Plan developed by the City of Reno Public Works Department. Priority is given to arterial and collector streets along with school zones, hospitals, emergency facilities, bus routes, dangerous intersections, hills and curves. Secondary streets are given a low priority and generally receive a lower level of service or no service due to the limited availability of resources. Examples of Priority 1 streets include portions of Virginia Street, Longley Lane, and Stead Boulevard. Examples of Priority 2 streets include Center Street, Evans Avenue, and Hunter Lake Drive.

The City utilizes the assistance of private contractors through the Associated General Contractors Auxiliary for snow accumulations greater than 8 inches based on current and forecasted conditions for the region.

Severe Storms (Winter Storm)

Vulnerability

Vulnerabilities from winter storms include those related to power outages and impairments to transportation. Because nearly all social and economic activity is dependent on transportation, snow can have a serious impact. Road closures and hazardous conditions can delay or prevent emergency vehicles from responding to calls. Vehicle accidents rise among those who try to drive. Power outages can result from physical damage to electrical infrastructure as a result of ice or snow, downed trees, or debris, or from increases in demand beyond the capacity of the electrical system.

Power outages may disrupt businesses, especially facilities without back-up generators, potentially increasing the economic impact of severe storm events. Members of the community who are isolated or have disabilities may be more vulnerable, especially those that may be trapped in their homes from power failures, heavy snow and ice, and debris from falling trees and power lines.

Snow storms can also adversely impact employees without certain benefits, as closures may results in unpaid time away from work.

For Fiscal Year 2018–2019, the City of Reno Public Works Department had 18 trucks with plows and sanders and 50 snow plow operators. In 2018, the City participated in the Northern Nevada Regional Snow Workshop, consisting of educational classes and engagement related to preparation for the upcoming winter season and collaboration on best practices.

Recent Development Trends

- **Economic:** Increased regional economic development increases the potential for disruptions during and after severe storm events. (Increased Vulnerability)
- **Land Use:** The County's upward trend in development increases the overall strain on responding to winter storm impacts at various locations. (Increased Vulnerability)
- **Future Land Use:** The city's increasing population trends put more individuals and assets at risk from severe storms. (Increased Vulnerability)

3.4 Vulnerability Assessment

3.4.1 Asset Inventory

Local assets that may be affected by hazards include residents, properties, and utilities and infrastructure. GIS data from federal, state, and local databases was used to inform the vulnerability assessment and identify critical infrastructure. Section 4.4.2 and Appendix F1, both of the Basic Plan, discuss the sources and types of data used in the HMP. Data collection for the vulnerability assessment was complicated by the fact that the region has never comprehensively identified critical infrastructure; therefore, the list of critical infrastructure in the city of Reno may be incomplete. Similarly, valuation information has not been compiled by the region, so valuation data was not available to be included in the vulnerability assessment. Washoe County and its partners are committed to continuing to refine and build on the list of critical infrastructure over the next five years to improve the data provided in the next plan update.

3.4.2 Repetitive Loss Properties

The city of Reno has 12 repetitive loss properties ($7,767,495 in total claims paid), which is three times more than any other jurisdiction in the state. There are zero severe repetitive loss properties ($0 in claims).

3.4.3 Exposure Assessment

Table 3-5 shows exposure of the city's identified critical facilities to natural hazards that are able to be mapped.

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Airport	Reno/Tahoe International Airport	N/A	500-year Flood Zone	64+	48-64	low	1
Dam	Highland Reservoir	N/A	--	48-64	32-48	low	1
Dam	Wheeler Reservoir Dam	N/A	--	64+	48-64	mod	1
Dam	West Wash Dam	N/A	--	48-64	32-48	low	1
Dam	East Wash Diversion	N/A	--	48-64	32-48	low	1
Dam	Peavine Creek Upper Dam	N/A	--	48-64	32-48	low	1
Dam	Peavine Creek Lower Dam	N/A	--	48-64	32-48	low	1
Dam	Hunter Creek Reservoir	N/A	--	48-64	48-64	low	1
Dam	Northgate Golf Course Dam	N/A	--	48-64	32-48	low	1
Dam	Chalk Bluff Treatment Plant Phase I	N/A	--	48-64	32-48	low	1
Dam	Dant Blvd Detention	N/A	--	64+	48-64	mod	1
Dam	Double Diamond	N/A	100-year Flood Zone	64+	48-64	low	1
Dam	Herman Dam	N/A	--	48-64	32-48	low	1
Dam	North Virginia Detention	N/A	--	48-64	32-48	low	1
Dam	Huffaker Effluent Storage Reservoir	N/A	--	64+	48-64	low	1
Dam	Hidden Lake Dam	N/A	--	64+	48-64	low	1
Dam	Chalk Bluff Treatment Plant Phase II	N/A	--	48-64	32-48	low	1
Dam	Alexander Lake Dam	N/A	--	64+	48-64	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Dam	Damonte Ranch Flood Control Diversion	N/A	100-year Flood Zone	64+	48-64	low	1
Dam	Damonte Ranch Flood Detention Basin	N/A	100-year Flood Zone	64+	48-64	low	1
Dam	Damonte Ranch Wetlands Detention Basin	N/A	100-year Flood Zone	64+	48-64	low	1
Dam	Damonte Ranch Detention Pond #4	N/A	--	64+	48-64	low	1
Dam	Virginia Lake	N/A	100-year Flood Zone	64+	48-64	low	1
Dam	Chalk Bluff Solids Storage Pond	N/A	--	48-64	32-48	low	1
Dam	Canyon 9 Golf Course Dam	N/A	--	48-64	32-48	low	1
Fire Station	Lemmon Valley Volunteer Fire Department Station 223	130 Nectar Street	100-year Flood zone	48-64	32-48	low	1
Fire Station	Silver Lake Volunteer Fire Department Station 221	11525 Red Rock Road	--	64+	32-48	low	1
Fire Station	City of Reno Fire Department Station 2	2500 Sutro Street	--	48-64	32-48	low	1
Fire Station	City of Reno Fire Department Station 5	1500 Mayberry Drive	--	48-64	48-64	low	1
Fire Station	City of Reno Fire Department Station 7	3050 Skyline Boulevard	--	64+	48-64	mod	1
Fire Station	City of Reno Fire Department Station 6	3970 Mira Loma Drive	500-year Flood Zone	64+	48-64	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Fire Station	City of Reno Fire Department Station 9	14005 Mount Vida Street	--	48-64	32-48	low	1
Fire Station	City of Reno Fire Department Station 8	3600 Kings Row	--	48-64	32-48	low	1
Fire Station	City of Reno Fire Department Station 13	1075 Silver Lake Road	--	48-64	32-48	low	1
Fire Station	Hidden Valley Volunteer Fire Department Station 226	3255 West Hidden Valley Drive	100-year Flood Zone	64+	48-64	low	1
Fire Station	City of Reno Fire Department Station 4	1096 Ralston Street	--	48-64	32-48	low	1
Fire Station	City of Reno Fire Department Station 3	580 West Moana Lane	--	64+	48-64	mod	1
Fire Station	City of Reno Fire Department Station 18	3680 Diamond Peak Drive	100-year Flood Zone	48-64	32-48	low	1
Fire Station	City of Reno Fire Department Station 10	5250 North Virginia Street	--	48-64	32-48	low	1
Fire Station	Sutcliffe Volunteer Fire Department Station 241	301 Kennedy Drive	--	64+	32-48	low	1
Fire Station	Pleasant Valley Volunteer Fire Department 227	United States Highway 395	500-year Flood zone	64+	48-64	high	1
Fire Station	Sierra Fire Protection District Station 38 - Galena	16255 Mount Rose Highway	--	64+	48-64	high	1
Fire Station	Sierra Fire Protection District Station 381 - Galena	16133 Mountain Ranch Road	--	64+	48-64	high	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Fire Station	Sierra Fire Protection District Station 331 - Peavine	11005 Longview Lane	--	64+	32-48	low	2
Fire Station	Sierra Fire Protection District Station 321 - Cold Springs	250 South Avenue	--	48-64	32-48	low	1
Fire Station	Reno Fire Department Station 12	Double Diamond Parkway	--	64+	48-64	low	1
Fire Station	Sierra Fire Protection District Station 382 - Galena	16175 Callahan Road	--	64+	48-64	high	1
Fire Station	Reno Fire Department Station 11	7105 Mae Anne Avenue	--	48-64	32-48	low	1
Fire Station	Sierra Fire Protection District Station 39	4000 Joy Lake Road	--	64+	48-64	high	2
Fire Station	Red Rock Volunteer Fire Department Station 240	16180 Red Rock Road	--	48-64	32-48	low	1
Fire Station	Palomino Valley Volunteer Fire Department Station 229	6015 Ironwood Road	--	48-64	32-48	low	1
Fire Station	Reno Airport Authority Fire Department	1802 Riley Avenue	500-year Flood Zone	64+	48-64	low	1
Fire Station	City of Reno Fire Department Station 14	12300 Old Virginia Road	500-year Flood Zone	64+	48-64	low	1
Fire Station	Nevada Air National Guard Fire And Emergency Services	1776 National Guard Way	--	64+	48-64	low	1
Hospital	Saint Mary's Regional Medical Center	N/A	--	48-64	32-48	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Hospital	Stead Medical	N/A	--	48-64	32-48	low	1
Hospital	Tahoe Pacific Hospital West	N/A	--	48-64	32-48	low	1
Hospital	Renown Medical Group Urgent Care Center	N/A	--	64+	48-64	low	1
Hospital	Eastern Sierra Medical Group and Faster Care	N/A	500-year Flood Zone	64+	48-64	low	1
Hospital	Washoe Progressive Care Center	N/A	--	48-64	32-48	low	1
Hospital	West Hills Hospital	N/A	--	48-64	32-48	low	1
Hospital	Trinity Services	N/A	--	48-64	32-48	low	1
Hospital	Washoe Medical Center Clinic	N/A	--	48-64	32-48	low	1
Hospital	Mediquik	N/A	--	48-64	32-48	low	1
Hospital	Renown Regional Medical Center	N/A	--	48-64	48-64	low	1
Hospital	Renown Medical Group Urgent Care Center Ryland	N/A	500-year Flood Zone	48-64	48-64	low	1
Hospital	Life Care Center of Reno	N/A	500-year Flood Zone	64+	48-64	mod	1
Hospital	Ioannis A Lougaris Veterans Administration Medical Center	N/A	--	64+	48-64	low	1
Hospital	Community Health Alliance Health Center	N/A	--	64+	48-64	low	1
Hospital	Charles Drive Home	N/A	--	48-64	48-64	low	1
Hospital	Willow Springs Center	N/A	500-year Flood Zone	64+	48-64	low	1
Hospital	Manor Care Health Services	N/A	--	64+	48-64	mod	1
Hospital	Saint Mary's Redfield Clinic	N/A	--	64+	48-64	mod	1
Hospital	ARC Med Center	N/A	--	64+	48-64	mod	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Hospital	Regent Care Center of Reno	N/A	500-year Flood Zone	64+	48-64	mod	1
Hospital	Saint Mary's Family Walk-In Center	N/A	500-year Flood Zone	64+	48-64	mod	1
Hospital	Eastern Sierra Medical Group and Faster Care	N/A	--	64+	48-64	low	1
Hospital	Saint Mary's Medical Center at Galena	N/A	--	64+	48-64	low	1
Hospital	Physicians Hospital for Extended Care	N/A	--	48-64	32-48	low	1
Hospital	Renown South Meadows Medical Center	N/A	--	64+	48-64	low	1
Hospital	Renown Medical Group Urgent Care Center Vista	N/A	--	48-64	32-48	low	1
Hospital	Tahoe Pacific Hospital Meadows	N/A	--	64+	48-64	low	1
Hospital	Renown Rehabilitation Hospital	N/A	--	48-64	48-64	low	1
Hospital	Tahoe Pacific Hospital (historical)	N/A	--	48-64	32-48	low	1
Hospital	Saint Mary's Urgent Care Center at Los Altos Parkway	N/A	--	48-64	32-48	low	1
Hospital	Saint Mary's Urgent Care Center at Mae Anne	N/A	--	48-64	32-48	low	1
Hospital	Summit Ridge Medical Center	N/A	--	48-64	32-48	low	1
Hospital	Renown Medical Group Urgent Care Center	N/A	--	48-64	32-48	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Hospital	Renown Medical Group Urgent Care Center	N/A	--	48-64	32-48	low	1
Police Station	Reno-Tahoe Airport Authority Police Division	2001 East Plumb Lane	500-year Flood Zone	64+	48-64	low	1
Police Station	Nevada Department of Wildlife Enforcement Bureau	1100 Valley Road	--	48-64	32-48	low	1
Police Station	Washoe County Sheriffs Office / Washoe County Jail	911 Parr Boulevard	--	48-64	32-48	low	1
Police Station	University of Nevada Reno Police Department	1664 North Virginia Street	--	48-64	32-48	low	1
Police Station	Reno Police Department	455 East 2nd Street	--	48-64	32-48	low	1
Police Station	Reno Police Department - Central Substation	199 East Plaza Street	--	48-64	32-48	low	1
Police Station	Truckee Meadows Community College Department of Public Safety	7000 Dandini Boulevard	--	48-64	32-48	low	1
Police Station	Reno Police Department - Neil Road Substation	3905 Neil Road	--	64+	48-64	mod	1
Police Station	Washoe County School Police	425 East 9th Street	--	48-64	32-48	low	1
Police Station	Reno Police Department - Stead Substation	10555 Stead Boulevard	--	48-64	32-48	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
Police Station	Nevada Department of Public Safety - Nevada Highway Patrol - Reno Station	357 Hammill Lane	500-year Flood Zone	64+	48-64	mod	1
Police Station	Reno Municipal Court Marshals Division	1 South Sierra Street	500-year Flood Zone	48-64	48-64	low	1
Power Plant	Steamboat Hills Geothermal Complex	20590 Wedge Parkway	--	64+	48-64	low	1
Power Plant	Steamboat II	1010 Power Plant Dr	--	64+	48-64	low	1
Power Plant	Steamboat III	1010 Power Plant Dr	--	64+	48-64	low	1
Power Plant	Richard Burdette Geothermal	1010 Power Plant Drive	--	64+	48-64	low	1
Power Plant	Galena 2 Geothermal Power Plant	20590 Wedge Parkway	--	64+	48-64	low	1
Power Plant	Galena 3 Geothermal Power Plant	1010 Power Plant Drive	--	64+	48-64	low	1
School	Reno High School	N/A	--	48-64	48-64	low	1
School	Reno Junior Academy	N/A	--	64+	48-64	low	1
School	Silver Lake Elementary School	N/A	--	64+	32-48	low	1
School	Washoe High School	N/A	--	48-64	32-48	low	1
School	ESL Center	N/A	--	64+	48-64	low	1
School	Glenn Hare Center	N/A	--	48-64	48-64	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	Hidden Valley Elementary School	N/A	--	64+	48-64	low	1
School	Caughlin Ranch Elementary School	N/A	--	64+	48-64	mod	1
School	Child Garden	N/A	--	48-64	48-64	low	1
School	Truckee Meadows School	N/A	--	48-64	32-48	low	1
School	Saint Johns Children's Center	N/A	--	64+	48-64	low	1
School	Truckee Meadows Child Development Center	N/A	--	64+	48-64	low	1
School	Sierra Nevada Job Corps Center	N/A	--	48-64	32-48	low	1
School	Reno Christian Academy	N/A	--	48-64	32-48	low	1
School	Cambridge School	N/A	--	48-64	48-64	low	1
School	Holy Child Catholic Day Home	N/A	--	48-64	48-64	low	1
School	Jamilian Parochial School	N/A	--	48-64	32-48	low	1
School	Brookfield School	N/A	500-year Flood Zone	64+	48-64	mod	1
School	Shepherd of the Mountain Lutheran Church School	N/A	--	64+	48-64	mod	1
School	A Plus Learning Center	N/A	500-year Flood Zone	64+	48-64	mod	1
School	William O'Brien Middle School	N/A	--	48-64	32-48	low	1
School	Truckee Meadows Community College	N/A	--	48-64	32-48	low	1
School	University of Nevada	N/A	--	48-64	32-48	low	1
School	Aquinas School (historical)	N/A	500-year Flood Zone	48-64	32-48	low	1
School	Jessie Beck Elementary School	N/A	--	64+	48-64	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	Billinghurst Junior High School (historical)	N/A	--	64+	48-64	low	1
School	Libby C Booth Elementary School	N/A	500-year Flood Zone	48-64	48-64	low	1
School	Rita Cannan Elementary School	N/A	--	48-64	32-48	low	1
School	Archie Clayton Middle School	N/A	--	48-64	32-48	low	1
School	Roger Corbett Elementary School	N/A	500-year Flood Zone	64+	48-64	low	1
School	Doten School (historical)	N/A	--	48-64	32-48	low	1
School	Elmcrest Elementary School	N/A	--	48-64	32-48	low	1
School	Roy Gomm Elementary School	N/A	--	48-64	48-64	low	1
School	Proctor R Hug High School	N/A	--	48-64	32-48	low	1
School	Hunter Lake Elementary School	N/A	--	48-64	48-64	low	1
School	Lemmon Valley Elementary School	N/A	--	48-64	32-48	low	1
School	Little Flower Elementary School	N/A	--	64+	48-64	low	1
School	Echo Loder Elementary School	N/A	--	64+	48-64	low	1
School	Bishop Manogue High School	N/A	--	48-64	32-48	low	1
School	McKinley Park School (historical)	N/A	100-year Flood Zone	48-64	48-64	low	1
School	Mount Rose Elementary School	N/A	--	48-64	48-64	low	1
School	Our Lady of Snows Elementary School	N/A	--	48-64	48-64	low	1
School	Peavine Elementary School	N/A	--	48-64	32-48	low	1
School	Ring School (historical)	N/A	--	48-64	32-48	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	Saint Albert the Great Elementary School	N/A	--	48-64	32-48	low	1
School	Sierra Vista Elementary School	N/A	--	48-64	32-48	low	1
School	Darrell C Swope Middle School	N/A	--	48-64	48-64	low	1
School	Mamie Towles Elementary School	N/A	--	48-64	32-48	low	1
School	Fred W Traner Middle School	N/A	--	48-64	32-48	low	1
School	E Otis Vaughn Middle School	N/A	--	64+	48-64	low	1
School	Veterans Memorial Elementary School	N/A	--	64+	48-64	low	1
School	Grace Warner Elementary School	N/A	--	48-64	32-48	low	1
School	Earl Wooster High School	N/A	--	64+	48-64	low	1
School	Edward L Pine Middle School	N/A	500-year Flood Zone	64+	48-64	mod	1
School	Edwin S Dodson Elementary School	N/A	--	64+	48-64	low	1
School	Nancy Gomes Elementary School	N/A	--	64+	32-48	low	1
School	George Westergard Elementary School	N/A	--	48-64	32-48	low	1
School	B D Billinghurst Middle School	N/A	--	48-64	32-48	low	1
School	Robert McQueen High School	N/A	--	48-64	32-48	low	1
School	Alice L Smith Elementary School	N/A	--	48-64	32-48	low	1
School	Elizabeth Lenz Elementary School	N/A	--	64+	48-64	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	Picollo Special Education School	N/A	--	64+	48-64	mod	1
School	Huffaker Elementary School	N/A	500-year Flood Zone	64+	48-64	mod	1
School	Pleasant Valley Elementary School	N/A	100-year Flood Zone	64+	48-64	low	1
School	Smithridge Elementary School	N/A	500-year Flood Zone	64+	48-64	mod	1
School	Stead Elementary School	N/A	--	48-64	32-48	low	1
School	Anderson Elementary School	N/A	--	64+	48-64	mod	1
School	Brown Elementary School	N/A	--	64+	48-64	low	1
School	Damonte Ranch High School	N/A	--	64+	48-64	low	1
School	Galena High School	N/A	--	64+	48-64	low	3
School	North Valleys High School	N/A	--	48-64	32-48	low	1
School	Opportunity School	N/A	--	48-64	48-64	low	1
School	Regional Technical Institute	N/A	500-year Flood Zone	64+	48-64	low	1
School	Truckee Meadows Community College High School	N/A	--	48-64	32-48	low	1
School	Damonte Ranch Middle School	N/A	--	64+	48-64	low	1
School	Desert Heights Elementary School	N/A	--	48-64	32-48	low	1
School	Donner Springs Elementary School	N/A	--	64+	48-64	low	1
School	Double Diamond Elementary School	N/A	--	64+	48-64	low	1
School	Ted Hunsberger Elementary School	N/A	--	64+	48-64	mod	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	Bernice Mathews Elementary School	N/A	--	48-64	32-48	low	1
School	Rollan D Melton Elementary School	N/A	--	48-64	32-48	low	1
School	Sarah Winnemucca Elementary School	N/A	--	48-64	32-48	low	1
School	Bishop Manogue High School	N/A	--	64+	48-64	low	1
School	Child and Family Research Center	N/A	--	48-64	32-48	low	1
School	Child Garden South Meadows	N/A	--	64+	48-64	low	1
School	Child Garden	N/A	--	48-64	48-64	low	1
School	Childrens World Learning Center	N/A	--	48-64	32-48	low	1
School	Childrens World Learning Center	N/A	--	48-64	48-64	mod	1
School	Church Academy	N/A	--	48-64	32-48	low	1
School	E L Cord Foundation Child Care Center	N/A	--	48-64	32-48	low	1
School	Early Basics Learning Academy	N/A	500-year Flood Zone	64+	48-64	mod	1
School	First Baptist Childrens Center	N/A	--	48-64	48-64	low	1
School	Ginny's Child Garden	N/A	--	64+	48-64	low	1
School	Kids R Kids Kindergarten	N/A	--	64+	48-64	low	1
School	Kings Academy	N/A	--	48-64	32-48	low	1
School	Koinonia Day Treatment Center	N/A	500-year Flood Zone	64+	48-64	low	1
School	Lighthouse Baptist Academy	N/A	100-year Flood Zone	64+	48-64	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	Lion and the Lamb Christian School	N/A	--	48-64	32-48	low	1
School	Little Golden Goose Kindergarten	N/A	--	48-64	48-64	low	1
School	Little Hearts Preschool and Kindergarten	N/A	500-year Flood Zone	64+	48-64	mod	1
School	Mountain View Montessori School	N/A	100-year Flood Zone	64+	48-64	low	1
School	Safe Harbor Church School	N/A	--	64+	48-64	low	1
School	Sage Ridge School	N/A	--	64+	48-64	mod	1
School	Sierra Nevada High School	N/A	--	48-64	32-48	low	1
School	Saint Mary's Children's Garden	N/A	--	48-64	32-48	low	1
School	Truckee Meadows School	N/A	--	64+	48-64	low	1
School	Truckee Meadows Christian Academy	N/A	500-year Flood Zone	64+	48-64	low	1
School	Stepping Stones Children's Center	N/A	500-year Flood Zone	64+	48-64	low	1
School	I Can Do Anything Charter High School	N/A	500-year Flood Zone	64+	48-64	low	1
School	Sierra Nevada Academy	N/A	--	48-64	32-48	low	1
School	Coral Academy of Science	N/A	--	48-64	32-48	low	1
School	Bailey Charter Elementary School	N/A	--	64+	48-64	low	1
School	Academy for Career Education	N/A	--	64+	48-64	low	1
School	High Desert Montessori School	N/A	--	48-64	32-48	low	1

Table 3-5 Exposure Assessment

Type	Name	Address	Flood Zone	Seismic Ground Motion Hazards with 2% Probability	Seismic Ground Motion Hazards with 10% Probability	Landslide Susceptibility	Wildland Fire Hazard Potential (scale 1-6)
School	High Desert Montessori School	N/A	--	48-64	32-48	low	1
School	Mariposa Academy of Language and Learning	N/A	--	64+	48-64	mod	1
School	Rainshadow Community Charter High School	N/A	--	48-64	32-48	low	1
School	Team A School	N/A	500-year Flood Zone	64+	48-64	low	1
Transfer Station	Reno Transfer Station	N/A	--	48-64	32-48	low	1
Wastewater Treatment Plant	Lemmon Valley WWTP	11000 Lemmon Dr	100-year Flood Zone	48-64	32-48	low	1
Wastewater Treatment Plant	Stead WRF	4250 Norton Dr	--	48-64	32-48	low	1
Wastewater Treatment Plant	National Wild Horse and Burro Center	15780 SR 445	--	48-64	32-48	low	1
Wastewater Treatment Plant	Stead WRF	4250 Norton Dr	--	48-64	32-48	low	1
Wastewater Treatment Plant	Lemmon Valley WWTP	11000 Lemmon Dr	100-year Flood Zone	48-64	32-48	low	1
Wastewater Treatment Plant	National Wild Horse and Burro Center	15780 SR 445	--	48-64	32-48	low	1

Key:
-- = Critical facility is not in a mapped flood zone
ARC = American Red Cross
ESL = English as a second language
N/A = Information not available
SR = State Route
WRF = Wastewater Reclamation Facility
WWTP = Wastewater Treatment Plant

3.5 Land Use and Development Trends

FEMA	**D1.** Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

Reno's population continues to grow as economic development and more moderate housing prices compared to California draw new residents to the region. Reno development has expanded outward to areas in foothill regions with greater vulnerability to wildland fires.

The vulnerability sub-section of each hazard profile in Section 3.3 outlines recent development trends to illustrate ways in which vulnerability may have changed over the past five years. Vulnerability changes have been measured for economic interests and land use trends. Each measure has been identified as having an increased, decreased, or unchanged vulnerability. Table 3-6 provides a snapshot of how vulnerability has changed since development of the 2012 HMP.

Table 3-6 Recent Development Trends

Hazard	Economic	Land Use
Energy Emergency	-	+
Flooding	+	+
Wildland Fire	+	+
Earthquake	+	+
Criminal Acts	-	=
Hazardous Materials Incident	+	+
Severe Storms	+	+
+ Increased vulnerability - Decreased vulnerability = Unchanged vulnerability		

4. CAPABILITY ASSESSMENT

FEMA	**C1.** Does the plan document [the City of Reno's] existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

4.1 Human and Technical Resources

Table 4-1 describes the City's human and technical capabilities to engage in and improve mitigation planning and program implementation.

Table 4-1 Human and Technical Resources Integrated with Hazard Mitigation

Resource	Department	Tasks and Activities Integrated into Mitigation Planning
City Manager	City Manager's Office	Ensure mitigation program is incorporated into the City's daily business
Emergency Manager	Fire Department	Oversee mitigation program and encourage integration of mitigation planning into all City activities
Housing and Neighborhood Development Manager	Community Development Department	Administer grant funding for rehabilitation of existing homes and construction of affordable housing. Plan for the city's housing needs.
Director of Parks, Recreation & Community Services	Parks, Recreation & Community Services Department	Manage, maintain, and improve the City's parks and open space areas
Director of Community Development	Community Development Department	Integrate risk reduction into land use plans and zoning and encourage integration of mitigation into private development plans
Engineering Manager	Community Development Department	Inspects development projects to ensure compliance with design standards
Geographic Information System (GIS) Technicians and Analysts	Department of Information Technology	Integrate hazard data into mapping capabilities of the City
Historical Resources Commission	-	Official advisor to City Council on matters relating to the historic preservation of cultural resources and buildings
Fire Marshal	Fire Department	Review new development for compliance with fire codes and work with private property owners to integrate mitigation
Other		
Planners and Engineers	Community Development Department	Integrate risk assessments and mitigation tactics into ongoing City projects
Construction Professionals	Public Works Department	Manage structural mitigation activities for City facilities, parks, streets, and sewer infrastructure
Grant Specialists	Multiple departments	Manage grant applications and project budgets for City programs
Hazardous Materials Planning	Washoe County Local Emergency Planning Committee	Develop capacity for local jurisdictions to prepare for and respond to hazardous materials incidents

4.2 Financial Resources

The City maintains many fiscal and financial resources to support its mitigation program. Table 4-2 identifies specific resources accessible for use.

Table 4-2 Accessible Financial Resources

Financial Resource	Accessible?
Community Development Block Grants	Yes
Capital Improvement Project Funding	Yes
Insurance	Yes, self-insured for comprehensive property, general liability, and director's liability
User Fees for Utility Services	Yes, for sanitary sewer services
Incur Debt	Yes
State-sponsored Grant Programs	Yes

Table 4-3 identifies current and potential sources of funding to implement identified mitigation actions contained within the HMP. In addition, funding is also available from the State of Nevada and potentially through Washoe County.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Local		
General Fund	City Council	Funding available for mitigation efforts supporting government-wide projects and activities
Enterprise Fund	Specific Enterprises	Funding available for mitigation efforts associated with the City's enterprise operations
Capital Projects Funds	City Council	Funding for acquisition, construction, and maintenance of major capital facilities
Department Funding	Specific Departments	Funding available for the mitigation efforts of a specific department
Federal		
Pre-Disaster Mitigation Program	Nevada Division of Emergency Management	Provides funding to develop hazard mitigation plans and implement mitigation actions contained within.
Hazard Mitigation Grant Program	Nevada Division of Emergency Management	Post-disaster funds to hazard reduction projects impacted by recent disasters.
Flood Mitigation Assistance Program	Nevada Division of Emergency Management	Provides funds for flood mitigation on buildings that carry flood insurance and have been damaged by flooding.
Community Development Block Grant Program	U.S. Department of Housing and Urban Development/Governor's Office of Economic Development	Funds projects that benefit low- and moderate-income communities, prevent or eliminate slums or blight, or meet urgent community development needs posing a serious and immediate threat to community health or welfare.

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Emergency Management Performance Grants Program	FEMA/Nevada Division of Emergency Management	Provides funding to states for local or tribal planning, operations, acquisition of equipment, training, exercises, and construction and renovation projects.
Flood Mitigation Assistance	Nevada Division of Emergency Management	Provides funding to support development of the flooding hazard portion of state and local mitigation plans and up to 100% of the cost of eligible mitigation activities. This funding is only available to communities participating in the National Flood Insurance Program.
Earthquake State Assistance Program	National Earthquake Hazards Reduction Program/ Nevada Resiliency Advisory Committee/ Nevada Division of Emergency Management	Funds activities, including seismic mitigation plans; seismic safety inspections of critical structures and lifelines; updates of building codes, zoning codes, and ordinances; and earthquake awareness and education.
State Fire Assistance Program	U.S. Forest Service/ Nevada Division of Forestry	Provides funding opportunities for local wildland-urban interface planning, prevention, and mitigation projects, including fuels reduction work, education and prevention projects, community planning, and alternative uses of fuels.
Risk Mapping, Assessing, and Planning	FEMA	Provides funding and technical support for hazard studies, flood mapping products, risk assessment tools, mitigation and planning, and outreach and support.
State		
Emergency Assistance Account	Nevada Division of Emergency Management	Provides support to state agencies and local jurisdictions during declared emergencies at the state or local level.
Disaster Relief Account	Interim Finance Committee	Special account intended to stabilize the operation of the state government following a disaster. Used to match federal funding for declared disasters.
Wildfire Emergency and Mitigation Funds	Nevada Division of Forestry/ Nevada Division of Emergency Management	Administers funding from FEMA, Bureau of Land Management, and U.S. Forest Service for certain types of wildland fire emergency and mitigation funding.
Earthquake Mitigation Funds	Nevada Resiliency Advisory Committee/ Nevada Division of Emergency Management	Allocates FEMA money for earthquake mitigation efforts.
Conservation Reserve Program	U.S. Department of Agriculture Farm Service Agency and Natural Resource Conservation Service	Retires eligible cropland from agricultural production and plants the land with permanent grass cover to reduce wind erosion and dust hazards.
University of Nevada, Reno partnership with the U.S. Geological Survey (USGS) National Landslide Hazards Program	USGS/University of Nevada, Reno	Conducts studies of landslide hazards

Table 4-3 Financial Resources Integrated with Hazard Mitigation

Funding Source	Fund Administrator	Description
Western States Fire Managers Grants	U.S. Forest Service/ Nevada Division of Forestry	Provides funding for fuel reduction, restoration of fire adapted ecosystems, prevention education, and community wildland fire protection planning.
Landscape Scale Restoration Grants	U.S. Forest Service/ Nevada Division of Forestry	Provides funding for projects that cross property ownership, management and/or jurisdictional boundaries and involve collaborative efforts among multiple stakeholders to address issues identified in Nevada's Forest Action Plan.
Hazardous Fuels-Community Protection Grants	U.S. Forest Service/ Nevada Division of Forestry	Provides funding for priority fuels management projects identified in a Community Wildfire Protection Plan that are adjacent to a recent, current, or planned project on U.S. Forest Service lands.
Regional Conservation Partnership Program	U.S. Forest Service/ Nevada Division of Forestry	Provides grant funds for wildland fire restoration and other sagebrush ecosystem improvements, including weed and pre-emergent treatments; riparian improvements; prescribed, targeted, or deferred grazing; and brush management.
Nevada State General Fund	Nevada State Legislature	Nevada State General Fund money is used to pay the labor costs of state employees working to support statewide and local hazard mitigation activities and as non-federal cost share for federally funded projects.
Other		
Community Planning Assistance Teams	American Planners Association Foundation	Provides pro bono technical assistance for planning frameworks or community vision plans for communities needing extra assistance. Local governments are responsible for travel costs.

4.3 Legal and Regulatory Resources

Table 4-4 describes the legal and regulatory capabilities, including plans, policies, and programs that have integrated hazard mitigation principles into their operations.

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2015-2019)	Hazard Mitigated
Plans	Master Plan	Establishes the City's vision, goals, and policies for future growth and development, including policies related to development in hazard areas	▪ Updated City of Reno Master Plan adopted in 2017	All
	Capital Improvement Plan	Guides construction and major maintenance of the City's infrastructure	▪ Continued to reduce facility maintenance backlog resulting from 2008 recession	All

Table 4-4 Legal and Regulatory Resources Integrated with Hazard Mitigation

Capability Type	Capability	Description	Key Accomplishments (2015-2019)	Hazard Mitigated
	Regional Emergency Operations Plan	Outlines roles and responsibilities of city government in mitigating potential hazards.	▪ Plan updated to incorporate new changes in risk	All
Policies	Zoning Code	Regulates development in hazard areas, including flood hazard areas and steep slopes	▪ Continued policy implementation	Flooding Winter Storm Earthquake Landslide
	Special Purpose Ordinance (Flood Hazard Areas)	Establishes guidelines and requirements for development in flood hazard areas	▪ Continued policy implementation	Flooding Winter Storm
	Subdivision Ordinance	Includes design standards for subdivisions and roads and guidelines and requirements for development in hazard areas	▪ Continued policy implementation	Flooding Winter Storm Earthquake Landslide
	2012 International Fire Code and amendments	Regulates development to minimize fire risks	▪ Continued policy implementation	Wildland Fire
Programs	Mutual Aid Agreements	Standing agreements to provide support to partners in times of need.	▪ Increased capacity and capability through partnership	All

4.4 National Flood Insurance Program Participation

FEMA

C2. Does the Plan address [the City of Reno's] participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3))

The City participates in the National Flood Insurance Program (NFIP). In 2019, the NFIP provided the following information on flooding losses:

Total Losses	Closed Losses	Open Losses	Losses Closed Without Payment	Total Payments
253	187	0	66	$7,798,974.91

Twelve repetitive loss properties are located within the city of Reno. Claims paid on these properties total $7,767,495, an amount three times higher than claims paid in any other jurisdiction in the state. No severe repetitive loss properties are located in the city.

4.5 Integration of Mitigation into Existing Planning Mechanisms

Integration of the principles of mitigation into the City's daily operations and ongoing planning activities is a priority of the City's mitigation program. These activities will support:

- Raising awareness of the importance of hazard mitigation for the whole community;
- Facilitating an understanding that hazard mitigation is not just an 'emergency services' function and building ownership of mitigation activities across the organization;
- Reduction in duplication or contradiction between tribal plans; and
- Maximization of planning resources through linked or integrated planning efforts.

The City is encouraged to consider integration actions into planning mechanisms, including:

- Budget decision-making;
- Building and zoning ordinances and decision-making;
- Emergency planning mechanisms; and
- Economic developing planning and decision-making.

4.5.1 Existing Plans

FEMA	**C6.** Does the Plan describe a process by which [the City of Reno] will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

The following existing plans provide an ongoing opportunity for integration of hazard mitigation and department leadership will work with plan owners and stakeholders when these plans are updated to consider hazard mitigation data and principles and ensure plans align with the HMP.

The **City of Reno Master Plan, The Great City Plan**, lays out the City's vision, goals, and policies related to future growth and development through the planning horizon of 2030. City-wide plans cover the city and its sphere of influence, while center and corridor plans and neighborhood plans pertain to specific planning areas within the city. City-wide policies in the plan related to hazard mitigation include:

- Policy E-2: The Reno Municipal Code should require a special use permit for all activities that disturb natural drainage courses shown on the Major Drainageways Plan Map.
- Policy E-3: Natural drainage courses should not be channelized. When channelization is deemed necessary by the City, natural materials should be utilized.
- Policy E-4: There should be no net loss of wetlands, stream environments, playas, stream fed riparian and non-404 wetlands in the city in terms of both acreage and value. The goal of no net loss may be achieved in one or more of the following ways: designation of lands for resource or open space use, avoidance of these areas, mitigation of impacts on site, or mitigation off site.
- Policy E-6: The City should identify and protect the functions of significant hydrologic resources and major drainageways within its jurisdiction to the degree possible.

- Policy E-10: Where wetlands provide flood control and groundwater recharge functions, they should be preserved to include the 100-year floodplain or jurisdictional wetland boundary if determined to be a significant wetland by the U.S. Army Corps of Engineers.
- Policy E-17: The City should prevent the development of high occupancy land uses on geologically hazardous property.
- Policy E-20: Development in areas subject to liquefaction may require special engineering for subsurface drainage and stabilizing fill to construct a suitable building pad.
- Policy E-21: Development of properties below the apex of an alluvial fan should be preceded by a geotechnical investigation of the site which includes evaluation of the surface drainage patterns and potential for mass wasting upslope.
- Policy E-23: The City should promote energy conservation programs, and development of solar, wind and geothermal energy resources.
- Policy OS-1: The City should actively acquire and retain a minimum of a 50-foot strip of property or easements on the banks of Truckee River on either side. Access through properties to the River should be maintained for public use.
- Policy OS-15: The City should develop maintenance standards for Open Space and Greenways and update them as needed.
- Policy WWW-7: The City should encourage landscaping which utilizes drought tolerant plant materials, efficient irrigation or other low water usage practices.
- Policies FM-1 through FM-4, related to flood control and development in floodplains
- Policy F-7: The City should develop and implement measures to minimize fire hazards in open and sagebrush areas.
- Policy F-8: The City should review development plans for urban/wildland interface issues to ensure that applicable weed management, public safety service provision, wildland fire management, and fuels reduction issues are addressed as appropriate.

It is anticipated that future updates of the Master Plan will reflect mitigation strategies and actions recommended in the current HMP.

The annual **Capital Improvement Plan** outlines the City's planned capital improvement projects, providing project descriptions, budget information, and schedules. The City will integrate hazard mitigation strategies into the capital improvement planning process by taking hazard risks and vulnerabilities into consideration when siting and designing capital projects, updating the CIP to include high priority infrastructure projects identified in the HMP, and developing new infrastructure projects to address emerging hazards during the 5-year mitigation planning period.

5. MITIGATION STRATEGY

FEMA	**C4.** Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the [City of Reno] being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

5.1 Review of 2015 Hazard Mitigation Actions

As part of the mitigation strategy update, all mitigation actions identified in the 2015 plan were evaluated to determine what the status of the action was and whether any ongoing or incomplete actions should be included as actions in the 2020 plan update. The MPT worked through each previous action during MPT Meeting #4 to document steps taken to fulfill the action.

See Appendix A of the Basic Plan for an overview of the status of all actions from the 2015 plan update.

5.2 2020-2025 Mitigation Implementation Plan

FEMA	**C5.** Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by [the City of Reno]? (Requirement §201.6(c)(3)(iii))

The mitigation implementation plan lays the groundwork for how the mitigation plan will be incorporated into existing planning mechanisms and how the mitigation actions will be prioritized, implemented, and administered by the City. The implementation plan includes both short-term strategies that focus on planning and assessment activities, and long-term strategies that will result in ongoing capability or structural projects to reduce vulnerability to hazards.

See Appendix A of the Basic Plan for Mitigation Action Worksheet instructions and completed Mitigation Action Worksheets for each action listed in Table 5-1.

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
MH-4	Increase staffing level within the Reno Fire Department to allow all fire stations to be staffed with an engine company and provide for two rescue and four truck companies across the city. (City of Reno)	New	Preparedness and Response	2 (2.1), 5 (5.1)	Reno Fire Department	Reno City Manager's Office	1 – 3 years	All Hazards	$100,000 per employee	Anticipated	Existing Budget Grant	18	6	24
MH-9	Implement and/or utilize Community Emergency Response Teams, as well as the Citizens Homeland Security Council, to shift burden from sworn officers, where appropriate. (All Partners)	Existing (2015 action)	Preparedness and Response	2 (2.1), 6 (6.3)	All Jurisdictions – • Emergency Managers • Police Departments	-	Immediate	All Hazards	Minimal, administrative staff already budgeted for	Yes	Existing Budget	18	4	22
WF-2	Identify moderate to high risk areas for wildland fire and develop Community Wildfire Protection Plans (CWPPs) or Fire Adapted Communities programs for each community through home owners associations. (City of Reno)	New	• Plans and Regulations • Education and Aware-ness	5 (5.3), 6 (6.1, 6.3)	Reno Fire Department	• Reno Community Development • Reno Parks, Recreation, and Community Services • Nevada Cooper-ative Extension (Living with Fire) • Nevada State Fire Marshal	1 – 3 years	Wildland Fire	$250,000	No	Grant	18	2	20
WF-3	Provide free or low-cost resources to private property owners as an incentive to maintain defensible space on their properties (e.g., free weekend use of dump trailers or free dump day drops). (City of Reno)	New	Preparedness and Response	5 (5.3), 6 (6.3)	Reno Fire Department	• Reno Community Development • Reno Parks, Recreation, and Community Services • Nevada Cooper-ative Extension (Living With Fire) • Nevada State Fire Marshal	< 1 year	Wildland Fire	$20,000/year	No	Existing Budget Grant	15	8	23
WF-4	Enforce State adopted Wildland-Urban Interface (WUI) code on new developments within the WUI and monitor and enforce required vegetation management plans. (City of Reno)	Existing	• Plans and Regulations • Preparedness and Response	5 (5.2), 6 (6.2)	Reno Fire Department	• Reno Community Development • Reno Parks, Recreation, and Community Services • Nevada Cooper-ative Extension (Living with Fire) • Nevada State Fire Marshal	< 1 year	Wildland Fire	$100,000/year	Yes	Existing Budget	18	6	24

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
WF-5	Identify high risk properties owned by the City of Reno and hire an abatement crew for defensible space clearing and weed pre-emergent application. Currently identified areas of high risk include Rosewood Canyon and the Northwest Reno Peavine area. (City of Reno)	New	Preparedness and Response	5 (5.3)	Reno Fire Department	• Reno Community Development • Reno Parks, Recreation, and Community Services • Nevada Cooperative Extension (Living with Fire)	1 – 3 years	Wildland Fire	$10,000/property	No	Grant	19	6	25
WF-6	Offer incentives for private property owners to clear 30-foot fire breaks on City-owned property adjacent to their homes. (City of Reno)	New	• Education and Awareness • Preparedness and Response	5 (5.3), 6 (6.3)	Reno Fire Department	• Reno Community Development • Reno Parks, Recreation, and Community Services • Nevada Cooperative Extension (Living with Fire)	1 – 3 years	Wildland Fire	$1,000/property	No	Grant	16	6	22
WF-7	Adopt the 2024 International Fire Code with amendment based on requirements in the Nevada Revised Statutes and regional challenges. (City of Reno)	New	Plans and Regulations	5 (5.2), 6 (6.2)	Reno Fire Department	Reno Community Development	3 – 5 years	Wildland Fire Hazardous Materials Incident	No/minimal cost	Yes	Existing Budget	20	2	22
WF-13	Adopt 2018 wildland fire code County-wide. (All Partners)	New	Plans and Regulations	5 (5.2), 6 (6.2)	Regional Fire Protection Districts	-	Immediate	Wildland Fire	No/minimal cost	Yes	Existing Budget	20	2	22
WF-16	Review and update (as needed) evacuation plans for communities in wildland fire-prone areas and hold evacuation drills at least once every two years. (All Partners)	Existing (2015 action)	• Plans and Regulations • Preparedness and Response	5 (5.3), 6 (6.3)	Regional Fire Protection Districts	Washoe County Emergency Management and Homeland Security	Immediate	Wildland Fire	$10,000/plan. $50,000/year	Yes	Existing Budget	19	6	25
FL-1	Update flood maps to incorporate recently completed flood mitigation projects along the Truckee River in Sparks. (Washoe County, City of Reno, City of Sparks, Truckee River Flood Management Authority [TRFMA])	In Progress	• Preparedness and Response	5 (5.4)	• Washoe County Emergency Management and Homeland Security • Reno Fire Department • Sparks Fire Department	TRFMA	< 1 year	Flooding	< $10,000	No	Existing Budget Grant	17	2	19

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
FL-3	Implement scour countermeasures, including channel stabilization at bridge piers and abutments for 14 bridges identified as scour critical bridges. Work would include countermeasure design, permitting, diversions, excavation, and riprap placement. (City of Reno)	In Progress	• Plans and Regulations • Infrastructure/Capital Project	1 (1.3), 5 (5.7)	Reno Public Works	-	3 – 5 years	Flooding	$3 million	No	Grant	16	8	24
FL-4	To address localized flooding on Ranger Road, connect adjacent development to the storm drain system. (City of Reno)	New	Infrastructure/Capital Project	5 (5.5)	Reno Public Works	-	3 – 5 years	Flooding	$200,000	No	Existing Budget/ Stormwater Utility (if created)	18	6	24
FL-5	To address localized flooding on Ranger Road, work with residents of the adjacent trailer park to mitigate runoff from impervious surfaces that adds to flood depth. (City of Reno)	New	Education and Awareness	5 (5.5), 6 (6.3)	Reno Community Development	-	3 – 5 years	Flooding	$100,000	No	Existing Budget/ Stormwater Utility (if created)	16	6	22
FL-9	Complete drainage ditch improvements. (Washoe County, City of Reno, City of Sparks, Reno Sparks Indian Colony [RSIC], Pyramid Lake Paiute Tribe [PLP])	In Progress	Infrastructure/Capital Project	5 (5.5)	All Jurisdictions – Public Works	-	1 – 3 years	Flooding	Unknown	No	Grant Existing Budget	19	8	27
FL-10	Complete Rosewood Wash culvert and channel upgrades. (City of Reno)	Existing (2015 action)	Infrastructure/Capital Project	5 (5.5)	Reno Public Works	-	3 - 5 years	Flooding	$2,500,000	Anticipated	Grant Existing Budget	19	8	27
FL-11	Complete Cemetery Drain Phase I. Complete Phase 2 five years out (City of Reno)	In Progress	Infrastructure/Capital Project	5 (5.5)	Reno Public Works	-	1 – 3 years	Flooding	$1,000,000	Anticipated	Grant Existing Budget	19	8	27
FL-12	Complete Warren Estates Evaluation and Drainage Improvement Project. (City of Reno)	In Progress	Infrastructure/Capital Project	5 (5.5)	Reno Public Works	-	1 – 3 years	Flooding	$3,200,000	Anticipated	Grant Existing Budget	16	8	24
FL-13	Complete Autumn Hills Flood Control Project. (City of Reno)	In Progress	Infrastructure/Capital Project	5 (5.5)	Reno Public Works	-	1 – 3 years	Flooding	$10,000,000	Anticipated	Grant Existing Budget	17	8	25
FL-14	Complete improvements to address undersized drainage ditches and systems County-wide. (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	In Progress	Infrastructure/Capital Improvement	5 (5.5)	All Jurisdictions – • Public Works Engineering	-	3 – 5 years	Flooding	$20/linear foot of drainage ditch	No	Grant Existing Budget	17	8	25

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
FL-54	Autumn Hills, Offenhauser, Longley & McCarran storm drain improvements and detention solutions	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$10,000,000	Anticipated	Existing Budget Grant	17	8	25
FL-55	Sagittarius storm drain improvements	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$6,000,000	Anticipated	Existing Budget Grant	17	8	25
FL-56	Miscellaneous Various Storm Drain: Greenridge to Moore, various "island 18," Edison Way, Sage St yard area, California Ave, Isbell Rd, Avenida de Landa, Wedekind, Scottsdale/Clear Acre	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$2,500,000	Anticipated	Existing Budget Grant	17	8	25
FL-57	Double Diamond Levee Upgrades: Construct levee improvements at Double R Blvd and Double Diamond Blvd to provide FEMA certified flood protection.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$1,000,000	Anticipated	Existing Budget Grant	17	8	25
FL-58	Belford Drainage Overpass at Lake Ditch: Provide overpass/bypass such that the Belford Drainage flows will continue down the drainageway and not be intercepted by the Lake Ditch.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$800,000	Anticipated	Existing Budget Grant	17	8	25
FL-59	In and Out Basins – 12th and Brookfield, 12th and Washington, Plumas & Hillcrest: Remove in and out basins and tie to storm drain.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$500,000	Anticipated	Existing Budget Grant	17	8	25
FL-60	Miscellaneous Grading-Regrading - Len Cir, Orange and Apple St, Hatch, Brentwood, Walker, Skyline: Grading/regrading curb and gutters to address ponding issues.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$500,000	Anticipated	Existing Budget Grant	17	8	25
FL-61	Sadlier Southworth (Wells Ave) Area Storm Drain Improvements: Upgrade/enlarge or provide surcharge relief system for storm drain system.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$350,000	Anticipated	Existing Budget Grant	17	8	25

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
FL-62	Irrigation Ditch Tributary Crossing Improvements: Improve the ditch crossings at three irrigation ditches to reduce ditch failures and overtoppings.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$15,000,000	Anticipated	Existing Budget Grant	17	8	25
FL-63	Stead Storm Drain and Channel Improvements	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$7,000,000	Anticipated	Existing Budget Grant	17	8	25
FL-64	Aquila Ave/ Krupp Cir Drainage Improvements: Enlarge and reinforce roadside ditches, upsize/install new storm drain.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$6,500,000	Anticipated	Existing Budget Grant	17	8	25
FL-65	Thomas Creek at South Virginia St between approximately Patriot & Gavian storm drain improvements: Improve storm drainage across roadways.	New	Infrastructure/Capital Project	5 (5.5)	Reno Building, Planning, and Engineering Division	Reno Public Works	3 – 5 years	Flooding	$5,000,000	Anticipated	Existing Budget Grant	17	8	25
EQ-4	Develop a process to provide financial and professional assistance for seismic retrofits to make unreinforced masonry buildings identified by the Nevada Earthquake Council safer. (City of Reno)	Existing	• Plans and Regulations • Education and Awareness • Preparedness and Response	5 (5.9), 6 (6.3)	Reno Building, Planning and Engineering Division	-	1 – 3 years	Earthquake Severe Storms	$50,000	No	Grant	18	6	24
EQ-5	Retrofit Reno's City Hall with seismic upgrades (ex. seismic dampers and improved column splices) to ensure the building remains functional after an earthquake. (City of Reno)	New	Infrastructure/Capital Project	5 (5.9)	Reno Public Works	Reno Emergency Manager	1 – 3 years	Earthquake	Estimated $10 million	Anticipated	Grant	19	10	29
EQ-6	Relocate Reno's City Hall offices to address seismic risks. (City of Reno)	New	Infrastructure/Capital Project	5 (5.9)	Reno Public Works	Reno Emergency Manager	1 – 3 years	Earthquake	Unknown	No	Grant	15	10	25
EQ-10	Assess, repair, and/or replace infrastructure that may fail during earthquakes (e.g., Keystone Ave. Bridge). (Washoe County, City of Reno, City of Sparks, RSIC, PLPT)	Existing (2015 action)	Infrastructure/Capital Project	1 (1.2), 5 (5.9)	All Jurisdictions – Public Works Engineering	-	1 – 3 years	Earthquake	Unknown	No	Grant Existing Budget	16	10	26

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
EE-2	Replace wooden power poles in high risk areas with poles made of steel or an alternative material. (Washoe County, City of Reno, City of Sparks)	New	Infrastructure/Capital Project	3 (3.3), 4 (4.1)	NV Energy	• Washoe County Community Services Department • Reno Community Development • Sparks Community Services	1 – 3 years	Energy Emergency Earthquake Flooding Severe Storms Wildland Fire	$3,000/pole	No	Grant	17	8	25
EE-3	Replace transmission and distribution cables with alternative cables able to withstand fallen branches and snow loading. (Washoe County, City of Reno, City of Sparks)	New	Infrastructure/Capital Project	4 (4.1)	NV Energy	• Washoe County Community Services Department • Reno Community Development • Sparks Community Services	1 – 3 years	Energy Emergency Earthquake Flooding Severe Storms Wildland Fire	$1,000/1,000 Linear Feet	No	Grant	16	8	24
EE-5	Install back-up generators for critical infrastructure and facilities along with other measures to improve reliability (e.g., alarms, meters, remote controls, and switchgear upgrades). (All Partners)	Existing (2015 action)	Preparedness and Response	3 (3.3), 4 (4.1)	All Jurisdictions – Emergency Management	Public Works	3 – 5 years	Energy Emergency	$100,000 per design and installation	No	Grant	18	8	26
CA-1	Implement measures to prepare for a potential active shooter incident, including new security measures, training and exercises, improved partnerships with law enforcement agencies, and policy changes (ex. prohibiting open carry). (All Partners)	New	• Infrastructure/Capital Project • Education and Awareness • Preparedness and Response	5 (5.10)	• Law Enforcement Agencies • Facility Managers	• Local Elected Officials • Federal Agencies	1 – 3 years	Criminal Acts and Terrorism	$50,000/year. $120,000/officer	Anticipated	Existing Budget Grant	16	6	22
CA-2	Procure bullet proof vests, helmets, and other equipment needed to support rescue task forces during an active assailant, civil unrest, or terrorist event. (City of Reno)	New	Preparedness and Response	5 (5.11)	Reno Fire Department	Reno City Manager's Office	< 1 year	Criminal Acts and Terrorism	$750/medical kit. $500 per vest. $200 per helmet	No	Grant	16	6	22

Table 5-1 2020-2025 Mitigation Implementation Plan

Action No.	Mitigation Action	Action Status	Type of Action	Goals Supported (Objectives)	Lead Department	Supporting Departments	Timeline	Hazards Addressed	Anticipated Cost	Funding Available?	Funding Source	STAPLEE Score	Mitigation Effectiveness Score	TOTAL SCORE
HM-1	Purchase additional equipment such as booms or collapsible spill containment berms or walls to ensure respond-ing fire crews have the capability to perform immediate containment of hazardous material spills. (City of Reno)	New	Preparedness and Response	5 (5.12)	Reno Fire Department	• Reno Public Works • Reno Emergency Manager	1 – 3 years	Hazardous Materials Incident	Estimated $20,000	Anticipated	Grant	17	10	27
DT-2	Implement current Truckee Meadows Water Authority Conservation Plan including encouraging transition to less water-intensive landscaping on both public and private properties. (All Partners)	Existing (2015 action)	Education and Awareness	6 (6.3)	All Jurisdictions – • Water Utilities • Planning Departments	All Jurisdictions – Emergency Management	< 1 year	Drought	$50,000/year	No	Grant Existing Budget	17	4	21

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ACRONYMS AND ABBREVIATIONS

ACS	American Community Survey
AEL	annual earthquake loss
County	Washoe County
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HMP	Hazard Mitigation Plan
I-580	Interstate 580
I-80	Interstate 80
MPT	Mitigation Planning Team
NFIP	National Flood Insurance Program
PG&E	Pacific Gas and Electric Company
PHMSA	Pipeline and Hazardous Materials Safety Administration
US 395	U.S. Route 395
USGS	U.S. Geological Survey
WUI	Wildland-Urban Interface